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Standard of Care and New Operative Techniques for Small Renal Tumors: a Meta-analysis with a Special Focus on Cryoablation

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Abstract

Introduction: the aim of this article is to realize a meta-analysis of published data evaluating open nephrectomy, laparoscopic nephrectomy and cryoablation for small renal masses to define the current data, and to adjust oncological results for patients and follow-up heterogeneity by performing econometric estimations.

Materials and methods: a systematic literature review using the STROBE checklist was performed for clinically localized sporadic renal masses from the beginning of January 1996 until October 31, 2008. The main variables evaluated were patients' age and sex, tumor size, ASA score, duration of follow-up, available clinical outcomes, pathological data, and oncological outcomes.

Results: 152 studies representing 19 994 patients were analyzed. The authors found a significant lower operation time for percutaneous cryoablation, and a lower hospital stay and blood losses for all types of cryoablation (i.e. open, laparoscopic and percutaneous). No significant difference is found between cryoablation and resection methods as regard to complication rates. When adjusting oncological results for patients and follow-up heterogeneity, higher recurrence rates at five years are found for cryoablation, on the contrary, no difference is found for specific-cancer survival rates at five years.

Conclusions: cryoablation is a safe and less invasive procedure than resection methods. However, its long term efficacy has not yet been established and a more stringent selection of patients is needed to reduce recurrence rates.

Keywords: Cryoablation, Nephrectomy, Laparoscopy, Small renal tumors, Meta-analysis

1. Introduction

Worldwide, more than 100 000 deaths occur from renal cell carcinoma (RCC) each year. RCC accounts for 2–3% of all adult malignancies and is the most lethal of the urologic cancers (Parkin *et al*., 2002; Jemal *et al*., 2003). Unlike many other cancers, the incidence of kidney cancer is steadily increasing at a rate of about 2.5%

per year across population groups (Pantuck *et al*. 2001; Hankey *et al*., 1999; Chow *et al*., 1999). Recent techniques of abdominal imaging have revealed a new population of renal tumors whose size is less than 4 cm. This population currently represents 60% to 70% of incidentally detected renal tumors (Chow *et al*., 1999; Russo, 2000). Over 30% of these small renal tumors are benign or indolent, and many are growing slowly (Frank *et al*., 2003; Rukstalis *et al*., 2006) at about 0.35 cm per year (Bosniak *et al*., 1996).

Although small lesions may be at low risk for dissemination and metastases, they have the ability to metastasize, that's why ablative treatment is commonly performed for small renal masses with imaging criteria suspicious for malignancy. Besides, this ablative treatment is all the more necessary insofar as current techniques of medical imaging are unable to clearly distinguish between benign and malignant tumors, and because results of biopsies are only 70-80% reliable (Dech *et al*., 2003; Israel and Bosniak, 2005). Given this uncertainty and the risk of morbidity associated with excision of renal tumors through open surgery, urology surgeons are therefore increasingly favoring techniques that are less invasive, such as laparoscopy and percutaneous ablation of renal tumors by radiofrequency or cryotherapy. The latter two techniques are not yet part of the standard list of treatments available for patients as their therapeutic efficacy is not statistically supported by a sufficiently large number of medical studies over long periods. For this reason, many physicians consider these new promising techniques as experimental and are hesitant to use them. These two techniques can also be used in open or laparoscopic methods and their use is generally limited to: renal tumors less than 4 cm, exophytic or polar, non-cystic, away from the elements of the hilum (vessels and pelvis) and the digestive structures, and in a single kidney or a transplanted kidney.

The aim of this article is to perform a comparison of four different operative techniques for small renal tumors: open nephrectomy, laparoscopic nephrectomy, cryoablation surgery, and percutaneous cryoablation. In doing so, a systematic literature review is provided by comparing the results of the cryoablation technique to standard procedures (i.e. open and laparoscopic nephrectomy) for small renal tumors. Subsequently, from a subset of observed values, missing data is randomly simulated because studies often lack some data. This data simulation allows for a more precise analysis of oncological results. Finally, econometric estimations are performed to adjust oncological results for patients and follow-up heterogeneity.

2. Systematic literature review

2.1 Methodology

Search engines used for this systematic review are Embase, CINALH, AMED, OVID HealthSTAR, OVID Medline, Mantis, Pubmed, ScienceDirect, British Medical Journal, Cochrane Database, and the Center for Research and Dissemination. The websites of the Quebec "Agence d'évaluation des technologies et des modes d'intervention en santé", the National Institute for Health Research (NIHR) Health Technology Assessment Programme, the International Network of Agencies for Health Technology Assessment, the InfoBank of the Canadian Medical Association, the National Guideline Clearinghouse, and the "Répertoire des recommandations de bonne pratique & des conférences de consensus francophones" were also consulted.

The reference period used for the search for articles was from the beginning of January 1996 until October 31, 2008. The languages used for this research are mainly English and French. The key words used in the different search engines are: cryoablation, cryotherapy, cryosurgery, cryobiology, laparoscopic, renal, kidney, and tumor.

Studies found duplicate in several search engines were considered as a unique study (i.e. they were not accounted several times). Results provided by the search engines and web sites consulted allowed listing more than 2000 articles from journals with a peer review committee, and four guides of good clinical practice. Among these articles, many did not correspond to the object of this research. Thus, all articles that did not address renal tumors in humans were excluded. To determine which articles were to be excluded, summaries of each of them were read by two reviewers and their appropriateness with the subject of this research was discussed according to our inclusion criteria (i.e. renal tumor, cryoablation, laparoscopic and open surgery, statistical analysis). The number of articles resulting from this initial selection was thus reduced to 325. After reading these 325 studies, with the exclusion criteria adopted (i.e. research on animals, five or less patients, studies with subgroups of patients mostly from other studies, studies giving average results of several techniques of ablation or surgery without the possibility of making a distinction, metastatic kidney cancer), only 154 studies constituting 227 groups of patients were finally selected for this analysis. Within these 154 studies, only two were randomized and 25 designed as prospective; however, none of them were on cryoablation. Moreover, it is important to note that in almost one study in four (34/154) no information on the type of methodology is provided. Given these factors, it was difficult to exclude studies in accordance with their level of evidence without losing too many details. Moreover, often, there is no significant difference in the quality of randomized trials methodologically

well designed and observational studies methodologically well designed (Benson and Hartz, 2000; Concato *et al*., 2000; Pocock and Elbourne, 2000).Consequently, it was decided to exclude studies on the basis of the quality of the information provided by using the STROBE checklist (Note 1). In some cases, authors of the studies were contacted in order to get additional information about the study design and the analysis. Studies failing to meet a minimum of 15 to 22 items were excluded from this analysis, which finally allowed retaining 152 studies. All items were discussed between two reviewers. Whatever where is the information provided in the study, this information was considered suitable to complete the checklist. Discrepancies and disagreements between the two reviewers were discussed with a third reviewer who indicated if the study meets or not the item in the STROBE checklist. The decision of choosing a selection criteria that may seem weak (i.e. a minimum of 15 to 22 items) is due to the fact that not having certain information due to a limited number of words imposed in the published literature should not be a strict exclusion criteria because it does not guarantee a low level of evidence from these studies.

From the 152 studies selected for this analysis, 225 groups of patients were studied. Among these 225 groups, 73 deal with laparoscopic partial nephrectomy (LPN), 34 with laparoscopic radical nephrectomy (LRN), 38 with open partial nephrectomy (OPN), 27 with open radical nephrectomy (ORN), 33 with laparoscopic cryoablation (LC), 5 with cryoablation by open surgery (OC), and 15 with percutaneous cryoablation (PC) (7 under local anesthesia).

2.2 Results

Studies available in the peer-reviewed, published scientific literature are mostly in the form of case series studies. Some of the studies had small sample sizes and short, incomplete follow-up. Patients included in the studies were those with renal masses under 7 cm in diameter, located on the periphery of the kidney, as determined by diagnostic imaging studies. In many of the cases, a definitive histological diagnosis was not available until the chirurgic or the cryoablative procedure had been performed, and only a proportion of patients in each study had confirmed RCC. According to the literature, this can affect interpretation of results, as patients with benign lesions would likely have more favorable prognoses than those with malignant lesions. Moreover, the pooling of outcome data could make cryoablation appear more effective than if all patients had RCC (Gill *et al*., 2000; Rukstalis *et al*., 2001; Russo, 2005). To correct the results for this potential bias, controlled econometric estimates were conducted to calculate rates of recurrence and cancer-specific survival rates at five years. By cons, it was not possible to control for possible publication bias.

2.2.1 Description of the cryoablation technique

Cryoablation is indicated in patients who would become anephric following nephrectomy, either because they have a solitary functioning kidney or bilateral renal tumors. The procedure may also be considered in patients who have any comorbid situations that could lead to renal function deterioration in the future. Besides being an alternative to patients who cannot tolerate or may refuse surgical nephrectomy, cryoablation spares renal function and decreases pain, morbidity, hospital stay, and operation time. Its less invasive nature — especially when it is used percutaneously — makes cryoablation a preferred choice among approaches for elective interventions.

Cryoablation is a technique in which an average of 2 cryoprobes are inserted in the center of the tumor, either surgically or percutaneously pinpointed by computed tomography (CT), magnetic resonance imaging (MRI), and/or ultrasound. Cryoprobes are then cooled and heated by means of a gas, which cause cell death as a result of crystallization and recrystallization causing mechanical cell damage in the acute setting, and apoptosis and vascular amputation in the subacute setting. During the warming phase, an ischemia is created in the treated area because of vasoconstriction, endothelial injury, and microvascular thrombosis. If the freezing temperature is between -19.4°C and -40°C (Chosy *et al*. 1998), all tissues virtually turn to 100% necrosis. However, when one moves away from the point of application, the temperature increases, suggesting less efficiency as the tumor margin is approached. It is therefore important to apply an ice ball at least 6–8 millimeters beyond the tumor margin (Desai and Gill, 2002). In addition, double freezing, when compared with a single-freeze approach, has been shown to produce a larger area of necrosis in an animal model (Woolley *et al*., 2002). As a consequence, the (sonographic) determination of the ice ball is an essential part of the procedure.

The practice of cryoablation in conjunction with open surgery or laparoscopy is usually recommended when PC may cause intra-abdominal organ injury, the reason why PC is generally reserved for posterior tumors.

2.2.2 Patients' characteristics

Table 1 gives the characteristics of the patients:

As compared to the standard approaches for the treatment of renal tumor, independent t-tests were used to compare all the means. The statistical significance level for each test was set at $P<0.05$, based on a two-tailed test. Results show that:

- LC and PC are significantly used for older patients: the minimally invasive nature of cryoablation reduces certain risks associated with a conventional operation (bleeding, etc.) for a category of patients particularly at risk;

- There are systematically and significantly larger percentage of men to be treated with PC compared to other types of intervention. The fact that men are statistically almost two times more likely than women to have a malignancy (Snyder *et al*., 2006) could have consequences as regards to recurrence and specific-cancer survival rates. However, the percentage of malignant tumors is not significantly greater for patients benefiting from PC;

- The American Society of Anesthesiologist (ASA) score, reflecting the prevalence of medical comorbidities, is significantly higher for patients with LC and PC; no data are available for open cryoablation;

- With the exception of LPN, cryoablation – whatever the method used – is performed for tumors significantly smaller than for tumors using the standard approaches. Although cryoablation is rarely used for tumors larger than 4 cm because of technical constraints and larger costs (more cryoprobes, gas, etc.), this has already been performed on larger tumors; however, the potential number of failures is higher than with smaller tumors (Sewell and Shingleton, 2004; Sausville *et al*., 2008);

- The percentage of malignant tumors is generally significantly less important for patients benefiting from a cryoablation than for patients benefiting from a standard approach. Such a discrepancy could be explained by a probable overuse of minimally invasive techniques for small incidental masses for which open nephron-sparing surgery would not be considered. New data on the growth rate of tumors particularly < 2.5 cm would indicate that the majority remains indolent, and surveillance is indicated in those patients who are elderly or with significant comorbidity that precludes surgical intervention. Therefore, if cryoablation can treat these patients with a relatively small risk, this should lead to an increase in interventions for tumors suspected as malignant but whose final prognosis concludes with a benign condition.

2.2.3 Clinical outcomes

Table 2 gives the main clinical outcomes:

As compared to the standard approaches for the treatment of renal tumor, independent t-tests were used to compare all the means. The statistical significance level for each test was set at $P<0.05$, based on a two-tailed test. Results show that:

- The operation time for PC is approximately one hour shorter than for other types of intervention. This gain is mainly due to a lesser need for mobilizing medical equipment, a practice technically more simple, and a much lower theoretical complication rate. The literature review revealed an average of two cycles of cooling–warming for cryoablation, then corresponding to a total of 19.8 minutes cooling time. In general, most studies indicate a time of warming equal to the time of cooling;

- A significant reduction of hospital stay was observed, in the range of 0.66 to 5.11 days less according to the type of operation performed. This reduction tends to indirectly confirm the less invasive nature of cryoablation to the extent that it should theoretically lead to a reduction in bleeding and peri- and postoperative complications;

- Insofar as cryoablation does not require ischemia to minimize the effect of a tumor excision (i.e. there is no tumor excision), this technique is regarded as risk-free, as compared to partial nephrectomy. This advantage of cryoablation is particularly important vis-à-vis the laparoscopic partial nephrectomy in that the latter is currently very difficult to perform owing to the great difficulty in obtaining renal parenchymal hemostasis during tumor excision and the consequent high risk of bleeding. Moreover, LPN may be associated with an increased risk of impairment of ipsilateral renal function owing to ischemic damage during warm ischemia time;

- A significantly lower blood loss was observed with cryoablation. Because cryoablation requires no renal parenchymal hemostasis, the low losses of blood observed are mainly due to the excisions performed by the open and laparoscopic surgery, and to the bleeding that may result from the withdrawal of cryoprobes;

- As regard the complication rates during and after the intervention, cryoablation does not present any significant difference with the standard approaches.

From the literature review, five grades of complications were considered leading to: I) oral medication or bedside care; II) intravenous therapy or thoracostomy tube; III) intubation, interventional radiology, endoscopy

or reoperation; IV) major organ resection or chronic disability; V) death. Grades I and II are regarded as minor complications, whereas grades III to V are cases of major complications.

Results are at first quite surprising because a lower rate of complications for cryoablation was expected, particularly with PC, because of the less invasive nature of this technique. However, literature review suggests that the different types of complications were not consistently reported in all studies. This type of omission can mean two things: either a few complications are not reported – in particular certain minor complications and postoperative complications – or there were no complications. Faced with this lack of information, it is difficult to determine with accuracy and precision the rate of complications according to the kind of intervention.

2.2.4 Oncological outcomes

The follow-up of the studies is generally too short to obtain evidence on the rates of recurrence and survival associated with the different types of intervention. Indeed, the follow-up of a patient treated for a RCC should theoretically be for a period of at least 15 years because even late recurrences have been reported. Moreover, in a significant number of studies (Gill *et al*., 2005; Littrup *et al*., 2007), survival rates were calculated for populations in which some tumors are benign or indolent, which creates a problem of comparability between studies, especially as the results of biopsies are themselves subject to some uncertainty (Dechet *et al*., 2003).

In addition, the studies identified for this research present patients with features such as sex, age, tumor size, body mass index, ASA score, and so on, which can be very different and may have a significant effect on recurrence and specific-cancer survival rates. To control for this heterogeneity in patient characteristics and follow-up durations, the rate at 5 years for recurrence and specific-cancer survival for a representative patient was calculated from the coefficients obtained by each econometric estimation of these two dependant variables for each kind of intervention (Table 3). Econometric estimations are based on ordinary least squares (OLS) regression with nine independent variables and weighted by frequency. The nine variables are: duration of the follow-up, sex, age, tumor size, percentage of malignant tumors, ASA score, whether the kind of intervention is imperative or not, % of exophitic or peripheral tumors, body mass index. Furthermore, it must be noted here that although one of the most important determining factors for a five-year survival rate is the presence of kidney metastasis before surgery, and because none of the patients in the sample used for this study showed this characteristic, this factor could not affect the results provided in Table 3. Finally, to improve the accuracy of the estimations, a random data simulation for missing data was performed in Stata Version 8. Each missing data entry of the imputation variable is imputed by values randomly drawn from a subset of observed values, that is, its donor pool, with an assigned probability close to the missing data entry that is to be imputed. Each data simulation is based on the mean, the minimum and the maximum, and the standard deviation from its donor pool. New data are generated when the donor pool represents a minimum of one-third of the final sample. As a result, 27% of the data was generated in the final sample, which enabled to almost double the number of observations in the econometric estimates and to consider more variables of control. However, it is noted that the results obtained show very little difference with those obtained without simulation.

2.2.4.1 Local or nearby recurrence rates

With cryoablation, a recurrence is considered when the size of the lesion increases instead of decreasing or when a new cryoablation or standard surgery had to be performed. Although the increase of the size of the lesion observed by medical imaging is a good predictor of the recurrence of the disease in the case of cryoablation (Weight *et al*., 2008), this technique does not guarantee a result that is 100% accurate (Schwartz *et al*., 2006; Stein *et al*., 2008). Regarding standard techniques of nephrectomy, a recurrence is considered when, in a review of medical imaging, a new tumor appears at the site of resection (local) or at a location a few centimeters away from the site of resection (nearby).

Once controlled by the duration of the follow-up and the main characteristics of patients, the five-year local or nearby recurrence rate on a same kidney and the five-year specific-cancer survival rate for each kind of treatment techniques for renal tumors are obtained for patients sharing the same characteristics.

Rates of local or nearby recurrence provided in Table 3 indicate the lowest rates for the standard approaches. Within this category, rates for open nephrectomy are probably slightly higher than those of laparoscopic nephrectomy because of the generally more advanced stage of the tumors operated on, a feature that could not be controlled because of very less data from the reviewed studies.

Both open cryoablation and especially percutaneous cryoablation present particularly high rates of local or nearby recurrence (Note 2). As for open cryoablation, there are no objective reasons explaining why this rate is twice higher than that of LC and almost four times higher than that of OPN, except that the low number of

observations that was found in the literature has led to a bias by not being representative of the reality, and that cryoablation is a new technology. On the contrary, with regard to PC, the difference is well explained by the number of technical failures of percutaneous procedures. The main reasons for these failures are twofold: 1) it is more difficult to accurately locate the tumor with medical imaging techniques than with a micro-camera (laparoscopy) or by the direct view of the surgeon (open surgery); 2) cryoablation is a new technology. The published studies are often based on the results of the first experiences of physicians who seem to have imperfect control of the percutaneous approach. This last point is probably decisive, because just as in the studies of Simmons and Gill (2007) and Thompson *et al*. (2005), it is very likely that a similar pattern will evolve with the technical failures of PC interventions. Indeed, these authors observed a sharp decline over time in rates of complications of laparoscopic partial nephrectomies because of the acquisition of greater experience by physicians.

Finally, if these results suggest that cryoablation techniques are — on the basis of recurrence — worse than standard techniques, it means that, for patients with local or nearby recurrence, these techniques mainly lead to delaying the date of the partial or radical nephrectomy using a standard technique without causing additional damage (i.e., there are no significantly more metastases with cryoablation than other techniques according to the meta-analysis performed by Kunkle *et al*. (2008)). For all other patients who did not require re-operation, cryoablation allows them to benefit from a minimally invasive technique.

2.2.4.2 Specific-cancer rates

According to Table 3, the five-year specific-cancer survival rate are quite similar, whatever the technique used. However, it should be noted that when there is a recurrence of the tumor or the development of metastases, the approach used by the physician to treat this new development of the kidney cancer is not necessarily the one that has been used at the outset, particularly when it was a cryoablation. Therefore, results of five-year specific-cancer survival rates for each initial approach are probably biased by the last approach in the case of multiple interventions. It is very likely that this bias applies only to cryoablation practices insofar as for open and laparoscopic nephrectomy, the main principles of oncological renal surgery are the same: primary access to the renal vasculature and their ligation before the kidney is mobilized and resected.

Other studies using more control variables to calculate or compare specific-cancer survival rates found results similar to those presented in Table 3. For example, in the study by Leibovich *et al*. (2004), the five-year specific-cancer survival rates following an open partial or radical nephrectomy are, respectively, 98% and 86%, but after adjusting the data by the patients' characteristics, this difference is not statistically significant (Note 3).

3. Conclusion

Although there are still concerns about the safety of the LPN – longer warm ischemia times compared with OPN and the reported high rate of complications –, LPN is now considered by a growing number of specialists as a gold standard for small renal tumors (Shuford *et al*., 2004). Thus, it is from that point of reference that the technique of cryoablation should be compared. Principally the new technique has to address two points: is the cryoablation approach a safe procedure and are the oncological results equal to standard surgery?

It seems that the answer to the first question is positive insofar as a large number of studies indicate complications rates and hospitalization times lower or identical for cryoablation as compared to standard approaches. The main advantages of cryoablation as compared to laparoscopic and open nephrectomy are: less postoperative pain, a faster recovery, and a more rapid return to normal activities (Ono *et al*., 1999). These advantages and a consequent reduced period of convalescence not only reduce direct medical costs for hospital and patients, but also reduce the economic losses related to a long-term morbidity. In contrast, hemorrhage around the cryolesion may inhibit accurate post-treatment size measurements (Russo, 2005), as well as the removal of the cryoprobe creates a potential risk of bleeding and dissemination of cancer cells along its route.

The answer to the second question is more indecisive. Indeed, if the current evidence suggests that cryotherapy for renal cancer is able to ablate tumor tissues and that the safety of the procedure is adequate, its long-term efficacy has yet to be established. The results provided by Table 3 indicate quasi identical values of the five-year specific-cancer survival rates for both cryoablation and standard techniques, but much higher values of the five-year local or nearby recurrence rates for cryoablation, especially for PC. To reduce this problem, the team NICE (2007) recommends that the procedure should only be offered after evaluation by a multidisciplinary team, which should include an urologist, an oncologist, and an interventional radiologist. Nevertheless, given the fast pace of change in the cryoablation technology and its relative simplicity of use, more and more patients are expected in the near future to benefit from this technique with the same degree of efficiency than the current standard techniques (Kunkle *et al*., 2008).

Finally, it is clear from this literature review that cryoablation is an interesting alternative as compared to current standard approaches (i.e., open and laparoscopic nephrectomy). Not only this practice is recognized as safe and minimally invasive, but, in the specific case of percutaneous cryoablation, it also has the advantage to be potentially (i.e. with a more stringent selection of patients) less costly for the hospital. However, as its long-term effectiveness is not yet fully established, the authors believe that the practice of cryoablation must be excluded for the complex renal mass such as hilar tumors, partially cystic tumors, central tumors, or tumors larger than 4 cm.

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Notes

Note 1. http://www.strobe-statement.org/Checklist.html

Note 2. The meta-analysis performed by Kunkle *et al*. (2008) also indicates that the local recurrence rate is significantly higher with cryoablation. However, it is not distinguished in this study if the approach is open, laparoscopic or percutaneous.

Note 3. In the same study, the rate at 5 years of non-recurrence of renal tumors is 94% for partial nephrectomy and 98% for radical nephrectomy.

Table 1. Main patients' characteristics

	LPN		LRN		OPN		ORN		LC		OC		PC	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age (years)	59.6 [50-76]	4.4 [71]	60.3 [51-67]	3.9 [33]	60.1 [51-70]	4.1 [36]	60.8 [49-66]	3.5 [27]	65.7 [50-76]	5.1 [29]	62.9 [60-67]	2.6 [5]	67.1 [58-73]	4.9 [13]
Male (%)	61.1 [25-88]	13.5 [57]	60.1 [36-76]	9.6 [27]	65.9 [46-80]	7.2 [29]	61.7 [26-72]	9.6 [23]	60.5 [33-85]	13.9 [23]	55.3 [50-60]	4.8 [3]	73 [50-92]	10.7 [11]
ASA score	2.4 [1.8-3]	0.3 [25]	2.4 [1.9-2.9]	0.3 [18]	2.5 [2-3]	0.3 [12]	2.4 [1.8-2.8]	0.3 [11]	2.6 [2-3]	0.3 [10]	NA	NA	3 [3-3]	0 [2]
Tumor size (cm)	2.7 [1.8-8.1]	0.9 [71]	5.2 [2.8-15]	2.2 [29]	3.4 [2.2-5.3]	0.7 [38]	5.4 [2.6-14]	2.5 [26]	2.6 [1.9-6]	0.7 [33]	2.3 [2-2.6]	0.3 [5]	2.9 [2.1-6]	1 [14]
Malignant (%)	77.2 [36-100]	14 [69]	88.3 [52-100]	13.4 [28]	90.2 [67-100]	11.4 [36]	96.6 [70-100]	7.2 [27]	61.9 [36-84]	11.6 [28]	70.6 [59-79]	8.4 [5]	81.1 [50-100]	17.3 [9]

Notes: Brackets in the « Mean » columns are for Minimum and Maximum; Brackets in the « Standard Deviation » columns are for the number of studies observed.

Table 2. Main clinical outcomes

	LPN		LRN		OPN		ORN		LC		OC		PC	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Operation time (min)	186 [84-324]	53.8 [65]	189 [70-330]	63.5 [27]	201 [122-275]	52.9 [14]	171 [118-222]	36.5 [12]	192 [115-306]	49.9 [21]	218 [-]	0 [1]	135 [77-235]	49.6 [8]
Hospital stay (days)	4.2 [1.7-10]	1.9 [54]	3.6 [1.4-7.4]	1.6 [28]	6.5 [4-14]	2.2 [19]	6.5 [3.6-9.7]	1.8 [15]	2.9 [1-5]	1.1 [25]	4 [3-5.7]	1.1 [5]	1.4 [0.5-2.4]	0.6 [10]
Blood losses (ml)	259 [20-725]	136 [62]	182 [90-372]	65 [26]	452 [250-865]	187 [13]	405 [238-640]	114 [13]	88.1 [35-178]	32 [20]	132 [58-200]	59 [4]	5 [0-10]	7 [2]
% major complicat°	2.4 [0-16.7]	4.2 [61]	3.4 [0-11]	3.4 [30]	2.4 [0-11]	3.6 [18]	4.2 [0-14]	4.3 [16]	2.7 [0-13.3]	3.8 [28]	0 [-]	0 [5]	3.6 [0-20]	5.6 [14]
% minor complicat°	6.2 [0-62.5]	10.7 [60]	6.2 [0-34.4]	7.5 [28]	8.7 [0-48.1]	11.1 [22]	9.5 [0-45.5]	11.7 [17]	6.2 [0-35]	10.5 [27]	12.8 [0-25]	9.4 [5]	8.2 [0-30]	9.7 [13]
% post-op complicat°	14.7 [0-75]	14.9 [57]	9.3 [1.6-30]	6.8 [18]	15.2 [3.4-34]	8.7 [20]	8.9 [1.6-19]	5.8 [11]	13 [0-67]	15.8 [24]	9.2 [0-14]	8 [3]	7.8 [0-20]	6.9 [9]

Notes: Brackets in the « Mean » columns are for Minimum and Maximum; Brackets in the « Standard Deviation » columns are for the number of studies observed; Major and Minor complications are perioperative complications.

Table 3. Five-year local or nearby recurrence rates on a same kidney and specific-cancer survival rates

	Local or nearby recurrence [Ћ Љ]		Specific-cancer survival [Љ]	
	Rate [Ψ]	Nb. Patients [Φ]	Rate [Ψ]	Nb. Patients [Φ]
LPN	0,86	4082	99,76	4082
LRN	1,02	2660	97,47	2660
OPN	5,58	6694	97,76	6694
ORN	4,47	4810	90,38	4810
LC	8,70	1212	98,14	1212
OC	18,22	68	100	68
PC	42,04	468	96,17	468

[Ћ] A failure leading to a new intervention is also considered as a recurrence, even if no recurrence had time to appear.

[Љ] Calculations based on OLS regression with nine independent variables and weighted by frequency. The nine variables are: duration of the follow-up, sex, age, tumor size, percentage of malignant tumors, ASA score, whether the kind of intervention is imperative or not, % of exophitic or peripheral tumors, body mass index.

[Ψ] Rates are calculated for a representative patient of the 152 studies, that is, using the average value of 19 994 patients.

[Φ] Number of patients used to perform the econometric estimates.

Annex 1. List of studies included in the meta-analysis

Authors	Period	Place	Study design	Number of operation	Type of operation
Abbou *et al*. (1999)	95-98	Créteil, France	Retrospective	29-29	LRN-ORN
Abukora *et al*. (2005)	94-04	Linz, Austria	Retrospective	78	LPN
Adkins *et al*. (2003)	95-00	Nashville, TN		30	OPN
Allaf *et al*. (2004)	96-01	Baltimore, Maryland	Retrospective	48	LPN
Anast *et al*. (2004)	98-03	San Francisco, CA	Retrospective	44-117	LPN-LRN
Atwell *et al*. (2008)	03-07	Mayo clinic, Rochester, Minnesota	Retrospective	113	PC
Bachmann *et al*. (2005)	02-	Basel, Suisse - Munich, All		7	LC
Bandi *et al*. (2008)	00-06	Madison, Wisconsin	Retrospective	58-20	LC-PC
Bang *et al*. (2008)		Seoul, Corea		39-48	LPN-OPN
Barbalias *et al*. (1999)	86-96	Greece	Retrospective, paired	41-48	OPN-ORN
Baumert *et al*. (2007)	03-05	Paris Saint Joseph Hospital Trust, France - Cambridge, UK	Prospective	40	LPN

Beasley *et al.* (2004)	99-03	London & Hamilton, Canada	Retrospective, paired	22-27	OPN-LPN
Becker *et al.* (2006a)	75-02	Saarland et Stuttgart, Germany	Retrospective	241-369	OPN-ORN
Becker *et al.* (2006b)	75-04	Saarland et Stuttgart, Germany	Retrospective	69	OPN
Beemster *et al.* (2008)	03-06	Amsterdam, Holland		26	LC
Belldegrun *et al.* (1999)	80-97	University of California-Los Angeles, CA	Retrospective, paired	146-125	OPN-ORN
Bensalah *et al.* (2008)	03-07	Dallas, Texas	Retrospective	61-67-61-48	LPN-LRN-OPN-ORN
Berger *et al.* (2008)	00-06	New York University School of Medicine, NY	Retrospective	164	LRN
Bermudez *et al.* (2003)	01-02	Institut Mutualiste Montsouris, Paris, France	Prospective	19	LPN
Bollens *et al.* (2007)	02-06	Brussels, Belgium	Retrospective	39	LPN
Bolte *et al.* (2006)	00-04	Madison, Wisconsin		18	LC
Brown *et al.* (2004)	00-02	Philadelphia, Pennsylvania	Retrospective	30	LPN
Butler *et al.* (1995)	75-92	Cleveland, Ohio	Retrospective, paired	42	ORN
Caddedu *et al.* (1998)	91-97	Baltimore, Maryland - St. Louis, Missouri - Saskatoon, Saskatchewan - Nagoya, Japan - Innsbruck, Austria	Retrospective	157	LRN
Caviezel *et al.* (2008)		Geneva, Switzerland	Retrospective	7	PC
Cestari *et al.* (2007)	00-06	Turin, Italy	Prospective	86	LC
Chan *et al.* (2001)	91-99	Baltimore, Maryland - Atlanta, USA	Retrospective	54	ORN
Chapman *et al.* (2008)	04-07	Buffalo, NY	Retrospective	100	LRN
Chavla *et al.* (2006)	00-05	St-Louis, Missouri	Retrospective	12	LC
Cicco *et al.* (2001)	95-99	Creteil, France	Retrospective	50	LRN
Colombo *et al.* (2008)	97-99	Cleveland, Ohio	Retrospective	63-53	LRN-ORN

Colon & Fuchs (2003)	01-01	Los angeles, CA - Brooklyn, NY		8	LC
D'armiento *et al*. (1997)	88-93	Oxford, UK	Prospective, randomised	19-21	OPN-ORN
Davol, Fulmer & Rukstalis (2006)	96-02	Danville, Pennsylvania	Retrospective	24-24	LC-OC
Deger *et al*. (2008)	02-07	Berlin, Germany - Basel, Switzerland		163	LRN
Derweesh *et al*. (2006)	98-06	Memphis, Tennessee	Retrospective	9-13	LC-PC
Desai *et al*. (2005)	97-04	Cleveland, Ohio	Retrospective	78-153	LC-LPN
Desai *et al*. (2008)	00-07	Phoenix, Arizona	Retrospective	80	LPN
Doublet & Belair (2000)	94-98	Hôpital Tenon, Paris, France - Montréal, Canada		55	LRN
Dunn *et al*. (2000)	90-99	St. Louis, Missouri - Tanta, Egypt	Retrospective	61-33	LRN-ORN
Eschholz *et al*. (2005)	01-	Blankenhain, Germany		34	LPN
Feder *et al*. (2008)	95-06	Jacksonville, FL - Bronx, NY	Retrospective	45-43	LRN-ORN
Fergany *et al*. (2006)	80-02	Cleveland, Ohio	Retrospective	400	OPN
Finley *et al*. (2008)	03-07	Orange, CA	Retrospective	20-18	LC-PC
Funahashi *et al*. (2009)	05-07	Nagoya et Aichi, Japan	Prospective	12-20	LPN-OPN
Gallucci *et al*. (2007)	03-05	Rome, Italy		50	LPN
Georgiades *et al*. (2008)		Baltimore, Maryland	Retrospective		PC
Gettman *et al*. (2004)	02-03	Innsbruck, Austria	Retrospective	13	LPN
Gill *et al*. (2007)	98-05	Cleveland, Ohio - Baltimore, Maryland - Mayo Clinic, Rochester, Minnesota	Retrospective and Prospective	771-1029	LPN-OPN
Goel & Kaouk (2008)	07-	Cleveland, Ohio	Prospective	6	LC
Guillonneau *et al*. (2003)	97-02	Institut Mutualiste Montsouris, Paris, France	Retrospective	28	LPN

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Gupta *et al*. (2006)	03-04	Baltimore, Maryland		12	PC
Hacker *et al*. (2007)	04-05	Linz, Austria		25	LPN
Harmon *et al*. (2000)	98-99	San Antonio, Texas - Baltimore, Maryland	Retrospective	15	LPN
Hegarty *et al*. (2006)	97-	Cleveland, Ohio	Retrospective	161	LC
Heinrich *et al*. (2006)	01-05	Wurzburg, Germany	Retrospective	40	LPN
Henderson *et al*. (2008)	97-06	Ann Arbor, Michigan - Redhill, Surrey, UK	Retrospective	13	LPN
Herr (1999)	79-97	Memorial Sloan-Kettering Cancer Center, New York	Retrospective	70	OPN
Hollingsworth *et al*. (2006)	98-03	Ann Arbor, Michigan	Retrospective	65-106-73-92	LPN-LRN-OPN-ORN
Hruby *et al*. (2006)	00-04	NY, NY	Retrospective	12-11	LPN-LC
Hwang *et al*. (2006)		New jersey	Prospective	23	LC
Itoh *et al*. (2002)		Yamagata, Japan		6	LPN
Janetschek *et al*. (2000)	94-98	Innsbruck, Austria	Retrospective	25-73	LPN-LRN
Javidan *et al*. (1999)	68-94	Detroit, Michigan	Retrospective	381	ORN
Jeschke *et al*. (2001)	94-00	Innsbruck, Austria	Retrospective	51	LPN
Kang *et al*. (2008)	04-06	Seoul, Korea	Prospective, paired	15-15	OPN-LC
Kaul *et al*. (2007)	03-05	Detroit, Michigan		10	LPN
Keeley *et al*. (2008)		Bristol - Amsterdam - Swansea - London - Vienna - Basel	Prospective	80	LC
Kim *et al*. (2003)	98-02	Baltimore, Maryland	Prospective	35	LRN
Kobayashi *et al*. (2008)	01-05	Okayama, Japan		20	LPN
Lane *et al*. (2008)	99-06	Cleveland, Ohio	Retrospective	30-169	LPN-OPN
Lane & gill (2007)	99-01	Cleveland, Ohio	Retrospective and Prospective	56	LPN
Lau *et al*. (2000)	66-99	Mayo clinic, Rochester, Minnesota	Retrospective, paired	164-164	OPN-ORN

Lawatsch *et al*. (2006)	00-04	Milwaukee, Wisconsin	Retrospective	65	LC
Lee *et al*. (2000)	89-97	Memorial Sloan-Kettering Cancer Center, New York	Retrospective and Prospective	79-183	OPN-ORN
Lee *et al*. (2003)	97-01	Orange, CA - Bryn Mawr & Philadelphie, Pennsylvanie		20	LC
Leibovich *et al*. (2004)	70-20	Mayo clinic, Rochester, Minnesota	Retrospective	91-841	OPN-ORN
Li *et al*. (2007)	03-04	Kaohsiung, Taiwan		6	LPN
Lin *et al*. (2008)	99-06	Cleveland, Ohio	Retrospective	14-13	LPN-LC
Littrup *et al*. (2007)	01-06	Detroit, Michigan	Retrospective	48	PC
Lopez-Costea (2008)	95-03	Llobregat, Spain		11	OPN
Makhoul *et al*. (2004)	95-02	Créteil, France	Retrospective	39-26	LRN-ORN
Marszalek *et al*. (2008)	96-06	Klagenfurt, Austria	Retrospective	179-131	LPN-OPN
McKiernan *et al*. (2002a)	89-20	Memorial Sloan-Kettering Cancer Center, New York	Retrospective	117-173	OPN-ORN
McKiernan *et al*. (2002b)	89-02	Memorial Sloan-Kettering Cancer Center, New York	Retrospective	250	OPN
Miki *et al*. (2006)	01-02	Tokyo, Japan	Prospective	13	PC
Mogami *et al*. (2002)	-02	Chiba, Japan		5	PC
Moon *et al*. (2004)	00-02	Madison, Wisconsin		16	LC
Mouraviev *et al*. (2007)	00-05	Durham, NC	Retrospective	73-71-20	LPN-OPN-ORN
Murota *et al*. (2002)	99-01	Osaka, Japan		8	LPN
Nadler *et al*. (2003)	99-02	Chicago, Illinois		15	LC
Nadler *et al*. (2006)	01-05	Chicago, Illinois	Prospective, randomised	33	LRN
Nadu *et al*. (2007)	02-06	Tel Hashomer, Israel		140	LPN
Nakada *et al*. (2001)	97-00	Madison, Wisconsin	Retrospective	17-18	LRN-ORN
O'Malley *et al*. (2006)	02-05	New York University School of Medicine, NY	Retrospective, paired	15-15	LPN-LC

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Ono *et al*. (2001)	92-00	Nagoya & Komaki, Japan	Prospective	103-46	LRN-ORN
Pahernik *et al*. (2006)	79-04	Mainz, Germany	Retrospective	504	OPN
Patard *et al*. (2007)	84-05	France - LA, USA	Retrospective	730	OPN
Patard *et al*. (2004)	84-01	California - Italy - France - Holland	Retrospective	379-1075	OPN-ORN
Permpongkosol *et al*. (2006a)	96-04	Baltimore, Maryland - Long Island, NY	Retrospective	58-85	OPN-LPN
Permpongkosol *et al*. (2006b)	03-04	Baltimore, Maryland - Houston, Texas - Long Island - Memorial sloan-Kettering cancer center, NY	Retrospective	21	PC
Permpongkosol *et al*. (2007)	93-05	Baltimore, Houston, Long Island	Retrospective	345-549	LPN-LRN
Porpiglia *et al*. (2005)	98-04	Turin, Italy	Retrospective	34-30	LPN-OPN
Porpiglia *et al*. (2008)	01-07	Turin, Italy	Retrospective	90	LPN
Portis *et al*. (2002)	-96	St-Louis, MI - Saskatoon, CA - Nagoya, Japan	Retrospective	69-64	ORN-LRN
Pyo *et al*. (2008)	02-08	NY, NY	Retrospective	110	LPN
Raman *et al*. (2008)	04-08	Dallas, Texas	Retrospective	33	LRN
Rassweiler *et al*. (2000)	94-	Heidelberg, Germany - Creteil, France - Innsbruck et Klagenfurt, Austria	Prospective	53	LPN
Ray *et al*. (2006)	99-05	Oxford, UK	Retrospective	100	OPN
Rodriguez *et al*. (2000)	-99	Baltimore, MD - Lackland Air Force Base, Texas - Fort Lauderdale, Florida - Atlanta, Georgia		03-04	LC-OC
Rogers *et al*. (2008)	07-07	Bethesda, MD		8	LPN
Rosales *et al*. (2005)	02-04	Barcelona, Spain		14	LPN

Rukstalis *et al*. (2001)	96-00	Pittsburgh, Pennsylvania	Retrospective	29	OC
Saika *et al*. (2003)	92-02	Komaki, Japan	Prospective	195-68	LRN-ORN
Saranchuk *et al*. (2004)	89-03	Memorial Sloan-Kettering, NY	Retrospective	54	OPN
Sausville *et al*. (2008)	03-07	Baltimore, Maryland	Retrospective	02-09	LC-PC
Schiff *et al*. (2005)	00-04	NY, NY	Retrospective and Prospective	66-59	LPN-OPN
Schwartz *et al*. (2006)	01-05	Springfield, Illinois - Calgary, Alberta - Dallas & Arlington, Texas	Retrospective	70-11	LC-OC
Seifman *et al*. (2004)	98-02	Ann Arbor, Michigan	Retrospective	40	LPN
Sewell & Shingleton (2003)		Jackson, Mississipi		103	PC
Shekarriz *et al*. (2002)	91-97	Detroit, Michigan	Retrospective, paired	60-60	OPN-ORN
Shekarriz *et al*. (2004)	02-03	Syracuse, New York	Prospective	17	LPN
Shingleton & Sewell (2001)		Jackson, Mississipi		20	PC
Shuford *et al*. (2004)	99-01	Nashville, TN - Orange, CA	Retrospective	33-41	LRN-ORN
Silverman *et al*. (2005)	00-	Boston et Worcester, MA		26	PC
Simmons & Gill (2007)	03-05	Cleveland, Ohio	Prospective	200	LPN
Simon *et al*. (2004)	99-03	Scottsdale, Arizona	Retrospective	23-113	LPN-LRN
Stein *et al*. (2008)	00-07	Durham, NC	Retrospective	30	LC
Steinnerd *et al*. (2007)	04-06	Saint-Louis, Missouri	Retrospective	5	LRN
Stephenson *et al*. (2004)	95-02	Memorial Sloan-Kettering Cancer Center, NY	Retrospective and Prospective	361-688	OPN-ORN
Stifelman *et al*. (2001)	99-00	NY, NY - Madison, Wisconsin - Hartford, CN	Retrospective	11	LPN
Teber *et al*. (2006)	99-06	Heilbronn, Germany	Retrospective	40	LPN
Terai *et al*. (2004)	99-03	Kurashiki & Kyoto, Japan		19	LPN
Thompson *et al*. (2005)	85-01	Memorial Sloan-Kettering Cancer Center, NY	Retrospective	823	OPN

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Tillett *et al*. (2006)		Atlanta, USA	Retrospective	58	LC
Tornehl *et al*. (2004)		Chapel Hill, NC		15	LPN
Urena *et al*. (2004)	02-03	New Orleans, Louisiana	Retrospective	10	LPN
Van Poppel *et al*. (1998)	81-96	Leuven, Belgium	Retrospective	72	OPN
Venkatesh *et al*. (2006)	00-04	St. Louis, Missouri - Irvine, CA - Indianapolis, Indiana	Retrospective	123	LPN
Verhoest *et al*. (2007)		Rennes, France		5	LPN
Weight *et al*. (2008)	02-06	Cleveland, Ohio	Retrospective	176	LC
Weizer *et al*. (2008)	03-07	Ann Arbor, Michigan	Retrospective	174	LPN
Weld *et al*. (2007)	00-05	St-Louis, Missouri - Orange, CA - NY, NY	Prospective	31	LC
Weltzien *et al*. (2006)	02-05	Basel, Switzerland	Prospective	11	LC
Wille *et al*. (2008)	01-06	Berlin, Germany	Retrospective	100	LPN
Wille *et al*. (2004)	99-03	Berlin, Germany	Retrospective	125	LRN
Wright *et al*. (2007)	03-0	Marywood, Illinois - Baltimore, Maryland	Retrospective	32	LC
Wright & Porter (2005)	98-04	Seattle, Washington	Retrospective	51	LPN
Wyler *et al*. (2007)	02-	Basel, Switzerland	Prospective	13	LC
Yoshikawa *et al*. (2004)	99-03	Nagoya, Japan	Retrospective	17	LPN
Zhang *et al*. (2005)	02-04	Wuhan, China		21	LPN
Zorn *et al*. (2007)	02-06	Chicago, Illinois	Retrospective	42-66	LPN-LRN

Factors Associated with Abdominal Obesity among HIV-infected Adults on Antiretroviral Therapy in Malaysia

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Abstract

Abdominal or central obesity is a common morphological alteration among HIV-infected subjects on antiretroviral treatment. There is concern that this condition places the subjects at risk of cardiovascular disease. This is a cross-sectional study of 334, HIV-infected adult subjects on antiretroviral therapy at a public hospital in Malaysia. It was aimed at determining the association between nutritional factors and abdominal obesity among PLHIV receiving antiretroviral treatment. Abdominal obesity was prevalent in 36.5% of the respondents. Respondents with abdominal obesity were significantly (p<0.05) older in age, had significantly higher blood triglycerides, fasting plasma glucose, lower HDL-cholesterol, higher BMI at the start of medication and also at the time of the study, bigger waist circumference, higher waist hip ratio, body fat mass, systolic and diastolic blood pressure. They also had lower mean CD4 cell count at start of medication and body lean mass than those without abdominal obesity. After adjusting for the covariates, a significantly higher risk of abdominal obesity was observed in those who were older (adjusted OR=1.053, CI=1.012-1.095), had higher fasting plasma glucose (adjusted OR=1.189, CI=1.014-1.394), higher BMI at the time of study (adjusted OR=1.426, CI=1.215-1.674). Being Malay was a protective factor (adjusted OR=0.264, CI=00.102-0.685) for abdominal obesity. These results suggest that care of the HIV-infected population must include intervention to address abdominal obesity in order to provide better quality of life.

Keywords: Abdominal obesity, HIV/AIDS, ARV treatment, Nutrition, Dietary intake, Waist-Hip ratio, Malaysia

1. Introduction

Acquired Immune Deficiency Syndrome (AIDS or Aids) is a rapidly growing global problem that is accompanied by high morbidity and mortality. According to the latest report (UNAIDS, 2008) the number of people living with the human immunodeficiency virus (HIV) in the world totaled 33 million people as of December 2007 of whom 5 million were in Asia. In Malaysia there were more than 80 000 [52 000-120 000]

people living with HIV (PLHIV) as of the end of 2008 (UNAIDS, 2008). Antiretroviral (ARV) drugs are the only medication available to inhibit viral replication and reduce morbidity and mortality due to AIDS in the absence of vaccination (WHO, 2000a). The strategy of free access to antiretroviral (ARV) treatments adopted by Malaysia has notably increased the survival rate as a result of a reduction in the incidence of opportunistic infections and also HIV/AIDS complications (Malaysia UNGASS Report, 2008).

On the other hand, ART (Antiretroviral Therapy) can cause a variety of side effects, some of them adversely affecting the nutritional status of PLHIV (WHO, 2007). Changes in body composition and metabolic complications such as dyslipidemia, insulin resistance (Miller *et al*., 2003; Richter *et al*., 2005; Hansen *et al*., 2009) and increased rate of cardiovascular disease (CVD) (Depairon *et al*., 2001; Baum *et al*., 2006; Sankatsing *et al*., 2009) are the most commonly quoted adverse nutritional effects on patients receiving highly active antiretroviral therapy (HAART). Related to this, abdominal obesity as a typically morphological abnormality has been observed among both HIV-positive men and women (Galli *et al*., 2003; Jaime *et al*., 2006) in many countries where HAART has been available for a long time. Two recent studies showed that 45.7% (n= 223) of Brazilian HIV+ (Jaime *et al*., 2006) and 30.7% (n=471) of American HIV infected subjects (Mondy *et al*., 2007) had central obesity.

It is believed that protease inhibitors (PIs) are the main cause of morphologic changes in the form of fat accumulation (Carr, 2000; Martínez *et al*., 2001, Saves *et al*., 2002). Besides, other factors may contribute to fat redistribution including HIV infection related factors like severity and length of HIV infection (Lichtenstein *et al*., 2001), hypertriglyceridemia and insulin resistance (Martínez *et al*., 1999; Rodriguez-Guardado *et al*., 2001) and dietary intake (Hendricks *et al*., 2003; Jaime *et al*., 2006).

Abdominal obesity is defined as the localized accumulation of adipose tissue in abdomen irrespective of proportion to total body fat (NHI, 1998). In general, the presence of excess body fat around certain parts of the body, especially around the abdominal area is considered a risk factor for certain diabetes, metabolic syndrome and cardiovascular disease (Kannel *et al*., 1991, Denke *et al*., 1993; Insel *et al*., 2007).

Presently waist-hip circumference ratio (WHR) is not so often used for evaluating central adiposity in the general population and in its place waist circumference is the most widespread anthropometric measurement used. However waist hip ratio (WHR) is useful in detecting possible signs of excess fat deposition (lipodystrophy) in those infected with the HIV (Florindo *et al*., 2004; Dolan *et al*., 2005; Jaime *et al*., 2006).

The present study is aimed at estimating the prevalence of abdominal obesity and comparing the significantly associated factors between those with had abdominal obesity with those who did not. The study was also designed to predict those factors that have the potential to contribute to the development of abdominal obesity in PLHIV receiving HAART. This is the first study on abdominal obesity among PLHIV in Malaysia.

2. Materials and Methods

2.1 Study design and sampling method

Study subject involved a total of 340 adult HIV diagnosed patients aged 20 years or older undergoing treatment with at least one ARV drug, proportionally sampled from all PLHIV who were initially investigated between February and September, 2008, at Hospital Sungai Buloh, Malaysia. The missing data related to anthropometric measurements were the result of some conditions during clinical examinations including pregnancy (4 cases), inability to measure height and weight (2 cases) due to inappropriate position of subjects (sitting or lying down and not able to stand up).

Finally, the waist and hip measurements of 334 of studied population were measured for the calculation of waist-hip ratio (WHR). Patients were recruited when they were at the hospital for their normal follow-up. Patients who were undergoing treatment with b-blockers, diuretics, steroids, oral contraceptive pills, lipid-lowering and hyperglycemic agents, corticoids, anabolic steroids or growth hormones before and during ART as well as those who had active opportunistic diseases (infections or tumors) in the six months prior to the study as well as non Malaysians were also excluded. The process of sampling was applied on respondents' records. Before selecting respondents' records, the investigator used a sampling fraction in each stratum that was proportional to that of the total population. The investigator determined the total HIV respondents receiving antiretroviral medication till February 2008 at the infectious diseases clinic at Hospital Sungai Buloh, and then calculated the percentage in each ethnic group and gender. In order that the sample was well represented from the standpoint of gender and ethnicity a two-stage proportional stratified sampling method was applied with the Chinese making up 64.7% (216 patients), and the Malay and Indians each making up 24.9% (83patients) and 10.4% (35 patients) respectively. Meanwhile, 79.9% (267 patients) were male and 20.1% (67 patients) females.

2.2 Data collection

The data collection was conducted in 29 weeks between February and September, 2008, at Hospital Sungai Buloh, Malaysia. A bi-lingual structured questionnaire (in Malay and English) was developed to obtain the information about socioeconomic status (gender, ethnicity, age, employment and educational level, monthly household income), medical history and health status (duration of HIV infection, current supplementation, history of drug abused, CD4 cell count and HIV viral load at start of medication and at time of the study) ARV regimen (line, length of time on ARV and exposure to AZT, d4T, PI). Informed written consents were obtained from the respondents by two trained assistants prior to taking measurements (all done by the principal investigator to reduce error) and conduct of interview.

Weight (kg) was taken using the Tanita weighing scale that was calibrated weekly and height (m) measures using a SECA body meter. Two weight and height measurements were taken and the average recorded. Body mass index (BMI, kg/m2) was calculated according to the World Health Organization (WHO) criteria for classification (WHO, 2000b).

Body composition including total fat and total fat-free mass (lean mass) were measured using bioelectric impedance analyzer (BIA) BODYSTAT®1500. In accordance to the instructions in its manual, respondents were told the following; (a) not to eat or drink four hours before the test, (b) avoid heavy exercise 12 hours before testing, (c) to not drink alcohol within 24 hours of the test, (d) empty bladder completely prior to testing and (e) to avoid taking diuretics prior to testing unless instructed by the physician. Because all respondents had also to fast overnight (12 to 14 hours) for blood to be taken for various tests and therefore it was the best opportunity for the researcher to carry out the BIA at the same time.

Both waist and hip circumferences were measured using the SECA ® (SECA, Germany) non stretchable tape to the nearest 0.1 centimeter. Waist circumferences were obtained by measuring the distance around the smallest area below the rib cage and above umbilicus (belly button). Hip circumference measurements were taken at the point yielding the maximum circumference over the buttocks with the tape in a horizontal plane, touching but not compressing the skin. The measurements were carried out twice, and then the average of the two readings was recorded as the final reading. All measurements were taken by the researched herself.

Abdominal obesity was defined as waist-to-hip ratio greater than 0.90 for men and 0.85 for women (WHO, 1998). Generally male waist circumference equal to or more than 102 cm and female waist circumference equal to or more than 88 cm were considered unhealthy (WHO, 1998).

Blood pressure was measured using digital blood pressure machine model (General Electric, DINAMAP ProCare 120). Blood pressures of respondents were measured in a sitting position on the right upper arm after a rest of a few minutes in the infectious disease clinic.

Biochemical assessment in adults included laboratory measurements of fasting lipid profile [Total Cholesterol (TC), LDL- Cholesterol (LDL-C) and HDL-Cholesterol (HDL-C)], fasting plasma glucose (FPG), CD4 cell count and HIV RNA load. All biochemical parameters were obtained from the computerized medical records of patients. The CD4 cell counts were categorized according to the standard of CENTRE FOR DISEASE CONTROL AND PREVENTION (CDC, 1993). Tests for HIV-RNA viral load was used to determine HIV RNA load during ARV medication and then classified using WHO (2006) references into undetectable level (value below 50 copies/mL) and detectable level (as equal or greater than 50 copies/mL).

The 24-hour dietary recall method of data collection required individuals to remember the specific foods and amount of food (macronutrient, micronutrient and total energy) they consumed in the past twenty-four hours. Detailed descriptions of all foods and beverages consumed including cooking methods were taken into account. Information such as ingredients of the cooked food and amount of raw food used in cooking were also obtained. Quantities of food consumed were estimated using household measures and were later entered into the data sheet. The twenty-four hour recalls were carried out over two days with one on a weekday and one in the weekend. Data obtained were analyzed based on the Malaysian food database using Nutritionist Pro software (First Data Bank, 2005). Malaysian food composition tables (Tee *et al*., 1997) were applied to measure the quantity of some food. If cooked dishes were not included in the database of Nutritionist Pro™ Software, Malaysian Food Composition database (Tee *et al*., 1997) were used to identify recipe for each dish and then the quantitative information was entered to Nutritionist Pro software. The average energy and nutrient content of the two days 24-houre dietary recall were used for statistical analysis. The dietary variables studied included consumption of energy (in kcal), macronutrients (in g and % energy), sodium and potassium.

2.3 Data analysis

Statistical analysis was performed using SPSS statistical software (version 16.0). The association between abdominal obesity and demographic, clinical and anthropometric variables was assessed using the Chi-square test (categorical variables) and Independent Sample t-test (continuous variables) and Fisher's Exact test.

A multiple logistic regression model was used to predict the risk or protective factors for abdominal obesity adjusting for potential confounders, such as gender, age, ethnicity, years of education, ever abused drug (yes/no), line of ARV regimen, monthly household income (in Ringgit Malaysia- RM), length of time on ARV (Months), BMI (kg/m2) at start of medication and at the time of the study, CD4 cell count at the time of study and triglyceride, fasting plasma glucose (mmol/L), body fat mass (%), energy intake (kcal), protein intake (g), carbohydrate intake (g), fat intake (g), sodium (mg), potassium (mg), % energy from protein, % energy from carbohydrate and % energy from total fat**.** The estimates were presented as odds ratio (OR) with a 95% confidence interval (95% CI). Guidelines provided had stipulated that total carbohydrate intake should contribute 55-70%, total fat 20-30%, and protein 10-15% of total daily energy intake for the Malaysian adult population (NCCFN, 2005). Total energy requirements were increased by 10 percent (WHO, 2003) over the level of energy intake recommended for healthy non- HIV-infected persons of the same age (adults), sex, and physical activity level for asymptomatic patients in stage 1 AIDS (WHO, 2006).

2.4 Ethical issue and Consent Form

Ethical considerations and approvals to conduct the study were obtained from the following list of individuals/committees: (1) Medical Research Ethics Committee of the Faculty of Medicine and Health Science, University PUTRA Malaysia, (2) The director, Hospital Sungai Buloh, (3) The director, Hospital Selayang, (4) Clinical Research Center (CRC) of the Ministry of Health Malaysia, (5) National Institute of Health (NIH) Malaysia and (6) Ministry of Health Malaysia.

All participants were fully informed about the purpose of the study. Their anonymity was maintained by asking participants not to write their names on the questionnaire. Confidentiality was maintained by not identifying any responses and by reporting the information in a summary form. In additional, their participation in the study was on a voluntary basis, they can withdraw from the study at any time without affecting their treatment. All the respondents filled and signed a consent form before they were interviewed.

3. Results

3.1 Prevalence of abdominal obesity

Prevalence of abdominal obesity according to waist circumference and waist hip ratio is presented in Table1. The overall prevalence of abdominal obesity based on waist hip ratio was 36.5%. The comparison of percentage distribution by characteristics revealed that a significantly higher percentage of Indians and Chinese, respondents who had no history of drug abuse, those currently exposure to a protease inhibitor (PI) agent, those respondents that were overweight/obese at start of medication or at the time of study had abdominal obesity (Table 2).

The comparison with the background of respondents as shown in Table 2 revealed that the respondents with abdominal obesity had significantly higher (p<0.05) mean age, blood triglycerides, fasting plasma glucose, HDL-cholesterol, BMI at the start of medication and at the time of the study, waist circumference, waist hip ratio, body fat mass, systolic and diastolic blood pressure and also lower mean CD4 cell count at start of medication and body lean mass than those without abdominal obesity.

The comparison of mean dietary intakes for patients with and without abdominal obesity is presented in Table 3. There were no significant differences in average dietary intake of various nutrirnts between two groups.

As shown in Table 4, the results of the final logistic regression models for selected variables found that before adjusting for covariates, age (unadjusted OR=1.050, CI=1.023-1.078), current exposure to PI (unadjusted OR=2.237, CI=1.212-4.129), higher triglycerides (unadjusted OR=1.192, CI=1.032-1.378), higher fasting plasma glucose (unadjusted OR=1.292, CI=1.119-1.491), higher BMI at start of medication (unadjusted OR=1.207, CI=1.128-1.291), higher BMI at the time of study (unadjusted OR=1.319, CI=1.214-1.434), higher BMI at the time of observation (unadjusted OR=1.044, CI=1.012-1.078) and higher body fat mass (unadjusted OR=1.044, CI=1.012-1.078) significantly increased the risk of abdominal obesity. In contrast being Malay protected (unadjusted OR=0.471, CI=0.266-0.834) them against abdominal obesity. After adjusting for the covariates, a significant higher risk of abdominal obesity were observed in those who were older (adjusted OR=1.053, CI=1.012-1.095), those who had higher fasting plasma glucose (adjusted OR=1.189, CI=1.014-1.394), those with higher BMI at the time of observation (adjusted OR=1.426, CI=1.215-1.674) and being Malay was a protective factor (adjusted OR=0.264, CI=00.102-0.685) for abdominal obesity.

4. Discussion

This study revealed that WHR is a more accurate anthropometric predictor of abdominal obesity than WC confirming studies by Florindo *et al*. (2004) and Jaime *et al*. (2006). Florinda and colleagues (2004) using computerized tomography of the abdomen (CTA) found that visceral fat had better association with the measurement of WHR (r=0.74; p=0.009) than with the measurement of WC (r=0.60; p=0.050) among men (n=10) and women (n=5) in Brazil. The main reason for this is the fact that PLHIV on medication experience morphological alterations including reduction in hip circumference due to lipoathrophy along with increase in waist circumference as a result of subcutaneous and/or visceral fat accumulation

Similarly, a high incidence of centralized distribution of adiposity has been observed among PLHIV under treatment with ARV regimen, (Schwenk *et al*., 2001; Dolan *et al*., 2005; Jaime *et al*., 2006; Sutinen & Yki-Järvinen, 2007). Some previous studies (Miller *et al*., 1998; Carr, 2000; WHO, 2006) had attributed the increased risk of abdominal obesity mainly to the prescription of PIs.

Morphological abnormalities observed in subjects receiving ARV has been found to differ by gender as well as race/ethnicity. Some study of positive HIV infected subjects under ARV medication showed that abdominal fat and mean WHR/WC were higher in HIV positive men (Jacobson *et al*. 2005; Shah *et al*., 2005) or among HIV infected women (Jamie *et al*. 2006). In this study abdominal obesity was more prevalent among the women but the difference was not significant. Fasting hyperinsulinemia (Hadigan *et al*., 1999) in human immunodeficiency virus-infected women with the increased abdominal fat may be the possible explanations for tendency to progress an android body formation characterized by increased trunk fat. The finding of this research revealed that abdominal obesity was less prevalent among Malay and Chinese. Also, A number of researches revealed that Caucasian HIV positive women (Bausserman *et al*., 2004), African-American women and White men (Shen *et al*., 2006) had higher WC. Similarly, Kee *et al*. (2008) reported that among 32,900 Malaysian subjects, the prevalence of abdominal obesity was higher among the Indian (28.2%) than Malays (18.6%) and Chinese (14.1%). It may be a reason for higher incidence of abdominal obesity among studied HIV subjects that was influenced by race/ethnicity differences in general population (Kee *et al*., 2008).

This study revealed that PLHIV on ARV experienced an increase in central adiposity with age confirming the findings of Martinez *et al*. (2001), Jaime *et al*. (2006). WHO (2006) also made mention of this in their guidelines on ARV for PLHIV. PLHIV as a relatively small portion of general population may experience the similar consequences of aging including deficiencies in growth hormone, dehydroepiandrosterone, testosterone and, decline in resting metabolism that may be accompanied with weight gain (Racette *et al*., 2003). Another factor that was associated with prevalence of abdominal obesity was CD4 cell count at the start of medication confirming the study by Mallon *et al*. (2003) and WHO (2006).

Higher LDL-cholesterol (Mallon *et al*., 2003), triglycerides (Kosmiski *et al*., 2001; Mallon *et al*., 2003; Guimarães *et al*., 2007), and lower HDL cholesterol (Kosmiski *et al*., 2001; Fessel *et al*., 2002; Mallon *et al*., 2003; Scherzer *et al*., 2008), FPG (Meininger *et al*., 2002; Guimarães *et al*., 2007) in blood were observed in patients with more abdominal adiposy. Similarly, Meininger *et al*. (2002) demonstrated that increasing in WHR (CI = 18.6-136.1; p = 0.011) is associated with incidence of fasting hyperinsulinemia (as predictor of elevated plasma glucose).

Joy *et al*. (2008) using linear regression model in the USA found that the relationship between BMI and abdominal fat accumulation was linear ($p < 0.0001$). In the other words, increase in BMI was accompanied with the increase in abdominal obesity. In terms of abdominal obesity, Jacobson *et al*. (2005) using multivariate analysis in USA found that greater body fat mass (relative risk (RR) = 3.1, CI = 1.4-6.7; $p < 0.005$) was associated with the risk of fat deposition in abdomen and the respondents with higher percentage of body fat had more central fat deposition (waist-to-hip ratio of > 0.95 cm for men and of >0.85 cm for women).

In addition, it was noted that increased WC, WHR and abdominal obesity occurred more frequently in individuals with hypertention, expressed by increased systolic and/or diastolic blood pressure (Sattler *et al*., 2001; Jung *et al*., 2004; Guimarães *et al*., 2007; Nyamdorj *et al*., 2008).

Contrary to some studies (Hendricks *et al*., 2003; Jaime *et al*., 2006), there were no significant difference in dietary intake between HIV infected subjects with and without abdominal obesity in this study. It seems that dietary factors did not play a key role in occurrence of this morphological abnormality.

One limitation of this study is that it is based on a cross-sectional design and the availability of longitudinal follow-up data can further explain and confirm the association of abdominal obesity with other factors. Another limitation was the fact that the result of this study only indicates abdominal obesity and nutritional factors of

PLHIV receiving antiretroviral medication at Hospital Sungai Buloh and therefore it cannot be generalized to all PLHIV in Malaysia. In-spite of the advantages of using bioelectrical impedance analysis (BIA), it cannot measure regional body composition and thus was not used to measure abnormal body-fat deposition and this is a BIA measurement limitation. Consequently, the more advanced and precious medical instruments such as DEXA (Dual-Energy X-Ray Absorptiometry), MRI (Magnetic Resonance Imaging) or CT scan (Computed Tomography) are recommended. Since this study focused on fat deposition as abdominal obesity, these findings cannot be applicable to regional fat loss or fat atrophy.

The investigation on the incidence of morphological changes as fat atrophy and fat accumulation should be further studied to determine the prevalence of lipodystrophy. The estimated dietary intakes in this study were based on 24-hour recall and despite using trained interviewers inaccurate estimates and underreporting of food intake recall by respondents with little or no education was another limitation. Dietary data collected by 24-hour recall may be less accurate than food record data due to the inability of memory recall by older respondents as a result of their mental cognitive impairment (Gauthier *et al*., 2006), underreporting of consumed food by the obese due to desirability to eliminate unhealthy food such as fat (Tooze *et al*., 2007) and poorly educated respondents that may not reflect usual intake.

5. Conclusion

As a result of some complications associated with HIV infection and ARV medication including metabolic and morphological abnormalities that interfere with health status and quality of life of this population, further studies are needed to evaluate the impact of modifiable and preventive programs on morphologic and metabolic complications, their risk factors and risk of future chronic diseases in HIV infected subjects.

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Table 1. Prevalence of Abdominal Obesity According to Waist Circumference and Waist Hip Ratio

(N=334)

Abdominal Obesity	Waist Circumference [a] (n=334)	Waist Hip Ratio[§] (n=334)
Yes	15 (4.5)	122 (36.5)
No	319 (95.5)	212 (63.5)

[a] Abdominal obesity: Female WC $\geq$ 88 cm and Male WC $\geq$ 102 cm (WHO, 1998

[§]Abdominal obesity: Female WHR > 0.85 and Male WHR > 0.9 (WHO, 1998)

Table 2. Population characteristics according to the presence of abdominal obesity (n = 334)

Characteristic	**Abdominal Obesity No. (%)**		***P*-Value**
Abdominal Obesity	No (n=212)	Yes (n=122)	
Gender			
Male	172 (64.4)	95 (35.6)	
Female	40 (59.7)	27 (40.3)	0.473[a]
Ethnicity**			
Chinese	129 (59.7)	87 (40.3)	
Malay	63 (75.9)	20 (24.1)	
Indian	20 (57.1)	15 (42.9)	0.024[a]
Educational Level (Years)			
No Formal Education	4 (57.1)	3 (42.9)	
1-9	123 (62.1)	75 (37.9)	
=>10	85 (65.9)	44 (34.1)	0.725[§]
Employment Status			
Employed (Full and Part Time)	128 (65.6)	67 (34.4)	
Unemployed	72 (60.0)	48 (40.0)	
Self employed	12 (63.2)	7 (36.8)	0.600[a]
Monthly Household Income			
RM < 1000	95 (65.1)	51 (34.9)	
RM 1000-2000	66 (64.7)	36 (35.3)	
=> RM 2000	51 (59.3)	35 (40.7)	0.646[a]
Duration of HIV Infection (Years)			
1-5	98 (62.4)	59 (37.6)	
6-10	74 (60.2)	49 (39.8)	
=>10	36 (75.0)	12 (25.0)	0.182[a]
Current Supplementation			
No	149 (60.8)	96 (39.2)	
Yes	63 (70.8)	26 (29.2)	0.094[a]
Ever Drug Abused**			
No	167 (60.1)	111 (39.9)	
Yes	145 (80.4)	11 (19.6)	0.004
CD4 Cell Count at Start of Medication			
< 200 cells/mm^3	145 (62.0)	89 (38.0)	
200-499 cells/mm^3	50 (76.9)	15 (23.1)	
=> 500 cells/mm^3	4 (80.0)	1 (20.0)	0.052[§]
CD4 Cell Count at Time of Study			
< 200 cells/mm^3	36 (17.0)	22 (72.9)	
200-499 cells/mm^3	112 (52.8)	68 (47.2)	
=> 500 cells/mm^3	64 (30.2)	31 (69.8)	0.674[a]
Viral Load at Start of Medication			
< 100,000 copies/mL	76 (70.4)	32 (29.6)	
≥ 100,000 copies/mL	62 (62.6)	37 (37.4)	0.238[a]
Viral Load at Time of Study			
< 50 copies/mL	185 (64.0)	104 (36.0)	
≥ 50 copies/mL	27 (60.0)	18 (40.0)	0.603[a]
Length of Time on ARV (Months)			
< 6	8 (50.0)	8 (50.0)	
≥ 6	201 (64.0)	113 (36.0)	0.257[a]
Line of Antiretroviral Regimen			
First Line	110 (67.1)	54 (32.9)	
Changed First Line	101 (60.1)	67 (39.9)	0.188[a]

Exposure to AZT					
No	103 (62.1)		54 (37.9)		
Yes	105 (65.6)		64 (34.4)		0.514[a]
Exposure to d4T					
No	108 (62.1)		66 (37.9)		
Yes	100 (65.8)		52 (34.2)		0.486[a]
Exposure to PI**					
No	188 (66.4)		95 (33.6)		
Yes	23 (46.9)		26 (53.1)		0.009[a]
BMI at Start of Medication **					
Underweight (BMI < 18.50 Kg/m^2)	56 (82.4)		12 (17.6)		
Normal (BMI 18.5 – 24.99 Kg/m^2)	136 (65.4)		72 (34.6)		
Overweight/Obese (BMI≥18.5–24.99 Kg/m^2)	20 (34.5)		38 (65.5)		0.0001
	Mean; Standard deviation				
Age (Years) ***	40.66;	8.73	44.44;	8.68	0.0001
Number of years of formal education (Years)	7.96;	4.71	7.76;	4.26	0.692
Household Income Per Month (RM)	1,143.07;	1,060.08	1,311.35;	1,570.14	0.293
Duration of HIV Infection (Years)	6.10;	4.14	5.67;	3.48	0.346
CD4 cell count at Start of Medication (cells/mm^3) ***	129.42;	119.88	97.73;	99.53	0.015
CD4 cell count at the Time of Study (cells/mm^3)	402.02;	222.10	403.21;	220.29	0.963
Viral Load at Start Medication (copies/mL)	269,741.83;	695,459.80	412,087.42;	959,751.22	0.225
Viral Load at the Time of Study (copies/mL)	780.30;	5,894.72	2,491.73;	20,002.51	0.246
Length of Time on ARV (Months)	42.41;	33.77	45.92;	34.12	0.364
Total Cholesterol (mmol/L)	5.63;	1.24	5.75;	1.11	0.385
LDL-cholesterol (mmol/L)	3.41;	1.12	3.47;	1.10	0.646
HDL-cholesterol (mmol/L)***	1.20;	0.37	1.08;	0.33	0.005
Triglycerides (mmol/L)***	2.23;	1.57	2.68;	1.60	0.014
Fasting Plasma Glucose (mmol/L)***	5.34;	1.65	6.28;	2.48	0.0001
BMI at the Start of Medication (Kg/m^2)***	20.52;	3.21	23.24;	4.72	0.0001
BMI at the Time of Study (Kg/m^2)***	21.02;	3.11	24.04;	3.82	0.0001
Waist Circumference(cm)***	75.83;	7.29	87.17;	8.52	0.0001
Hip Circumference (cm)***	90.32;	6.64	91.95;	7.91	0.044
WHR (ratio)***	83.91;	4.40	94.83;	4.92	0.0001
Body Fat Mass Percentage (%)***	20.65;	6.85	22.83;	7.26	0.006
Body Lean Mass percentage (%)***	79.44;	6.95	77.19;	7.23	0.005
Systolic Blood Pressure (mm Hg)***	126.75;	18.80	132.78;	19.45	0.006
Diastolic Blood Pressure (mm Hg)***	75.10;	11.24	79.03;	11.97	0.003

Statistically significant difference (**Chi-square test for frequencies, ***Independent sample t-test for means), *p<0.05.

[a] Chi-square test for frequencies, [§] Fisher's Exact Test.

Table 3. Dietary intake of the population according to the presence of abdominal obesity

(n = 334)

	Abdominal obesity				*P-Value
Characteristic	No (n=212)		Yes (n=122)		
	Mean; Standard deviation				
Energy (kcal)	1461.06;	416.76	1414.99;	344.34	0.277
Protein (g)	67.45;	24.61	66.33;	24.07	0.688
Carbohydrate (g)	172.27;	46.67	167.33;	36.48	0.284
Total Fat (g)	55.85;	23.53	53.12;	20.25	0.266
Sodium (mg)	1966.35;	883.63	2080.58;	758.59	0.232
Potassium (mg)	1466.82;	1019.66	1302.56;	449.23	0.093
% Energy from Protein	18.39;	3.82	18.61;	4.22	0.629
% Energy from Carbohydrate	48.02;	8.06	48.28;	8.25	0.779
% Energy from Fat, total	33.56;	6.80	32.85;	7.35	0.369

Statistically significant difference (Independent sample t-test for means): *p<0.05.

Table 4. OR (95% CI) for the abdominal obesity from logistic regression analysis for selected variables

Characteristic	**Unadjusted OR (95% CI)**	**P-Value**	**Adjusted OR (95% CI)**	***P*-Value**
Age	1.050 (1.023-1.078)	0.0001*	1.053 (1.012-1.095)	0.010*
Ethnicity				
Chinese	1.00	0.027*	1.00	0.023*
Malay	0.471 (0.266-0.834)	0.010*	0.264 (0.102-0.685)	0.006*
Indian	1.112 (0.540-2.291)	0.773	0.593 (0.188-1.871)	0.372
Ever Abused Drugs				
No				
Yes	0.368 (0.182-0.742)	0.005*	0.610 (0.228-1.637)	0.327
Current Exposure to PI				
No	1.00		1.00	
Yes	2.237 (1.212-4.129)	0.010	2.112 (1.108-3.821)	0.216
Triglycerides	1.192 (1.032-1.378)	0.017*	1.033 (0.854-1.250)	0.738
Fasting Plasma Glucose	1.292 (1.119-1.491)	0.0001*	1.189 (1.014-1.394)	0.033*
BMI at Start of Medication	1.207 (1.128-1.291)	0.0001*	0.986 (0.877-1.109)	0.817
BMI at the Time of Study	1.319 (1.214-1.434)	0.0001*	1.426 (1.215-1.674)	0.0001*
Body Fat Mass (%)	1.044 (1.012-1.078)	0.007*	1.002 (0.936-1.072)	0.962

Adjusted for gender, age, ethnicity, years of education, ever abused drug (yes/no), line of ARV regimen, monthly household income (in Ringgit Malaysia- RM), length of time on ARV (Months), BMI (kg/m2) at start of medication and at the time of the study, CD4 cell count at the time of study and triglyceride, fasting plasma glucose (mmol/L), body fat mass (%), energy intake (kcal), protein intake (g), carbohydrate intake (g), fat intake (g), % energy from protein, % energy from carbohydrate, % energy from total fat.

In Vitro Study Cocaine Decreased Progesterone Synthesis in the Isolated Cytotrophoblast Cells and in Situ Study PGE_2 and PGF_2A Levels Increased N the Amniotic Fluid in Cocaine Users in Humans

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Abstract

In vitro study the capacity of isolated cytotrophoblast cells (placental cells) treated with cocaine hydrochloride ranging in dose level from 1-3.00 μmolar (0.25-75 mg/ml).to synthesize progesterone was examined. 25 hydroxycholesterol (OHC) or low density lipoprotein (LDL was added in the media as substrate to stimulate progesterone synthesis. In situ study, prostaglandins levels (PGE_2 and $PGF_2\alpha$) were measured in the aspirated amniotic fluid obtained from subjects who used cocaine throughout their pregnancy. The data show progesterone synthesis was significantly decreased ($p<0.05$) in vitro study, in situ study prostaglandin (PGE_2 and $PGF_2\alpha$) levels in the aspirated amniotic fluid were significantly increased ($p<0.01$). To determine whether cocaine effects cAMP synthesis in the isolated cytotrophoblast cells, cAMP level was measured in the presence of cocaine the data showed decreased cAMP level ($p>0.01$). Data on birth weights of newborn and gestational age of mothers in cocaine users showed a significant decrease ($p<0.05$) and the incidence of placental abruptio, a serious complications in pregnancy showed significant increase ($p<0.001$) in cocaine users.

We conclude that cocaine induced decreased progesterone synthesis in the placental cells and an increased prostaglandins level in the amniotic fluid is the cause of early termination of pregnancy in subjects using cocaine during pregnancy.

Keywords: Placenta, Cocaine, Progesterone, Prostaglandins, Humans

1. Introduction

It is estimated that 50 million people in Unites States use cocaine on a regular basis and almost one million are women ranging in age from 18-34 years. (Das, 1990) The National Association of Perinatal Addiction Research and Education reports that almost 11percent of all pregnant women are substance abusers, cocaine accounting for most abuse (Smith and Asch 1987, Chavkin, and Kandall 1990). Exposure of cocaine during pregnancy contribute to several medical problems including placental previa, placental abruption (Acker *et al* 1983, Chasnoff *et al* 1992, and Botros, Atterbury and Groome, 1996) and premature births (Chasnoff *et al* 1992) fetal growth retardation (Bingol 1987, Das 1994), numerous neurobehavioral dificits (Hoyme *et al*., 1990, Plessinger and Woods 1993,). Even after variables such as race, age, smoking and poly drug use are controlled, there is a little doubt that the use of cocaine during pregnancy is significantly associated with adverse pregnancy outcome. (Little *et al*, 2003).

A question how does cocaine contribute to early termination of pregnancy in humans is not yet fully resolved. Several hypothesis have been presented and generally it is accepted that cocaine causes vasoconstriction of placental blood vessels (Moore *et al* 1986, Monga *et al* 1994) and thus decreasing the blood supply to the fetus and causing fetal anomalies. Although there is a strong evidence to support this hypothesis, it still does not explain fully the cause of commonly observed condition in cocaine users in humans, an early termination of pregnancy. (Botros, Atterbury and Groome 1996, Das 1994,. Studies were designed to examine whether cocaine affects fetal-placental endocrine milieu namely progesterone and prostaglandins synthesis, two vital biochemical events taking place preceding pregnancy termination in mammals including humans. The studies were conducted in vitro and in situ, in vitro study, effect of cocaine on progesterone synthesis was determined using isolated placental cells (cytotrophoblast cells), in situ study, prostaglandins (E_2 and $F_{2\alpha}$) level in the aspirated amniotic

fluid was determined in subjects who used cocaine on a regular basis throughout their pregnancy.

2. Materials

Selection of Human Subjects

All participants in the study were volunteers and signed consent form which was approved by Institutional Review Board. The subjects came to Howard University Hospital for delivery. Medical history as well as substance abuse information was obtained from each subjects prior to their participation in the study. For in vitro study, each subject's history was reviewed and only those who provided negative history of drug abuse (licit and illicit) and tested negative for the presence of cocaine metabolites in the urine, free of infection, normal histology (microscopic examination) and morphology of the placenta. These subjects used no medication during pregnancy including over the counter medication in particular they had not taken aspirin or nonsteroidal anti-inflammatory medication in the weeks prior to delivery.

Urine Test

Each subject was tested for the presence of benzoylecgonine (cocaine metabolite) in the urine (0.5ml) regardless of their medical history given to us using Synchron LX system. Drugs of Abuse Testing. The test is a qualitative determination it utilizes a homogenous enzyme immunoassay, it comprises specific antibodies which can detect benzoylecgonine in urine. Briefly, the principle of the assay is as follows. A drug labeled glucose-6-phosphate dehydrogenase conjugate competes with any free drug from the sample, the drug labeled G6PDH conjugate is bound by the specific antibody and enzyme activity is inhibited. This reaction creates a direct relationship between the presence of drug and enzyme activity G6PDH enzyme activity is determined spectrophotometrically by measuring its ability to convert nicotinamide adenine dinucleotide (NAD) to NADH (reduced form). The system can be calibrated from 0 ng/mL benzoylecgonone to 3000 ng/mL benzoylecgonine. The results are reported as positive or negative. A sample rate greater than or equal to cutoff rate is reported as positive (>- 300 ng/mL). A negative test result indicates that cocaine metabolites are either not present, or are present at levels below the cutoff threshold of the test. Cross activity chart provided by the manufacturer indicate that none of the substance abuse has negative cross activity with this test. Inquiries into maternal drug use were made throughout the prenatal course and reported in the patient's chart is consistent with negative responses were considered reliable for this study. A resident physician explained the scope of the project and provided the participants with questionnaire. The selection of participants in the program was based on the following criteria: a) non drug users, essential or nonessential throughout pregnancy; b) no evidence of infection or known nutritional deficiencies at the time of delivery; 3) all had normal delivery with gestation age between 38-40 weeks.

The participants were of low socioeconomic status of indigent population and were in the age group between 20-25 years.

The duration of pregnancy was assessed by the date of the last menstrual period and by ultrasound examination.

For in situ study, subjects were tested for drugs and those who tested positive for cocaine and those who reported use of cocaine more than once per week throughout pregnancy were included in the study.

A total of 16 subjects were selected for the study. An equal number were used in the control group.. The groups were divided in sub groups of four (4). The differences between subgroups were not significant therefore all samples (sixteen) were pooled in each group and the data presented here are the in figures are the averages of sixteen subjects (16) in each group. The study was completed in two years period.

Culture Medium and Fetal Calf Serum

Culture medium and fetal calf serum were purchased from Grand Island Biological Company (Grand Island, NY), culture dishes from Falcon Plastics (Cockeyville, MD), bovine serum albumin (Pentex fraction V) from Miles Laboratories (Kankakee, IL), co-factors (NADP,Glucose 6- phosphatase and G-6-dehydrogenase) from Sigma Chemical Co. (St.Louis, MO) 25- hydroxycholesterol was obtained from Sigma chemicals, cAMP assay kit was obtained from New England Nuclear. (Boston, Mass)

Cocaine (cocaine hydrochloride) was obtained from National Institute of Drug Abuse under a license.

Cocaine hydrochloride:

Cocaine hydrochloride was acquired from NIDA in powder form and was dissolved in sterile water. Sterility was ensured by filtration through 0.22 um filter z(Millipore Corp, Bedford, MA) and verification with the litmus amebocytes lysate test (BioWhittaker Bioproducts,Walkersville, MD) for detection of Gram-negative bacterial endotoxins.

Stock solution of cocaine

A stock solution of cocaine HCL was prepared by adding 5 mg of the compound to 10 ml of pH 7.4 Krebs-Ringer phosphate buffers. To one ml of stock solution was then added in 20 ml glass vial and Krebs-Ringer phosphate buffer pH 7.4 diluted to total of volume of 5 ml were pipetted into each of the 20 ml glass test tube. Varying level of cocaine concentration was added to the cells.

Dose level of Cocaine

Several factors were taken into account for determining dose levels of cocaine in the media in vitro study. With the reported value in the blood of cocaine users being in the range of 1-2.5 μM or 0.68 mg/L. We decided to use 1.0-3.0 μM/ml. The dose level is consistent with plasma concentration similar to those of cocaine users (0.75μg/ml). 10 to 40 mg is the usual intoxication dose in adults (Stead and Moffat 1983). Reported that concentration levels of cocaine in whole blood greater than 0.9 mg/L are reported to be associated with fatalities in both fetus and adults. Preliminary studies were conducted using 1.00, 1.5, 2.1, 2.8, and 3.00μM cocaine the controls were incubated with equivalent volume of media solution. Cocaine up to 1.5 μmolar had no effect on progesterone synthesis. Differences between 2.1 and 3.0 μmolar of cocaine were not significant. For all incubation 2.1 μmolar cocaine was used. All incubation was done using 6 hr. period using $2x10^6$ cytotrophoblast cellsl/ml.

Assay solution was prepared by combining 4 ml of 0.75 ug/ml cocaine resulting final solution of 5 ml. This concentration of cocaine has been documented to be achievable through typical intranasal administration (Stead and Moffat 1983).

Amniotic fluid Collection

At the time of birth, approximately 50 ml of amniotic fluid and 20 ml of umbilical arterial blood (fetal blood) were collected by an attending physician and precautions were taken no to contaminate the samples. Samples which were free of blood, mucus, or cell debris were chosen for the assays. All samples were stored at -20 until assayed. After the delivery, no follow up of the participants or their newborn was undertaken. The cord blood sample were used for another study to be published elsewhere.

Birth weights of newborn, gestation age and placenta abruption were recorded at the time of delivery.

Collection of Placenta

Placenta was obtained aseptically upon delivery, and placental cells (cytotrophoblast) were isolated within 2 h of delivery. Only the healthy part of the placenta was used for the study and sections were obtained from various part of the placenta in order to represent the entire placenta and care was taken not to use the necrotic and calcified portion of the placenta.

All solutions and glassware used in the preparation were sterilized by autoclaving.

Isolation of trophoblast cells (cytotrophoblast cells)

Procedure

The procedure involving the initial handing of placenta and preparation of cytotrophoblast cell isolation was accomplished according to our procedure published elsewhere (Ahluwalia *et al*., 1992) with minor modification. Briefly the procedure is as follows: approximately 30-35 g of villous tissue was cut and washed several times with sterile saline solution and placed in sterile Petri dishes containing Hank's balanced salt solution (HBBS) without sodium bicarbonate (Gibco). The tissue was minced and centrifuged for 20 min at 1200g. The supernatant was discarded and the tissue was digested with trypsin solution and DNAase (Sigma) bovine deoxyribunuclease -1 (EC 3, 121.1) (1200 K at 37 C in a water bath shaking at 120 cycles/min.). After the incubation supernatant was aspirated off and filtered through a sterile NU gauze (Johnson and Johnson), 4x4.3 plyrayon /polyester) and 10%solution of fetal bovine serum (Gibco 200-6140 PG) was added. The filtered cell suspension was gently layered on the tubes and centrifuged for 20 min at 1200g. The supernatant was poured off and the pellet was re- suspended in RPMI to a total of 10 ml. A 4-ml sample was saved for loading into preformed Percoll gradient in a 50 ml conical centrifuge tube. The gradient was made by layering 14 solutions of 70 to 5% of Percoll (v/v) in 5% steps of 3 ml in 90% Percoll (18 ml Percoll and 2 ml HBSS 10x) in a 50 ml conical centrifuge tube. Cell suspension was gently layered and the contents were centrifuged at 200g for 20 min. The cytophoblasts were trapped in the layer that occurred between the 18-27 ml markings on the tube. This layer was aspirated and diluted up to 50 ml with RPMI, vortexed and centrifuged. The pellet was re- suspended in 10 ml of RPM containing 1 ml antibiotic/antimycotic (Gibco,1000x lyophilized penicillin G sodium, steptomycin, amphotericin. The cells were counted in a hematocytometer. Between $40\text{-}50x10^6$ cells were obtained from a

30-35 g of placental tissue.

Characterization of cytrophoblast cells and their cell viability

The identification of cytotrophoblast cells was done according to the method described by Ahluwalia *et al*., 1992.

Isolation of Mitochondria and Microsomes

Since steroid synthesis takes place in mitochondria and microsomes within the cellular system these organelles were isolated using differential gradient centrifugation (Ahluwalia *et al* 1992).

Incubation conditions, number of cells used for incubation (cytotrophoblast cells) and dosage of cocaine

A series of studies were conducted to determine optimum incubation period, approximate number of cells for incubation and dosages of cocaine added to the medium. Based on these results we choose 6 h as incubation time, $2x10^6$ numbers of cells and 2.1 µmolar concentration of cocaine to obtain measurable amount of progesterone synthesis. **Preparation of lipoprotein fraction (LDL).**

Preparation of LDL was done according to procedures described by Havel *et al*., 1955 and modified by Ahluwalia *et al*., 1992.

Separation of Progesterone on column chromatography.

A modified method described by Stone *et al*.., 1971 was used to separate progesterone on a celite column using benzene, methanol, and isooctane (5:10:85) as solvent system. This solvent system clearly separates progesterone from cholesterol. The recovery of progesterone was approximately 80-85%.

Progesterone values are expressed as nanogram progesterone per $2x10^6$ cells per 6-h incubation period. The extraction efficiency of progesterone assay was done according to the procedure described by Ahluwalia *et al* 1992.

Use of LDL and 25-OH cholesterol (OHC) to stimulate progesterone synthesis

LDL and OHC has been used as substrate to stimulate progesterone synthesis. Klinman 1986, and Hellig, *et al*.,1970 reported that cytotrophoblast cells respond with an 8 fold increase in progesterone synthesis using LDL as substrate and to a lesser extent with OHC.

Measurement of cAMP in the cytotrophoblast cells in the presence of cocaine

Cytotrophoblast cells at a concentration of $2x\ 10^6$ were pipetted into each of the 20 ml glass test tube Cell /ml with DMEM and 10 µl of 25 –OH cholesterol (OHC) was added to each sample. Cocaine at 2.1µmolar was added to each sample and samples were vortexed for 2 minutes and incubated for 2, 4, and 6 h at 37 c in shaking water bath. At the end of incubation, the samples were stirred at -20c until assayed. The samples were extracted and assayed using cAMP ^{125}I RIA kit. The inter assay coefficient of variation ranged from 6.8-9.9% and intra assay coefficient of variation ranged from 6.8-15%.

Prostaglandin's levels in amniotic fluid

Prostaglandins were extracted using 6 volumes of acidified diethylether. The organic solvent was evaporated under nitrogen, and the residue was dissolved in phosphate buffer (pH 7.4). The concentration of prostaglandins was corrected for extraction efficiencies. $PGF_{2\alpha}$ and PGE_2 were measured by tritium-labeled RIA kit (Advance Magnetics, Inc; Cambridge, MA). The cross activities with other prostaglandins were less than 1.0%. The sensitivity of the assay was 2.7 pg/ml and 50% binding for the standards was 50.5 pg. The extraction efficiency was 81.2%. Solvent blanks values were subtracted from measured values.

Statistical analyses

Data were analyzed using student's *t* test or analysis of variance followed by Mann-Whitney test for corrections.

3. Results

Preterm and low birth weight babies born to cocaine users

Shown in Table 1 is the pregnancy outcome in cocaine users and controls (drug free). Although data presented here are on rather small number of subjects (sixteen subjects in each group), the results show that there was a significant decrease in gestation age and birth weights in cocaine users compared with control. Placenta abruptio was significantly increased in cocaine users 18% compared to 6 % in non drug users (control)

Progesterone biosynthesis in the cytotrophoblast cells

Shown on Figure 1 is progesterone synthesis in the cytotrophoblat cells.($2x10^6$ /6 h incubation) with and without

exogenous substrate The results showed that, in the control (without exogenous substrate) measurable amount of progesterone synthesis took place for up to 6 h suggesting that preformed cholesterol was present in the cell organelles. However, the amount of preformed cholesterol was limited, because incubation beyond 6 h did not increase progesterone synthesis. With OHC or LDL as a substrate in the medium, progesterone synthesis increased by several- folds compared to control, ($p<0.01$). Differences in progesterone synthesis with LDL or OHC as substrate was not significant. When dibutyryl cAMP (0.20mM) was added in the medium along with OHC there was further increase in progesterone synthesis compared to LDL or OHC no cAMP in the medium suggesting the role of cAMP in progesterone synthesis. When cocaine (2.1 μmolar) was added in the medium in the presence of 25-OHC there was a significant decrease in progesterone synthesis ($p<0.01$)

Shown in the same Figure is the results of cAMP levels in the cytotrophoblast cells in the drug free (controls) and cocaine treated cells. The results showed significant decrease in the level of cAMP in the presence of cocaine suggesting the decrease in progesterone in the presence of cocaine is caused by decrease in cAMP levels. The decrease in cAMP level in the presence of cocaine is probably caused by inhibiting either the conversion of ATP →AMP or the breakdown of formed cAMP by phosphodiesterase.

Shown in Figure 2 are PGs levels in amniotic fluid. The data show that in cocaine users PGE_2 and PGF_2 alpha levels were increased significantly ($p<0.01$) in the amniotic fluid. In cocaine users PGE_2 levels predominate. Shown in the same figure is prostaglandins synthesis in isolated fetal membranes in cocaine users and drug free subjects. Data show that $PGF_{2\alpha}$ and PGE_2 levels were significantly higher ($p<0.01$) in cocaine users compared to drug free. Differences between $PGF_{2\alpha}$ and PGE_2 were not significant.

4. Discussion

Some explanation is needed to interpret the data presented here. First, whether subjects who participated in the study can be relied upon their oral account of drug use and whether they had used drugs other than cocaine during pregnancy and second, does isolated cytotrophoblast cell preparation from placenta represents placental fetal endocrine functions.. To answer the first question, it should be noted that subjects who participated in the study tested positive for cocaine only and none other drugs confirmed their oral history of cocaine use as entered in their medical chart, furthermore, none of the subjects who denied using any drug during pregnancy tested positive for drugs tested in the study. There still remains a question, for how long and how much cocaine these subjects used during pregnancy. Based on common knowledge among obstetricians that pregnancy brings incentive to women to tell the truth we believe the truthfulness of subjects that they used cocaine and none other drugs throughout their pregnancy is believable. Still a possibility can't ruled out that subjects on occasion may have used drugs other than cocaine for example alcohol, cigarette smoking. However, consistency of our data and the skill and trust of attending physicians towards their patients make us believe that drugs other than cocaine if used by the subjects occasionally has negligible effect on the results of our study. The answer to the second question is simple and the data presented here and elsewhere are compelling, isolated placental cells have been used routinely by several investigators to examine fetal placental endocrine functions (Hall *et al* 1977, Kliman., Feinman and Strauss 1987, Ahluwalia, 1992). In this study, the fact that isolated cytotrophoblast cells responded to stimuli such as LDL or 25 OHC by increasing progesterone synthesis strongly suggest that steroid producing enzyme system remains intact after their isolation and purification, moreover membrane receptors were not affected by several washings including the use of trypsin during the isolation procedure. A possibility that our preparation was contaminated with macrophages exist because human macrophages have been reported to possess LDL receptors (Brown *et al* 1980,), however, the methodology used in this study which includes several washings, percoll gradient separations, and no homogenization of the tissue rules out the macrophage contamination. Moreover the fact that isolated cytotrophoblast cells transformed to syncytiotrophoblast when cultured for 96 h argue against contamination with macrophages. We are also cognizant of the fact that pregnancy outcome in substance abusers can be compromised because of their poor dietary habits and likelihood of contacting infections. However, none of the participants in this study showed sign of infection or any known deficiency of key nutrients by the attending physicians.

The major objective of our study was to examine the two biochemical events in the fetal placental endocrine axis which play a vital in the maintenance of pregnancy and termination of pregnancy. (Speroff, Glass and Kase 1994). Termination of normal pregnancy in humans is signaled by decreasing progesterone synthesis in the placenta and increasing prostaglandins synthesis in the fetal membranes. The data presented here showing decreased progesterone synthesis in isolated cytotrophoblast cells (in vitro study) coupled with elevated prostaglandins levels in amniotic fluid (see Figure 2 and 3) in cocaine users (in situ study) presents a typical placental- fetal endocrine milieu preceding pregnancy termination in humans It is well known that pharmacologic treatment with progesterone or synthetic progestational agents has a dramatic effect in the

prevention of premature labor in humans (Albrecht 1990). We believe that our data answers one of the important observations made by numerous investigators in cocaine users, the early termination of pregnancy in humans (Botros Atterbury and Groome 1996). How does cocaine effect progesterone synthesis is not known we offer the following explanation. Three possibilities exists 1) cocaine decreases the capacity of steroid producing enzyme in the placental cells 2) cocaine inhibits the entry of cholesterol into the steroid producing cells. 3) cocaine decreases the cAMP levels which is essential for steroid synthesis. The answer to the first question is negative because our preliminary data suggest that the capacity of steroid producing enzymes within the cells were not affected. Using labeled pregnenolone as a substrate we observed progesterone synthesis was not affected (unpublished) in the presence of cocaine suggesting that steroid producing enzyme system remain intact, the second possibility that cocaine inhibits the entry of substrate into the cells also appear to be negative because when isolated cells when treated with cocaine prior or after the substrate was added in the media it had no effect on progesterone synthesis suggesting that cocaine did not effect the entry of substrate in the cells. In our previous study with alcohol we have shown that alcohol decreased progesterone synthesis in cytotrophoblast cells by preventing the entry of substrate into the cells. (Ahluwalia *et al*, 1992) The third possibility that cocaine decreases the cAMP levels appears logical because cAMP is essential in the steroid biosyntheis. cAMP is required for synthesis of 20, 22dihydrocholestrol cholesterol from cholesterol in situ, an essential step in the synthesis of progesterone (Albrecht and Pepe 1990). Cocaine induced decrease in cAMP in our study is contrary to several published which indicate elevated level of cAMP by cocaine in various transporter systems (Ganapathy *et al* 2000)). However, looking closely at the data it is a possibility that increase or decrease level of cAMP may be the same phenomenon in cellular system in situ because of transitory level of cAMP and its rapid degradation. Whether cocaine causes decrease conversion of ATP. cAMP or increases level of phosphodiestarase which degrades cAMP needs further study.

Prostaglandins are oxidized derivates of polyunsaturated fatty acids and eicosatetraenoic acid. Many PGs constrict arteries, induce platelet aggregation, increase membrane permeability, and produce ischemia.It is widely accepted that fetal membranes and decidua are the site of PGs synthesis. It has become increasingly evident that cAMP has marked effect on placental progesterone production in vitro. (Caritis *et al* 1983) reported a stimulation of progesterone secretion in human tropholast culture by 8-bromo-cAMP, the B_2 adrenergic receptor against terbutaline, and the B_1 adernergic receptor agonist dobutaline. It was suggested that *B*-adrenergic receptor activation increased adenyl cyclase, resulting in an increase in cAMP (Feinman *et al* (1986) Albright E Pepe GJ 1990). Increase level of prostaglandins (PGs) is interesting because there is a significant accumulation of cocaine in amnion and there is evidence that because of accumulation of cocaine in amniotic fluid the fetus is constantly ex posed to cocaine via transport across chorion-amnion (Thadani *et al* 2004).

The ability of placenta and fetal membranes to synthesize PGs has been demonstatred in several species including rat, rabbits and humans. $PGF_{2\alpha}$ and PGE_2 are the major forms of PGs involved in the initiation of labor. Elevated PGs initiate parturition in humans and PGE_2 has been found in greater concentration at the time of parturition amniotic fluid. ((Speroff, Glass and Kase 1994).., How cocaine causes an increase in prostaglandins levels needs investigation. It could be the result of the increase in the release of precursors such as archidonic acid or decrease in degradation of ecosanoids. Large variability in the placenta in the handling of cocaine has been presented. (Simone Cu *et al* 1994 Am J. Obstet Gynecol 170, 1404- 10.)

Data on gestation period, birth weight of newborn (see table 1) are consistent with the several published reports regarding the effect of cocaine during gestation in humans.

We conclude from these data that cocaine passes through the placenta and enters the cell organelles initiates a cascade of biochemical changes leading to decreased progesterone synthesis, increased prostaglandin synthesis leading to early termination of pregnancy.

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Table 1.

Factors	Cocaine users	Control	*pvalue*
Maternal Age	25±4	26.3±7	NS
Birth Weight (g)	2250±495	2678±434	*P<0.05**
Gestation Age (weeks)	33.5±4	38.4±3	*P*<0.05*
Apgar Score	6.3±2.0	7.8±3.0	NS**
Placental Abruptio	3/16	1/16	*P<0.05*

NS=Non Significant

Significant p>0.05.

Newborn weighing less than 2500 gm is considered low birth weight. Gestation age of 37 weeks and above is considered normal, 34 weeks or below is considered pre-term.

**Apgar score of 7 and above is considered normal and below is border line

*** Non significant

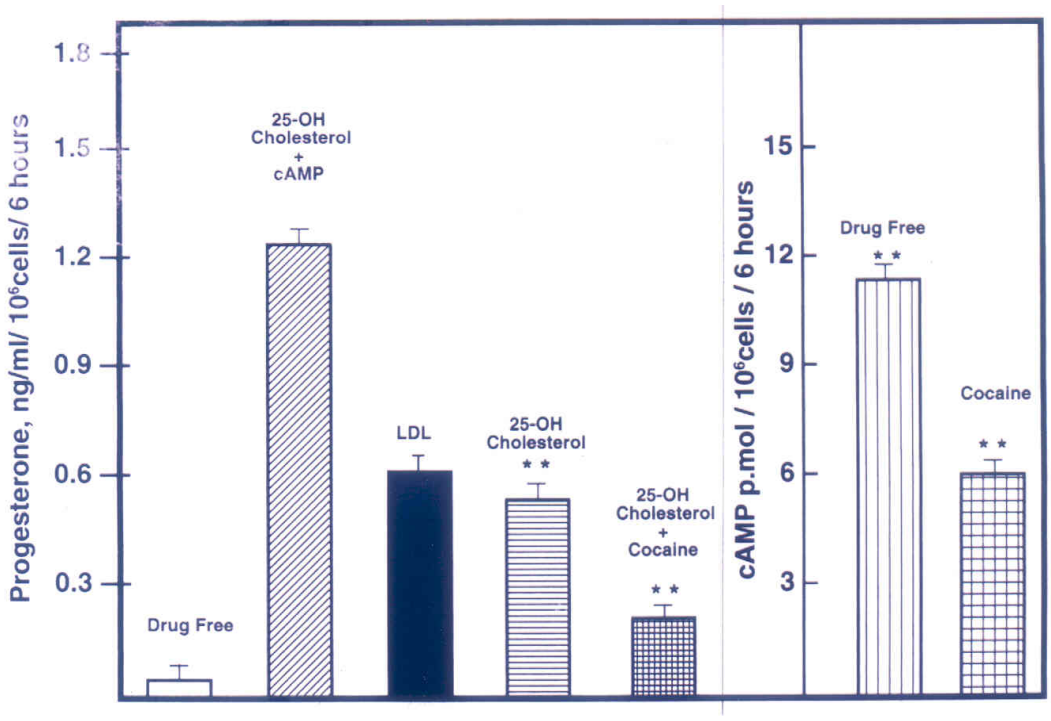

Figure 1.

Figure 1 Shows progesterone biosynthesis in isolated placental cells (cytotrophoblast cells). 1x10 ^{6} cells were incubated with cocaine (30 µM) for 6 hr. at 37c. Either of the substrate 25 –OH cholesterol or LDL was added to the medium. Results show that that either substrate progesterone synthesis increased significantly (p. <0.01)) compared with control. Differences between 25-OH and LDL were not significant. When cAMP was added in the media there was further increase in progesterone synthesis

Shown in the same Figure is the cAMP levels in cocaine treated and controls. CAMP levels were measured using radioimmunoassy. Results show that cAMP levels decreased significantly in cocaine treated cells.

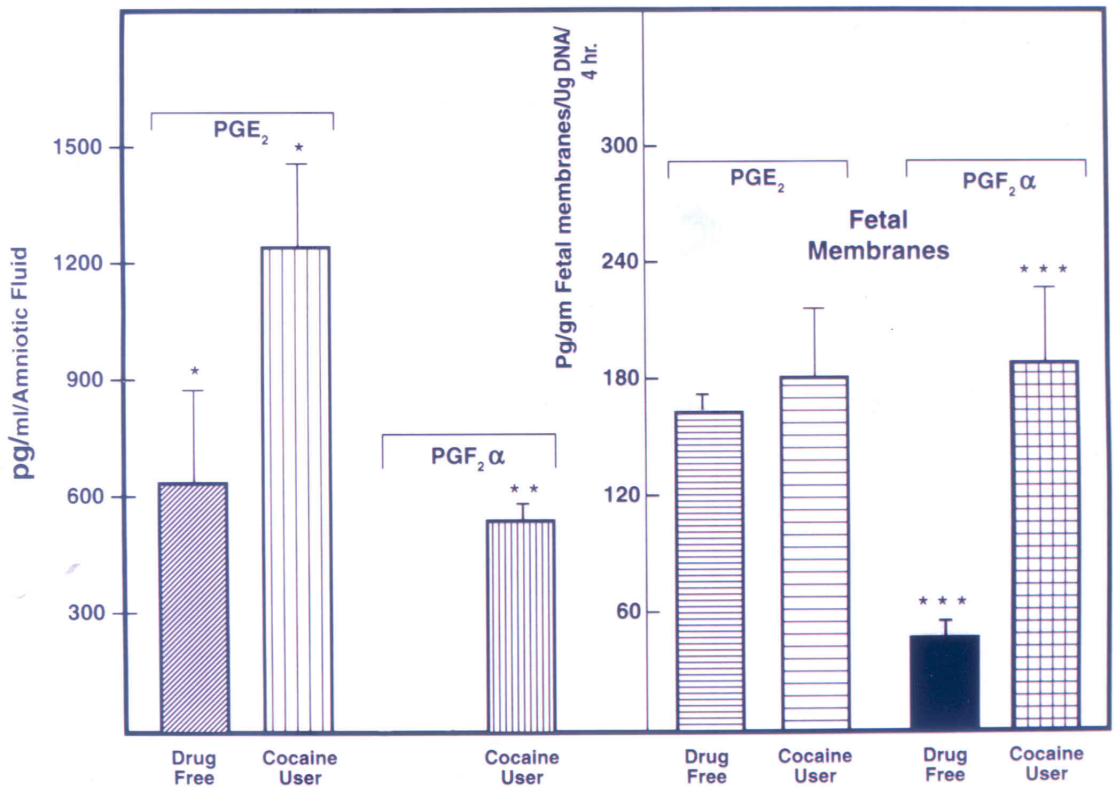

Figure 2.

Figure 2 shows PGs levels (PGE_2 and $PGF_{2\alpha}$) in amniotic fluid and isolated fetal membranes. Results show that PGE_2 levels increased significantly $p<0.001$) in cocaine users compared to controls. No significantly differences were found in $PGF_{2\alpha}$ and controls

Shown in the same figure is PGs levels in the isolated fetal membranes. Results show that PGE_2 and $PGF_{2\alpha}$ levels increased significantly compared to controls. Differences between PGE_2 and $PGF_{2\alpha}$ were not significant.

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Evaluation of the Effectiveness of Intervention for Malaria Control in Rural Areas in China

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Abstract

Malaria can be prevented at the individual level by taking personal protections. However, effective preventive action is a result of public health programs that adequately teach preventive measures to the population. This study was carried out in 2007 to evaluate the knowledge on malaria control and prevention and to evaluate the effects of intervention for malaria control in rural community in China.

An interventional study followed approximately 1971 randomly selected respondents over a period of four months. According to the level of endemicity of the areas, this particular study was carried out in a rural community. Two surveys were performed for the study in point. Demographic and socioeconomic variables were used as predictor variables in logistic regression analysis.

Different patterns of malaria behavior were found in the closely situated households and at the school level. Gender, age, length of residence time in the areas, and health seeking behaviors was found to be statistically significant predictors of health behaviors (P <0.001). The likelihood between male and female to admit that malaria is a threat for human health was 96.3% and 97.1% respectively, (Odds Ratio = 0.782; 95% Confidence Interval 0.458, 1.335; P-value = 0.368). The use of mosquito nets was approximately evenly split between genders (OR = 0.813; 95% C.I.: 0.645, 1.025; P = 0.080).

Public health campaigns through iterative actions should be maintained in the region to strengthen the awareness of the population for malaria prevention and control.

Keywords: Community intervention, Evaluation, Health promotion, Malaria control, Malaria prevention

1. Introduction

Malaria is a major parasitic disease in China with prevalence that gradually increases from the north to the south. The southern part of China used to be the hyper and meso-endemic regions where falciparum malaria was widely present (1, 2). In some meso- and hypo-endemic areas, vivax malaria was predominant, though falciparum malaria also existed and focal outbreaks often occurred. The epidemic situation in China is largely affected by the increase of national travel and immigration from endemics zones (3) and especially by that in the nearby Southeast countries (4). Although great success has been achieved since the launch of the National Malaria Control Programme in 1955, malaria is still an important public health problem in China (2, 5, 6). Malaria is considerably re-emerging in many provinces and the actual number of cases is much higher than the reported cases (7). The malaria early warning system is not well established in remote areas and the rapid response capability to malaria epidemic by local organizations is limited. The total number of malaria cases in 2003 increased to 40, 681 which is 15.3% higher than that in 2002 (8). In 2005, the resurgence of malaria in central China was considerable (6), despite the very significant regional decline in the reported malaria cases and deaths during the 1990s, after two decades of malaria control efforts (9). To alleviate the burden of malaria in this region, significant interventions should be carried out to enhance the population awareness on the disease and its degree of control.

Given the fact that malaria is a community or population level problem, it is appropriate to evaluate programs to combat this problem at the higher aggregate level. As with any wide scale problem, this requires certain properties within a study that enable generalization beyond the immediate study group.

It also requires standard measurement of the main outcomes and efforts on behalf of the research community to make the results of research as understandable to as wide an audience as possible (10). Therefore, understanding the local perceptions and practices of the villagers is of utmost relevance to enhance community's potential to deal with village based malaria interventions. The purpose of this study was to evaluate the effectiveness of health promotion in rural community by adopting intervention measures, to improve awareness and demand of the residents for effective malaria prevention and treatment, and to carry out a model that provides a scientific basis for the future evaluation of intervention.

2. Materials and Methods

2.1 Study population

The study was conducted in Hubei Province, central China. According to the level of endemicity of the areas, this particular study was carried out in a rural community located in the surrounding of Xiangfan city. The villages were chosen at random and interview conducted with trained personnel. The villages were densely populated and separated into clusters. The surveys were performed in 2007 at a four month interval in those clusters with the highest malaria incidence and where knowledge of malaria prevention and the use of personal protection measures among residents were not well established. The local populations within the areas are often vulnerable and appropriate measures of malaria control at the village level are threatened by low economic status. Weaknesses in the health care delivery system, especially at the village level, have produced instability in malaria control efforts and the resulting incidence of malaria.

A total of 1971 respondents that were more likely to disseminate information on health issues within the communities were interviewed. The study population includes household residents and the school populations.

The school populations were selected as respondents because they had acquired a high level of education and were likely to get some basic information about diseases prevention and control.

2.2 Study design

The surveys were design to gather more information from an interventional study of the population. According to the malaria incidence density distribution in Hubei province, two villages (Zaoyang and Xiangyang) and two primary schools in the rural areas of Xiangfan city were selected for the investigation on point. Two consistent surveys questionnaires before and after the intervention, were self-designed. The contents included general demographic characteristics, malaria basic knowledge and common sense, environment and behavior. The surveys were conducted in the same population and the questionnaires were structured in four main parts to develop; knowledge, attitude and practice of malaria control and prevention. The questionnaires were modified after discussion by malaria experts and pre-experimented for official use. Qualified householders were asked about the surveys and filled out the questionnaire before and after the intervention. The surveys were carried out under the supervision of the malaria experts of the regional malaria Center for Disease Control and Prevention.

2.3 Intervention

Considering that, with an adequate time and resources, a strategically designed communication can play an important role in scaling up prevention and control efforts at the individual/household and community level. A baseline survey was first completed. Residents in the study area were trained to conduct programs for education on malaria prevention and control. The programs consisted on carrying out lectures, organizing watching self-made malaria control and prevention missionary films, releasing learning materials, streets promotion consulting, layout tour blackboard, newspaper gallery, as well as face to face to guide the exchange of health promotion intervention. We evaluate data in accordance with the local population awareness and needs on malaria prevention and treatment, and develop promotional materials for the prevention. For broadcast requirements; a local television station broadcast once a week. In all primary schools, in each of the highest level, students watched film projection once a month.

2.4 Statistical Analysis

Potential factors related to health behavior and some outcome variables were adjusted. For looking for the trend, the chi-square test of the trend was calculated. The categorical variables were described using the logistic regression test to compare the data and analyze the impact of the intervention. For measure of association between different groups, a bi-variate Odds ratio (OR) was calculated with confidence intervals (CI) of 95%. Epidata version 3.1 and SPSS version18.0, PASWStatistics18 (SPSS Inc. Chicago, Illinois. U.S.) were used for data analysis.

2.5 Ethical considerations

This study was reviewed and approved by the ethical committee of the regional Center for Disease Prevention and Control and the Department of Epidemiology and Health Statistics of Tongji medical college. The participation of this study was voluntary and confidentiality of the information assured both before and after intervention. Consent was obtained from all the respondents who participated in the study.

3. Results

A total of 1971 respondents were examined during the survey, which included almost every resident present during the survey period. All respondents dwelled in the rural areas surrounding the xiangfan city. The majority of the respondents before and after the intervention were male 57.71% and 54.29% respectively. Most of the respondents are Han-chinese.

A baseline survey showed that knowledge on malaria prevention and control among the respondents, were relatively low. Before the intervention (survey 1), knowledge on how to prevent malaria and how it is spread was 37.14% and 49.10% respectively. Illness was not treated on time, only 22.33% of the respondents knew the onset of the symptoms and 4.76% seek treatment at the onset of the symptoms. Drug used and the number of days for treatment were not well known, 30.95% and 46.40% respectively, while 51.64% continued medication after the symptoms disappeared. Only 10.69% paid attention to medication. After the intervention (survey 2), we denoted a substantial increase of the awareness of malaria (Table 1). Up to 74.18% knew how to prevent malaria and 76.31% was aware on how malaria is spread.

Although the malaria symptoms are sometimes similar to those of many other infections caused by bacteria, viruses, or parasites at the early stages; 59.87% of the subjects interviewed were likely to identify them and

40.79% sought treatment on time. Knowledge on drug for treatment, 67.63% and days for treatment, 66.72% have also increased significantly ($P < 0.01$).

Although knowledge about mosquitoes transmits malaria was low, mosquitoes bite prevention was also evenly not well known before the intervention. However, after the intervention, residents, when asked about the best way to prevent malaria, 74.18% mentioned to avoid mosquito bites by using nets and tents, 15.22 % stated preventive treatment, 1.60 % stated community participation through education, and 0.51 % mentioned indoor residual spraying. Some major misconceptions about malaria prevention and control were also found among the respondents. Traditional beliefs were cited; 5.07 % do not know how to prevent malaria and they think that malaria can be prevented by avoiding drinking unboiled water and eating dirty food or to pray "Buddha" for help.

The percentages of participants viewing personal protective behaviors are very or somewhat effective. For each behavior (possessing and sleeping under mosquito nets, indoors sleeping, seeking medical care and doing the blood test) the majority of individuals felt it was an effective form of protection against malaria. Most of the respondents knew at least one method to prevent mosquito bites. Before the effective intervention, 83.65% of the respondents had mosquito net, 71.90% of them sleep under mosquito net and 88.68% avoid outdoors sleeping. After the intervention each of these behaviors was significantly improved by 91.88%, 85.19% and 94.93% respectively (Table 2). Before the intervention, 78.52% stated to seek medical care if suffering from malaria. After the intervention it was increased by 92.90%.

However, in remote rural areas many reasons can become blocking factors for health care improvements. One of the factors is the lower socioeconomic status. Financial access appears to be a significant factor, along with physical access. Some respondents affirmed that they do not seek medical care.

For those rural residents, the surveys showed that, 18% and 20%, respectively before and after intervention, affirmed do not seek medical care because it was seen as too costly, although this is interrelated with both distance and quality.

Others important factors are the distance to the health care center and the time. The distance from the consumers to the health care provider was a strong determinant of where people sought treatment for malaria. Roughly 12% and 19% of the residents, respectively during the first and second survey, stated that the health care center was far, while 22% and 18% stated that they do not have time. The perceived quality of services was also an important determinant. More importantly, rural residents access lower quality health services, including greater use of traditional healers, and less likelihood of using public and private hospitals and clinics. Surprisingly, 12% of the residents considered that it is useless to seek for medication in a health care center if they were suffering from malaria. After the intervention 4% of them still have the same idea. Additionally, 36% and 39% do not seek medication for unknown reasons (Figure 1).

Looking for association between groups, we collected information from the whole population including residents and the school children. Respondents were asked in an open-ended format about their awareness on malaria. Most of those interviewed, 90.65% of the male and 91.18% of the female declared they heard about malaria. There is no significant difference between gender (Odds ratio OR = 1.017; and 95% Confidence Interval C.I.: 0.723, 1.428; $P = 0.924$). A least 81.5% of the male declared that malaria is transmitted by mosquito bites and 83.4% of the female knew that mosquito transmit the disease.

About 73.37% of the respondents attested that malaria is a serious harmful infectious disease for human health. However, the likelihood between male 96.3% and female 97.1% to admit that malaria is a threat for human health is not significant (OR = 0.782; 95% C.I.: 0.458, 1.335; $P = 0.368$). About 10% of the respondents were immigrants and 78.2% of them agreed with the statement and 69% use mosquito nets for protection (Table 3).

The vast majority of the population was young. The study reported that 69.4% was less than 15years; 5.6% have an age range between 15-30years; 22.45% between 30-50years and only 2.5% were above 50years. The slight majority of the respondents were school children, and educational level was significantly higher in the youngest group, 86.31%. We found very different patterns of malaria behavior in the closely situated houses. Malaria knowledge, attitude and practices for personal protection vary strongly among the residents as well as the school children. The study showed that, people living in Xiangyang village had better understanding on malaria than those in Zaoyang village. It was also noted that in Xiangyang village, 98.4% of the school children declared that they have heard about malaria. They are also more likely to admit that malaria is a treat for human health, 98% (OR = 0.171; 95% C.I.: 0.119, 0.248; $P < 0.001$); knew that mosquitoes transmit malaria, 87.1% (OR = 0.586; 95% C.I.: 0.499, 0.688; $P < 0.001$); and therefore slept under mosquito net 99.4% (OR = 0.015; 95% C.I.: 0.005, 0.041; $P < 0.001$) (Table 3).

It was reported that 85.19% of the respondents use preventive methods such as mosquito nets. The constant use of mosquito nets, was approximately evenly split between male 94.5% and female 96.3% (OR = 0.813; 95% C.I.: 0.645, 1.025; P = 0.080).

For those who did not sleep under mosquito net, there were some differences in the perception of the use of the net. It was estimated that 30.57% did not use net because they did not know that it could prevent malaria, 30.36% for trouble reasons, 26.58% for heat intolerance and 12.28% for others reasons. For evaluating the susceptibility to malaria, the study revealed that respondents consider that those who were engaged in field operations were the more susceptible 73.7%, followed by immigrant from a nonendemic area to an endemic area (47.3%) and only (6.78%) for those who stay at home.

The concept of health management through community education is important in rural areas. The study showed that 76.26% of the respondents affirmed that health education to change the undesirable behavior is the best way to promote the prevention of malaria. Participants were asked whether they agreed with the statement that education through lectures, publicity or advertising campaigns were the best way to disseminate information on malaria protection and control (Figure 2). Roughly 60% of the sample disagreed with the statement with regards to lectures, while the rest stated they either agreed (27%), education through lectures was better or they were unsure (13%). Slightly less than half (48%) agreed when asked if they believed education through publicity was better and (42%) agreed with the statement with regards to the advertising campaigns. The remaining half of the population was split between with disagreeing with the statements, or being unsure.

4. Discussion

It is particularly important to understand the populations' awareness of malaria control and prevention to implement programs for future interventions in rural areas.

It is also important to identify those groups who are able to disseminate information on malaria prevention to the others in the community. Key informants must be chosen in any survey because they are the information givers in remote rural areas. Many interventions for reducing the burden of malaria and other diseases depend on improved consumers' knowledge about the disease and its control and this is enhanced by increased educational attainment (11). Educational attainment and knowledge of malaria both play a role in peoples' perceptions and practice for controlling malaria (12). This has been proved by similar studies in Tanzania where perceived symptoms was significantly associated with having primary education and above (13), and in Laos where school-based malaria education has been shown to be effective for improving the knowledge, attitudes, and practices of school children toward malaria control (14).

The level of knowledge with regards to disease transmission varies, and studies show that people may not understand that mosquitoes spread a number of diseases. The preventive measures taken by the population is strongly related to the perception and the understanding about the cause and the transmission of malaria.

Through this study, we found that in remote areas, traditional considerations can lead to misconceptions. Residents believe that taking bathe with cold water or drinking unboiled water can cause malaria. The same consideration has been found in Uganda, where a study showed that many people believe that in addition to mosquitoes, drinking dirty water, inhaling bad air, witchcraft, and eating fresh fruit can cause malaria (15). In Ghana, malaria is presumed to be caused as a result of excessive heat and eating oily or starchy food (16). Explanations of the disease were often related to spiritual and hereditary causes (17).

It is very apparent within the community that they do not believe mosquitoes transmit the disease. The only reason any measures are taken against mosquitoes by some individuals (using coils, herbs, or insect repellent) is simply because insects are a nuisance (17).

Additionally, residents in Thailand consider mosquitoes to be an annoyance, but do not perceive disease as a major risk associated with them (18). It is also well recognized that accessibility to anti-malaria interventions alone will not bring about the desired change. Several studies have demonstrated compliance to anti-malaria interventions depends substantially on social, behavioral and cultural factors that affect understanding of the causes, the relationship between mosquitoes and the disease, diagnosis, treatment and practices about prevention (19, 20). In addition, factors such as vulnerability, economic constraints, inadequacy or unavailability of appropriate health services, and other related factors play an important role in explaining health seeking behavior of the people (21). To better confront and solve the considerable malaria misconception through out the population in rural areas, an increased number of well-trained and active scientists and institutions should join effort for operational challenges. It is important not only to understand disease systems, but also to develop control strategies to reduce the number of cases in a population. It is therefore crucial that public health messages

help to educate the population about the health threats in the community. A widespread public information campaign about malaria prevention is a first step in recruitment both because it can attract a representative cohort of participants and because it provides opportunity to educate potential subjects. The development of educational methods that ensure ethical informed consent, likely an iterative process will be facilitated by the results of the studies on willingness to participate. The current lack of accurate documentation and the socioeconomic situation of the residents in the areas insight that scaling up the endemicity of malaria in the region did not receive the attention or resources they deserve. The reason for which residents stated not to seek medical care if suffering from malaria might be due to the weaknesses of the health care services and the lack of information. Equitable improvement of treatment-seeking for malaria will depend on how different socio-economic groups perceive the ease of accessing and utilizing malaria treatment services from different healthcare providers (22). Adapted health care services with qualified personnel workers still are an urgent need. Studies showed that epidemics tend to affect marginalized and underserved population that may be outside of the usual reporting systems (23). In some instances, more cases will go unreported than the usual families may be unable to attend facilities for financial or health reasons, both of which will be compounded in a severe epidemic (23). Although short-term malaria health education campaigns may have a positive impact on the control of malaria (12), a multi-channel approach is required to overcome the weaknesses inherent in individual channels (24). The involvement of politicians and opinion leaders, community advocates and local media in campaign is essential for the design and the conduct of a survey. Communication efforts should be strategically designed from an audience perspective to address the social and contextual environment as well as individual behaviors and knowledge. Integrating strategic communication approaches and service delivery can enhance utilization of services and improve client compliance. In fact, the integration of community based distribution of anti-malarial and malaria information and education has been documented to reduce under-five mortality by 41% in one Ethiopian programme (25, 26).

5. Conclusion

This study suggests how perceptions and practices vary within a group of individuals and is of use to public health officials dealing with both mosquito-borne and other types of diseases. Effective advocacy among influential individuals and groups can also help to address some of the underlying societal and environmental factors that influence individuals' ability to take action, either in terms of prevention or treatment.

Within the framework of the Health Belief Model, public health campaigns in the study region can be strengthened by raising awareness of mosquito-borne disease present in the area, by understanding what the general population feels, and what preventative methods are generally accepted. It would be important for public health officials to know if there is a temporal factor related to how long public health messages may be retained in a community. This is another issue that can be specifically addressed by public health campaigns to clear up misconceptions about malaria control and prevention.

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Table 1. Malaria-related KAP comparison in the general population before and after the intervention

	Knowledge, Attitude, and Practice (%)		χ^2	*P*
Parameter	survey 1	survey 2		
How malaria is spread	49.10	76.31	306.32	<0.01
Onset of the symptoms	22.33	59.87	560.09	<0.01
Seeking treatment on time	4.76	40.79	703.90	<0.01
What to do if suffering from malaria	79.79	90.11	80.81	<0.01
Drug for treatment	30.90	67.63	519.21	<0.01
Days for medication	46.40	66.72	162.26	<0.01
Attention to medication	10.69	39.37	419.68	<0.01
Continue medication after symptoms disappeared	51.64	81.18	379.08	<0.01
Prevent malaria	35.19	74.18	592.85	<0.01

KAP: Knowledge, Attitude, Practice; χ^2 chi-square, *P*: *P*-value. The surveys were performed respectively before and after the intervention. Residents were asked questions to ensure whether they know how malaria is spread, how to prevent, and if they can recognize the onset of the symptoms, and what to do if suffering from malaria. The types of drug used for treatment and medication schedule were also asked.

Table 2. Malaria personal protection and prevention before and after intervention

	Personal protection and prevention (%)		χ^2	*P*
Parameter	Survey 1	Survey 2		
Have mosquito nets	83.65	91.88	61.26	<0.01
Sleep under mosquito net	71.90	85.19	101.46	<0.01
Indoors sleeping	88.68	94.93	57.10	<0.01
Seek medical care after Suffering from malaria	78.52	91.32	124.47	<0.01
Blood test	84.81	92.90	64.05	<0.01

Personal protection is widely used and accepted to prevent mosquito bites. The number of respondents was stratified by those who have and use mosquito bed nets, indoor sleeping, seeking medical care for malaria, and accept the blood test for malaria. After the intervention, there is an increase of good practice for personal protection and prevention for malaria, and the trend is statistically significant ($P < 0.01$).

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Table 3. Binary logistic regression for the evaluation of the effectiveness of malaria intervention

Variable	Heard about malaria			Know mosquito transmit malaria			Malaria as a threat for human health			Use mosquito nets		
	N(%)	O R	95% CI	N(%)	O R	95% CI	N(%)	O R	95% CI	N(%)	O R	95% CI
Gender			P = 0.924			P = 0.257			P = 0.368			P = 0.080
Male	893 (92.1)			865 (81.5)			901 (96.3)			908 (94.5)		
Female	731 (91.8)	1.017	(0.723, 1.428)	725 (83.4)	1.047	(0.967, 1.133)	757 (97.1)	0.782	(0.458, 1.335)	751 (96.3)	0.813	(0.645, 1.025)
Age			P = 0.011			P = 0.005			P = 0.021			P = 0.578
< 15	952 (88.2)			937 (77.5)			985 (82.3)			1026 (85.8)		
15 -	94 (97.9)	0.159	(0.039, 0.655)	89 (89.9)	0.622	(0.446, 0.869)	91 (91.9)	0.614	(0.405, 0.929)	89 (89.0)	0.881	(0.563, 1.378)
			P = 1			P = 0.999			P = 1			P = 0.150
31 -	394 (99.7)			379 (96.9)			387 (99.7)			354 (90.3)		
> 50	43 (100)	0.000	(0.000, ….)	43 (100)	0.000	(0.000, ….)	42 (100)	0.000	(0.000, …)	42 (97.7)	0.257	(0.400, 1.636)
Dwelling			P = 0.463			P < 0.001			P < 0.001			P < 0.001
Zaoyang Village residents	487 (97.7)			421 (80.8)			449 (87.5)			432 (83.4) ,		
Xiangyang Village residents	373 (98.4)	0.687	(0.252, 1.874)	371 (95.4)	0.452	(0.348, 0.586)	386 (99.5)	0.144	(0.060, 0.342)	388 (98.2)	0.153	(0.079, 0.295)
			P < 0.001			P < 0.001			P < 0.001			P < 0.001
Zaoyang School child	293 (55.7)			380 (69.9)			349 (65.1)			202 (54.9)		
Xiangyang School child	378 (98.4)	0.064	(0.035, 0.116)	425 (87.1)	0.586	(0.499, 0.688)	491 (98.0)	0.171	(0.119, 0.248)	655 (99.4)	0.015	(0.005, 0.041)
Status			P < 0.001			P < 0.001			P = 0.110			P = 0.020
Native	936 (62.9)			972 (64.5)			1122 (86.4)			1175 (77.1)		
Immigrant	74 (47.1)	0.526	(0.378, 0.732)	55 (37.9)	0.336	(0.237, 0.478)	93 (78.2)	0.632	(0.360, 1.109)	107 (69.0)	0.623	(0.418, 0.927)

N (%) = Number and percentage of respondents; OR = Odds Ratio; P = P-value; 95% CI = 95% Confidence Interval. Participants were asked in an open-ended format about their awareness on malaria. The purpose was to know whether they had heard about malaria, knew that mosquito transmits malaria, whether they consider malaria as a threat for human health, and whether they used mosquito nets or knew those who were more susceptible to malaria.

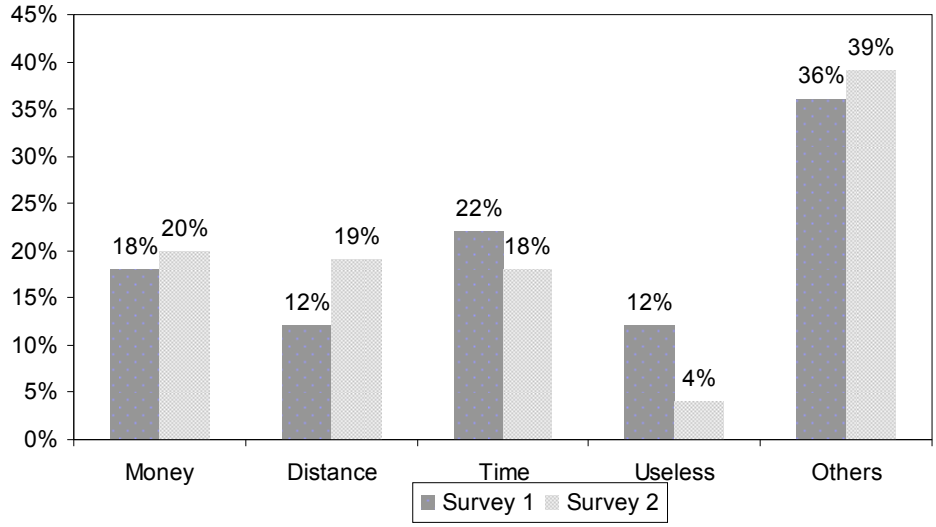

Figure 1. Different reasons as to why respondents do not see a doctor if suffering from malaria

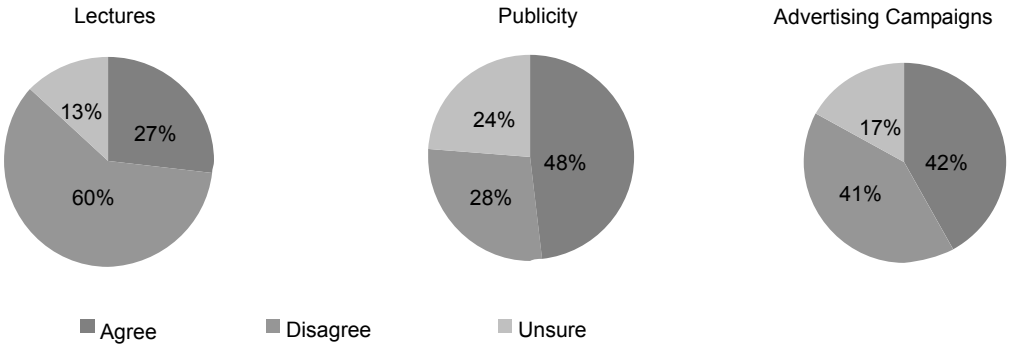

Figure 2. Agreement to the statement that education can disseminate information on malaria control and prevention

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Knowledge, Attitude and Practice Regarding HIV/AIDS among University Students in Xinjiang

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Abstract

Objective: The aim of this paper is to assess the level of knowledge on HIV/AIDS and its risk factors, attitude towards HIV/AIDS and AIDS patients and its transmission, and to identify high risk behaviors associated with HIV/AIDS among university students in the Xinjiang Uyghur Autonomous Region. **Methodology:** A cross–sectional survey was conducted among students enrolled in two universities, the Xinjiang University (XU) and Xinjiang Medical University (XMU). Data was collected using validated self-administered standardized questionnaire on knowledge, attitude and practice regarding HIV/AIDS among 200 students from XU and 200 students from XMU who agreed to participate in the study **Result:** Among the 400 students who participated in the study, the mean knowledge score was 19.3 $\pm$5.5 and their knowledge score ranged from 2 to 30. Two hundred and ninety eight (74.5%) students had knowledge score above 15. Mean knowledge scores were significantly higher among males (p=0.04), those who majored in medical courses (p= 0.01), those in the final year of study in university (p=0.04) and by ethnicity, among Han Chinese (p=0.00). However only 33.3% of the students had positive attitude towards HIV/AIDS and patients with HIV/AIDS. Mean attitude scores were not significantly different by sex, study major, year of study or ethnicity. With regards to high risk behaviors associated with HIV transmission, 15.8% of these students had at least one risk behavior related to unprotected sexual exposure. High-risk behavior was significantly higher among males (p=0.03) and first year students (p=0.03). **Conclusion:** Our study found most Xinjiang university students had good knowledge, but negative attitude towards HIV/AIDS and HIV/AIDS patients, and 15% of them reported having at least one high-risk behavior related to sex and unprotected sex. Thus HIV/AIDS health education efforts should be intensified to change attitude and practice among university students in Xinjiang especially among female students, newly enrolled students, and among the Uyghur and other minority students.

Keywords: KAP, HIV/AIDS, Sexual health, Risk behaviors, Medical and non-Medical students, Xinjiang China

1. Introduction

Acquired Immunodeficiency Syndrome (AIDS) has become one of the most serious health problems in the world. Since China's first detected case of HIV in 1985, the official estimate of HIV cases in the country had reached 650,000 at the end of 2005, yielding a national infection rate of 0.05 percent (Ministry of Health China, UNAIDS and WHO 2005). About three-quarters of these infected people live in five Chinese provinces: Yunnan, Henan, Xinjiang, Guangxi and Guangdong. Today, people living with HIV/AIDS are present in all the 31 provinces and municipalities of China. Although the 2005 estimate of 650,000 cases is lower than the previous figures, the epidemic is spreading more rapidly, with an estimated 70,000 new cases of HIV infection and 25,000 AIDS deaths per year as of 2005 (Ibid). However, these figures are only estimates. About half a million or more persons in China, or about 80 percent of those HIV-positive, do not know their status and the health authorities do not know who they are (National Population and Family Planning Commission of China 2006). A survey recently conducted among some 1,000 people in four Chinese municipalities suggests that 72.6 percent of respondents think HIV/AIDS has nothing to do with them, and that they cannot personally take steps to contain the epidemic (National Population and Family Planning Commission of China 2006). Furthermore, there is widespread agreement that HIV transmission is moving from within the so-called "high risk groups" into the general population, mostly through unprotected sexual relations. Public awareness about the epidemic continues to be fairly low, increasing the opportunity for the epidemic to spread rapidly. In 2003, the United Nations Joint Program on HIV/AIDS (UNAIDS) projected that the number of people living with HIV/AIDS in China will exceed 10 million by 2010 if the country does not mount a prompt and aggressive response (UNAIDS 2004).

As for Xinjiang Uyghur Autonomous Region of China, the first HIV positive case was discovered in 1995, although it is likely the disease was present there many years prior to this time (People's Daily 2004). Since then the number of HIV cases in Xinjiang has risen considerably. As of June 30, 2006, the number of confirmed HIV/AIDS cases in Xinjiang had reached 16,035. However according to the official estimates, there are some 60,000 HIV-positive persons living in Xinjiang, making it the fourth most-affected province in terms of total cases (Gill & Song 2006). Demographically, Xinjiang is also more populated by minorities especially Muslim Uyghur compared other areas which are dominated by Han Chinese. HIV is efficiently spread through the sharing of needles by intravenous drug users (IDUs). Until recently, IDUs made up the vast majority of HIV cases in China, and this was particularly the case in Xinjiang. Xinjiang borders eight other countries including Afghanistan, Pakistan and the newly independent Central Asian countries some of which are well known poppy growing areas and sources of drugs. In the past, over two-thirds of Chinese HIV infections were contracted through intravenous drug use with infected needles. Although the nationwide proportion of new HIV positive cases contracted through intravenous drug use declined to 48.6 percent in 2005, the spread of HIV through intravenous drug use will remain significant and difficult to combat. Official data published in 2005 show that HIV prevalence among IDUs has more than tripled from 1.95 percent in 1998 to 6.48 percent nationwide in 2004 (Gill & Song 2006). In some areas of Xinjiang, the HIV prevalence rate among IDUs has reached a staggering 89 percent (MOH of China, UNAIDS and WHO 2005).

Globally, it is known that there is a lack of HIV knowledge among youth between the ages of 15-24. The World Health Organization states that youths are at the epicenter for preventing the progression of the HIV/AIDS pandemic (WHO, 2004). The WHO estimates that youths ages 15 to 24 comprise 50% of all new HIV infections and consequently must be targeted for education in decreasing transmission and reducing the stigmatization of an HIV diagnosis (WHO, 2004).

In many parts of the world, young people in this age-group are at particularly high risk of HIV infection from unprotected sex, sex between men and IV drug-use because of the very high prevalence rates often found amongst people who engage in these behaviors. Young people are also often especially vulnerable to exploitation that may increase their susceptibility to infection. For Xinjiang, there has been a series of studies conducted in various parts of the region on various topics in health but there are few published studies on HIV/AIDS among medical students non of studies have been geared towards HIV/AIDS among university students. A study on medical students was conducted in 2007 but to date there are no studies comparing university students who enrolled in medical and non-medical programs as well as by other characteristics of students in Xinjiang. Our study was conducted among medical and non-medical students. It is prudent to conduct this study among university students in Xinjiang in order to ascertain their knowledge, attitude and practice (KAP) regarding HIV/AIDS. University students in general are the most educated of the youths and their KAP on health can be an indicator of the magnitude of the problem among youths in Xinjiang.

2. Aims

The aims of this study were to assess the level of knowledge on HIV/AIDS and its risk factors, attitude towards HIV/AIDS and AIDS patients and its transmission, and to identify high risk behaviors associated with HIV/AIDS among university students in Xinjiang.

3. Methodology

3.1 Study Design and Data Collection

A cross-sectional survey was conducted using self-administered questionnaires among university students in two public universities in Urumqi Xinjiang. These were students who registered for non-medical degree programme in Xinjiang University (XU) and the medical degree programme in Xinjiang Medical University (XMU). Students were informed of the study prior to their class sessions and were encouraged to participate. Those who agreed to participate were asked to complete a set of questionnaires. The questionnaires were distributed to the students at the end of their scheduled class sessions with cooperation of the lecturer in charge. The questionnaires were completed in class and took an average of twenty minutes to complete. The completed questionnaires were retrieved immediately after the sessions.

3.2 Sample size and sample selection

The sample size of the study should be between 392 and 524 respondents. These figures were obtained after considering sample size calculation based on a two-sided hypothesis tests for two population proportions (Lwanga and Lemeshow, 1991). Assuming level of significance at 5%, power of 80%, smallest prevalence of P1 or P2 (e.g. proportion of practice level in two populations/groups) at 45%, and the difference in two populations (P1-P2) at 0.1, the sample size will be 392. However, if power is 90% and all other parameters being equal, the sample size should be 524. However because of time and cost constraint we decided to collect data from a sample of 400 students.

Samples were purposively selected to include equal numbers of students by sex, year of enrolment and study major (medical or non-medical). In this study we collected data from 100 first year non-medical students and 100 final year non-medical students from XU, while the other respondents were 100 first year medical students and 100 final year medical students from XMU. We also selected 200 male and 200 female students distributed by year of enrollment from the 2 universities. For XU, we selected students from Law programme and IT programme. For XMU, we only selected students from the medical Programme.

3.3 Study location

This study was conducted in Xinjiang Uyghur Autonomous Region of the People's Republic of China. Xinjiang is in the North-Western part of China and is a large, sparsely populated area (spanning over 1.6 million sq. km) which takes up about one-sixth of the country's territory. Xinjiang borders the Tibet Autonomous Region to the south and Qinghai and Gansu provinces to the southeast, Mongolia to the east, Russia to the north, and Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, Pakistan and India to the west. There are about eight public universities and five public colleges in Xinjiang but this study was carried out in Xinjiang University and Xinjiang Medical University, two of the six public universities located in the city of Urumqi, the capital of Xinjiang. The total enrolment of XU was 38,000 students while that of XMU was around 12,400 students.

3.4 Questionnaire

The study instrument was a self-administered questionnaire which comprised of four parts. Part A related to respondent’s socio-demographic background, part B on knowledge regarding HIV/AIDS, Part C on AIDS Attitude Scale, and Part D on high risk behavior or practice related to HIV/AIDS transmission.

The knowledge, attitude and practice questionnaire was modified from the instrument used by a survey on HIV/AIDS knowledge, attitude & practice (KAP) reported by the Department of Education, Free State South Africa (2006) which was adopted from the WHO AIDS Questionnaire (WHO 1990). Knowledge was assessed using a 31-item questionnaire which includes knowledge on ways of infection, myths, disease detection and progression, and treatment and prevention of HIV/AIDS. Attitude was assessed using a 10-item questionnaire on attitude towards HIV/AIDS and with HIV/AIDS patients. The questions on high risk behaviors had 11 items related to unprotected sex and needle sharing. The English questionnaire was translated into simple Chinese and back translated into English. Prior to the survey, the questionnaire was pre-tested to assess its clarity, sequencing and time needed to complete. Pre- test of questionnaire was done on twenty respondents who were chosen to ensure that the questions are easily understood. The result of the pre-test was used to improve the phrasing of

questions in the questionnaire. Questionnaire validation tests showed that the Alpha Cronbach was 0.87 for knowledge, 0.71 for attitude and 0.72 for risk behaviors.

3.5 Scoring

For knowledge, each right response was given a score of 1 while a wrong or unsure response was scored 0. Total knowledge scores can range between 0-31. Knowledge scores from 0 to 15 were considered as poor knowledge while knowledge scores more than 15 was considered as having good knowledge regarding HIV/AIDS. Attitude towards HIV/AIDS patients was assessed using a 10-item questionnaire where attitude scores between 0 to 5 were considered as negative attitude, and scores 6 to 10 were considered as positive attitude. High risk behavior or practice was assessed using an 11-item questionnaire where report of at least one negative behavior related to HIV transmission is considered as having high risk behavior.

3.6 Ethics consideration

The study proposal was approved by the Universiti Kebangsaan Malaysia Medical Research and Ethics Committee, (Ethics Approval Reference FF-173-2008). Prior to data collection, all study participants were given information on the study and assured that all data is confidential and will only be analyzed as aggregates. All respondents signed the informed consent form before participation.

4. Result and Discussion

Data analysis was done using Statistical Package for Social Sciences (SPSS) Version 12. We described socio-demographic distribution using frequency and percentage and for analysis of the risk factors of KAP, we used the Chi-square test.

4.1 Response Rate

Four hundred students agreed to participate and completed the questionnaire after open recruitment of students in the selected faculties at the two universities. Thus we achieved 100 percent of the sample size we set for our study.

4.2 Student's profile

The mean age of the 400 respondents was 21.5±4.0 years, and ranged from 18 to 25 years. There were 29 (7.3%) 18 year-, 59 (14.5%) 19 year-, 81 (20.3%) 20 year-, 117 (29%) 23 year-, 79 (19.8%) 24 year-, and 35 (8.8%) 25 year-old respondents. In the study the majority of them, 381 (95.3%) were single, 10 (2.5%) were married and 9 (2.3%) were divorced. With regards ethnicity, 190 (47 %) of the respondents were Uyghur, 154 (38.5 %) were Han Chinese and 56 (14 %) were other minorities. By design we had 200 male and 200 female respondents.

4.3 Outcome of study

HIV/AIDS knowledge

Among the 400 respondents, only 109 (27.3%) respondents had attended an HIV/AIDS related lecture or training programme in their university. Table 1 shows the level of knowledge for all respondents and comparison by sex, study major, year of study and ethnicity. Most of the students, (74.5%) had good level of knowledge with total scores of more than 15. More than 80% of the respondents knew that HIV/AIDS could be transmitted via sharing syringes/needles as well as vertical transmission from mother to child, and about 65-75% thought condom can prevent HIV transmission during sexual intercourse. However many misconceptions still remain, for instance, 43.2% of them did not know it is possible to have a negative HIV blood test in the first couple of months after becoming infected with HIV; 59.5% thought one can get HIV through mosquito bite; and 38.5% thought HIV/AIDS is homosexual (gay) people's disease. Overall mean knowledge score for the 400 respondents was 19.3± 5.5. Their knowledge scores range from 2 to 30. Mean knowledge scores was significantly different by sex ($p=0.04$), study major ($p= 0.01$), year of study ($p=0.04$) and ethnicity ($p=0.00$) in university.

<Table 1>

Attitudes towards HIV/AIDS

Generally only 33.8% of respondents had positive attitude towards HIV/AIDS and patients with HIV/AIDS. Our analysis showed 86.0% of the respondents indicated that people with HIV&AIDS are like any of them and need their help and support. However our analysis also showed 84.3% of the respondents thought their friends will avoid them if they were found to be HIV positive; 75.8% felt it will not be easy for them to tell their friends they are HIV positive; 70.3% thought they will be dismissed from the university if they were found to be HIV positive; 54.0% felt that persons with HIV/AIDS deserve it; 52.5% reported they will not be comfortable to study with students who are HIV positive; 51.5% felt that students infected with HIV/AIDS should have separate

washing and toilet facilities at school and 30.0% felt that HIV infected students should be treated differently. The attitude scores can range between 0-10 and the mean attitude scores was 4.82 ± 1.85. Mean attitude scores were not significantly different by sex, year of study, study majored or ethnicity.

<Table 2>

Risk behaviors

Table 3 shows 15.8% of all respondents had at least 1 risk behavior related to HIV/AIDS transmission. About 10% reported having unprotected sex (sex without condom); 6.0% had more than 1 sexual partner; 3.3% reported having sex with sex workers; and 4.5% reported having sex under the influence of alcohol. In this study, 19.5% Uyghur, 11.0% Han Chinese, and 16.1% other minorities reported a least 1 high risk behavior but the difference by ethnicity was not statistically significant (p=0.095). However, significant more male than female students reported having risk behavior (p=0.039). We found no significant behavior difference between medical and non-medical students (p=0.680) and contrary to our beliefs, more first year students reported risk behaviors compared to their final year seniors (p=0.039).

<Table 3>

4.4 Discussion

This study showed that in general students in Xinjiang had relatively high level of knowledge on issues related to HIV/AIDS transmission, since 74.5% of the respondents had good level of knowledge. This study also found that more medical students had good knowledge than non-medical students but their attitude towards HIV/AIDS and patients with HIV/AIDS was not significantly different. Knowledge of the first year students was also lower than their seniors. This was similar to a study conducted by Nei and Shen (2006) on the knowledge, attitude and behavior status on AIDS among college students in Guangzhou. Nei and Shen (2006) found the level of knowledge was significantly different between medical students and non-medical students and year of study in university. Lönn, et.al (2007) conducted a study among medical students in the Xinjiang Medical University in 2006 and found that all but one student had heard about HIV/AIDS and approximately 95% knew the most common routes of transmission are sexual contact, mother-to-child transmission, and sharing needles. Eighty percent also knew that HIV in breast milk can be transmitted through breastfeeding. However, based on in-depth interviews of 20 students who participated in his study, Lönn et.al found the students' knowledge of HIV/AIDS seems superficial. A study by Xiaodong Tan (2006) on HIV/AIDS knowledge, attitudes and behaviors among undergraduate students in China, found that students majoring in medicine performed better (more knowledgeable and tolerant) than non-medical students.

Only a third (33.8%) of the students in this study had positive attitude towards HIV/AIDS and patients with HIV/AIDS. This finding was lower than that found in a study by Zou and Wang (2006) based on a survey of AIDS knowledge, attitude and behavior among students in Linyi City. In that study they found that 41.5% of students had positive attitude towards HIV/AIDS patients. In this study we found 24.3% respondents indicated that it would be easy for them to tell their classmates that they are HIV positive. This is similar to Lönn, et.al study on medical students in northwestern China, who found 28% of the undergraduate and 17% of the postgraduate students would not tell anyone if they were infected with HIV. Many studies have reported good knowledge on HIV/AIDS but negative attitude is still prevalent. From our study, although students had good knowledge regarding HIV/AIDS, they still harbor negative attitude towards HIV/AIDS and HIV/AIDS patients. Knowledge alone is not enough to change attitudes towards people having HIV/AIDS, but deep seated social and cultural factors such as religion, attitude towards ill-health and risk behaviors especially sexual behaviors can affect attitude too.

In this study, 15.8% of our respondents reported having at least one risk behavior related to unprotected sexual exposure and 3.0% reported sharing needles. This was higher than the assessment of HIV/AIDS knowledge, attitudes and behaviors of Chinese students made by Tan *et al*. (2007). Tan *et al*. found only 6.9% of students they assessed reported a bad practice. Huang, et.al (2005) study on knowledge, attitude, behaviors, and perceptions of risk related to HIV/AIDS among Chinese university students in Hunan found that 14% of Chinese university students were sexually active and risk behaviors tended to increase with age. In addition, 24% of the students in their study considered themselves to be at moderate to very high risk of contracting HIV and 40% of the sexually active students never used condoms. In this study, almost all our respondents believed condom can prevent HIV but 15.8% of our respondents admitted having at least one risk behavior related to unprotected sexual exposure. In practice, sexually active students are still shy to buy condom, especially among Uyghurs because of religious and socio-cultural norms related to youths especially unmarried youths.

This study suggests that the education system needs to implement specific and focused educational programs for students in university and promote health promotion. It is important that university students understand HIV prevention and transmission, as well as develop positive attitude and good practice. The university is a good place and time to have peer education programmes that address self esteem, healthy sexual attitudes, as well as to be socially active, accepting and caring. Taking into consideration the fact that not all students are sexually active, developing messages geared towards them while offering strategies that help students delay sex, refuse sex, or negotiate safer sexual practices should be included. This program must give students an understanding of why it is more advantageous to abstain from sex, without promoting unnecessary fear.

3.5 Strengths and limitations of the study

This study examines knowledge, attitude and behaviors on HIV/AIDS among medical and non-medical students from different universities in Xinjiang (Xinjiang University and Xinjiang Medical University). An earlier study in 2007 was only conducted among medical students from the Xinjiang Medical University (Lönn, et.al 2007). Xinjiang as a region is in many ways different from the rest of China due to its long borders and ethnic composition. This study addressed an important issue in this region since Xinjiang borders many countries, some of which are well known poppy growing areas and narcotic trading routes.

There are some limitations in this study. First, this study was designed a cross-sectional survey using self-administered questionnaires. Information bias may occur since the questionnaires may generate biased and preconceived answers. The questionnaires did not cover contents related to students' religion, family background, income and resident, when in fact, these factors might directly influence their knowledge, attitude and practice regarding HIV/AIDS. Second. The results obtained in this study should not be generalized to all Xinjiang youths or to all university students in Xinjiang since this study was carried out in only two universities in the capital, Urumqi and among students from limited faculties in these two universities.

5. Conclusion

Knowledge of HIV/AIDS is good but about two-thirds of the university students in Xinjiang had negative attitude towards HIV/AIDS and HIV/AIDS patients. This negative attitude will lead to discrimination and delay in seeking treatment for fear of discrimination. At the same time about 15% of these students reported having at least 1 high risk behavior related to sex and unprotected sex. In view of the limited extent of HIV/AIDS awareness programme at the universities, since only 27.3% of respondents had attended such education programme, the universities should increase their HIV/AIDS health education efforts to all students, and especially to female and non-medical students. It should also target Uyghur and the other minorities since their level of knowledge on HIV/AIDS is significantly lower than that of the Han Chinese. Knowledge alone is not enough to prevent HIV/AIDS but strategies to instill positive attitude and good practice for preventing HIV/AIDS transmission should be implemented.

6. Recommendations

The information on the KAP of university students in Xinjiang can reflect the gaps in HIV/AIDS KAP among youths in urban Xinjiang. It is possible that youths not enrolled in institutes of higher learning may be experiencing even greater gaps on knowledge of prevention of HIV/AIDS. Universities in Xinjiang should offer health education programme related to HIV/AIDS prevention among their students. This can help to improve the student's knowledge and correct any misconception regarding HIV/AIDS. High knowledge level improves student's attitude towards HIV/AIDS and training programmes or lectures regarding HIV/AIDS can help students practice good HIV/AIDS prevention behaviors. Beside health education, intervention strategies must focus on behavioral changes towards safer sex, and changing the negative attitude towards HIV/AIDS and those infected with HIV. This is to ensure prevention of rapid transmission of HIV and early screening of exposed youths.

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Table 1. Differences in distribution of knowledge level and mean knowledge scores for all respondents and by sex, Year of study, study major and ethnicity

Factors	N	Knowledge level				Mean	S td	p- value
		Good Knowledge (<15)		Poor Knowledge (0-15)				
		f	%	f	%			
All	400	298	(74.5)	102	(25.5)	19.3	± 5.5	
Sex								0.04
Male	200	158	(79.0)	42	(21.0)	19.9	± 5.4	
Female	200	140	(70.0)	60	(30.0)	18.7	± 5.5	
Study major								0.01
Medical	200	160	(80.0)	40	(20.0)	21	± 5.3	
Non-medical	200	138	(69.0)	62	(31.0)	18	± 5.4	
Year of study								0.04
First year	200	141	(70.5)	59	(29.5)	18.3	± 5.2	
Final year	200	157	(78.5)	43	(21.5)	20.3	± 5.5	
Ethnicity								0.01
Uyghur	190	118	(62.1)	72	(37.9)	17.6	± 5.7	
Han Chinese	154	114	(93.5)	10	(6.5)	21.1	± 4.0	
Others	56	36	(64.3)	20	(35.7)	17.1	± 5.7	

*Based on Chi-square test; significant at the 0.05 level

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Table 2. Differences in distribution of attitude level and mean attitude scores for all respondents and by sex, year of study, study major and ethnicity

Factor	N	Attitude				Mean	Std	p-value
		Negative scores (0-5)		Positive scores (>5)				
		f	%	f	%			
All	400	165	(66.7)	135	(33.3)	4.83	± 1.85	
Sex								0.91
Male	200	132	(66.0)	68	(34.0)	4.76	± 1.99	
Female	200	133	(66.5)	67	(33.5)	4.89	± 1.69	
Study major								0.34
Medical	200	128	(64.0)	72	(36.0)	4.99	± 1.72	
Non-medical	200	137	(68.5)	63	(31.5)	4.66	± 1.95	
Year of study								0.75
First year	200	134	(67.0)	66	(33.0)	4.93	± 1.84	
Final year	200	131	(65.5)	69	(34.5)	4.72	± 1.85	
Ethnicity								0.53
Uyghur	190	129	(67.9)	61	(32.1)	4.64	± 1.87	
Han Chinese	154	97	(63.0)	57	(37.0)	5.05	± 1.83	
Others	56	39	(69.6)	17	(30.4)	4.48	± 1.78	

*Based on Chi-square test; significant at the 0.05 level

Table 3. Distribution of risk behaviors related to HIV/AIDS for all respondents and by sex, study major, year of study and ethnicity

Factor	N	At least one Risk behavior				p-value
		Yes		No		
		f	%	f	%	
All	400	63	(15.8)	337	(84.2)	
Sex						
Male	200	39	(19.5)	161	(80.5)	0.03
Female	200	24	(12.0)	176	(88.0)	
Study major						
Medical	200	30	(15.0)	170	(85.0)	0.68
Non-medical	200	33	(16.5)	167	(83.5)	
Year of study						
First year	200	39	(19.5)	161	(80.5)	0.03
Final year	200	24	(12.0)	176	(88.0)	
Ethnicity						
Uyghur	190	37	(19.5)	153	(80.5)	0.09
Han Chinese	154	17	(11.0)	137	(89.0)	
Others	56	9	(16.1)	47	(83.9)	

*Based on Chi-square test; significant at the 0.05 level

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Family Communication Patterns and Willingness to Engage in Family Discussion about Organ Donation in the United States

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Abstract

Individuals can register as organ donors via state organ donor registries. But when individuals wish to donate their organs in the future, it is also important for them to engage in family discussion about these wishes. In many cases of organ donation, family members need to consent to the wishes of the deceased. In order to better understand possible reasons why young people may or may not engage in family discussions about organ donation, the current study focused on undergraduate students. Because they are young, undergraduates and their family members may be less likely to think about a possibility for their untimely death. Because of their youth, however, if undergraduates face an unfortunate deadly accident, they can become deceased donors well-suited for saving many others' lives. Undergraduate participants (n = 461) in the United States responded to a questionnaire assessing two dimensions of family communication patterns (conformity and conversation orientations), altruism, attitudes about organ donation, intention to sign an organ donor card, and willingness to talk to family about organ donation. Findings showed that attitude toward organ donation was a stronger predictor of willingness to engage in family discussion when a conformity orientation was high than when it was low (simple slopes, b = 0.28 versus b = 0.07). On the other hand, intention to sign a donor card was a stronger predictor of willingness to engage in family discussion when a conversation orientation was high than when it was low (simple slopes, b = 0.70 versus b = 0.45). Additionally, willingness to engage in family discussion was positively related to the self-reported behavior of family discussion about organ donation one week later.

Keywords: Family communication, Health communication, Organ donation, The United States

I. Introduction

One of the necessary steps for increasing organ donation is to create a society where “surviving family members would be comfortable giving permission” for organ donation from their loved ones (Institute of Medicine of the National Academies, 2006, p. 3). For individuals who wish to donate their organs in the future, individuals can

register as organ donors via state organ donor registries. However, it is important and necessary for individuals to these wishes to family members as well because family members need to consent to the wishes of the deceased. If individuals who have positive attitudes about organ donation engage in family discussion, their family members can be also positively influenced by the benefits of organ donation. For example, family discussion about organ donation has been found to be related to family members' more positive attitudes and beliefs about organ donation than before the discussion (Rodrigue, Cornell, & Howard, 2009).

A need to better understand the factors affecting intention or willingness to communicate with family about organ donation is not unique to one country. The lack of available organs for transplants has been a serious health problem worldwide. For example, in Korea, 15,897 patients were waiting for an organ transplant in 2007, but only 2,360 transplants were performed (Korean Network for Organ Sharing, 2008). Researchers in various countries have examined attitudes and related variables on organ donation among Japanese, Chinese, and Americans (e.g., Wu & Tang, 2009), people in Pakistan (Saleem *et al*., 2009), and people in Netherlands (Ryckman, Gold, Reubsaet, & van den Borne, 2009). In the United States, undergraduates have the overall positive attitudes about deceased organ donation (Feeley, 2007). A Gallup poll in 2005 showed that 78% of Americans in indicated their willingness to donate their organs. But organ donation still falls far short of organ transplant needs. In the United States, as of October, 2009, over 104,000 individuals were in need of transplant organs, but only about 12,834 transplants from deceased donors were conducted between January and July of 2009 (United Network for Organ Sharing, 2009).

One way to increase organ donation is to increase family consent rates. When the families of donor-eligible patients are approached for donation, their consent rates range from about 50% to 65% (Beasley *et al*., 1997; Christmas *et al*., 2008; Gortmaker *et al*., 1998; Siminoff, Gordon, Hewlett, &Arnold, 2001). A Gallup poll in 2005 found that 53% of Americans reported their family members had expressed wishes related to organ donation. These findings indicate that although one's wish to donate organs and consent rates are high, a significant number of American people still do not know their family members' wishes regarding deceased organ donation. Family members are significantly more likely to consent to organ donation when they know the wishes of the deceased than when they do not know them (Radecki & Jaccard, 1997; Siminoff *et al*., 2001). It is important to examine possible reasons why young people may or may not engage in family discussions about organ donation.

1.1 Attitude, Altruism, and Intention to Sign an Organ Donor Card

Individuals with more positive attitudes about organ donation and stronger altruistic tendencies and intentions to sign an organ donor card are expected to have higher willingness to express their organ donation wishes to their family members. Previous research findings on these three factors are, in general, supportive of these predications. Attitude toward organ donation was found to relate positively to willingness to engage in family discussion on the issue (Morgan & Miller, 2001), probably because individuals positively disposed toward organ donation are more likely to want their family members to know and respect their views on organ donation. Altruism, defined as "behavior carried out to benefit another without anticipation of rewards from external sources" (Macaulay & Berkowitz, 1970, p. 3) was also found to be related to diverse factors important in organ donation. For example, those who had signed a document indicating their wishes to become organ donors exhibited more altruistic dispositions than those who had not (Morgan & Miller, 2002). Finally, individuals who have stronger intentions to sign organ donor cards are more likely to know that family consent is crucial for their wishes to become organ donors. Research shows that most individuals who signed documents indicating their wishes to be organ donors also expressed their wishes to family members (Morgan, 2004; Morgan & Miller, 2001). In sum, the following hypotheses are advanced.

H1, 2, & 3: Attitude toward organ donation (H1), altruism (H2), and intention to sign an organ donor card (H3) are positively related with willingness to have family discussions about organ donation.

1.2 Family Communication Patterns

The perceptions of young individuals about their family communication patterns are likely to influence their willingness to express opinions about organ donation to other family members. Families have varying communication environments, which involve "norms of control and supportive messages" (Ritchie & Fitzpatrick, 1990, p. 525) and influence the extent to which family members express their own opinions or conceal certain information (Fitzpatrick & Ritchie, 1994). Individuals' perception about their ability to engage in family discussions about organ donation was an important factor influencing individuals' intentions to have family discussions (Afifi *et al*., 2006; Park & Smith, 2007). Considering that deceased organ donation is a sensitive topic about which family members may not talk on a regular basis and that disagreement is possible among

family members, the extent to which young people perceive their families to be open to diverse opinions versus avoidant of conflicts may be related to how willing young people might be to engage in family discussions.

Family communication patterns are thought to vary along two dimensions (Koerner, 2009; McLeod & Chaffe, 1972; Ritchie & Fitzpatrick, 1990). The ideas originally conceptualized as socio-orientation and concept-orientation dimensions of family communication patterns (McLeod & Chaffe, 1972) have been reformulated as *conformity orientation* and *conversation orientation*, respectively (Ritchie, 1997; Ritchie & Fitzpatrick, 1990). The conformity orientation dimension of family communication patterns refers to "the degree to which family communication stresses a climate of homogeneity of attitudes, values, and beliefs" (Koerner & Fitzpatrick, 2002a, p. 85). The conversation orientation dimension of family communication patterns is defined as "the degree to which families create a climate in which all family members are encouraged to participate in unrestrained interaction about a wide array of topics" (Koerner & Fitzpatrick, 2002a, p. 85). Research showed that more general family discussions occurred in a family that valued a conversation orientation than in a family that preferred a conformity orientation (Liebes & Ribak, 1992; Roberts, Pingree, & Hawkins, 1975). A conversation orientation was positively associated with young adults' preference for integrating and compromising strategies for handing conflicts with their parents, whereas a conformity orientation was positively associated with preferences for avoiding and obliging strategies (Shearman & Dumlao, 2008). Young adults who grew up in families with higher conversation orientation were more likely to indicate greater communication competence skills in their interpersonal relationship with others (Koesten, 2004). Additionally, research has shown that the two types of family communication patterns were differentially related to young adults' mental well-being (Schrodt & Ledbetter, 2007) and young adults' relational maintenance behaviors (Ledbetter, 2009).

Given that these two dimensions of family communication patterns assume opposite characteristics, some may suggest that these two dimensions should be combined into one dimension with the conformity orientation on one end and the conversation orientation on the other end. However, McLeod and Chaffe (1972) conceptualized these two dimensions as separate, arguing that some families may have a high level of both conformity and conversation orientations while other families may have a low level of both conformity and conversation orientations. Researchers have also reported empirical findings supportive of separate conceptualizations of conformity and conversation orientations (Koerner & Fitzpatrick, 1997). Advancing a theory of family communication, Koerner and Fitzpatrick (2002a, 2002b, 2006) conceptualized conformity and conversation orientations as important family communication beliefs contributing to individuals' development of family relationship schema. A meta-analysis showed that conformity and conversation orientations had "a meaningful association with a variety of cognitive activities and relational behaviors, as well as individual well-being" (Schrodt, Witt, & Messersmith, 2008, p. 248).

The two dimensions of family communication patterns are likely to moderate the effects of attitude, intention to sign an organ donor card, and altruism on willingness to have family discussions about organ donation. In general, it is expected that young adults who perceive their family communication patterns to be higher on the conformity orientation may believe that they are likely to offend their parents by initiating discussions about organ donation. Consequently, they should be less likely to initiate family discussions about organ donation. On the other hand, young adults who perceive their family communication patterns to be higher on the conversation orientation should be more willing to have family discussions because they may feel less apprehensive and more capable of managing family discussions on the issue. To be more specific, for young adults from a family with a higher conversation orientation, it is possible that positive attitude about organ donation is more likely to lead to willingness to engage in family discussion. For young adults from a family with a higher conformity orientation, however, regardless of their attitude about organ donation, they may not be willing to engage in family. Similarly, the way intention to sign an organ donor card and altruism affect willingness to engage in family discussion can depend on family communication patterns. In sum, conformity orientation of family communication pattern is hypothesized to weaken the positive effects of attitudes, altruism, and intention to sign on willingness to engage in family discussion, whereas conversation orientation of family communication pattern is hypothesized to strengthen the positive effects of attitudes, altruism, and intention to sign on willingness to engage in family discussion.

H4, 5, & 6: As individuals perceive their family communication patterns to be more conformity-oriented, the positive effects of their attitude toward organ donation (H4), altruism (H5), and intention to sign an organ donor card (H6) on willingness to engage in family discussions about organ donation will be weaker.

H7, 8, & 9: As individuals perceive their family communication patterns to be more conversation-oriented, the positive effects of their attitude toward organ donation (H7), altruism (H8), and intention to sign an organ donor

card (H9) on willingness to engage in family discussions about organ donation will be stronger.

1.3 Willingness to Engage in Family Communication and Self-Reported Behavior

Willingness to engage in family discussions about organ donation is expected to be positively related to individuals' behavior of actually engaging in family discussion. Research has shown that willingness to communicate about organ donation was predictive of engaging in family discussion and having an organ donor card witnessed (Smith, Kopfman, Lindsey, Yoo, & Morrison, 2004). In addition, other studies found that individuals who had family discussions had more positive attitudes toward organ donation and were more altruistic than individuals who had not (Morgan, 2004). Thus, there are reasons to hypothesize a positive relationship between willingness to engage in family discussion and the self-reported behavior of having family discussions one week later.

H10: As individuals are more willing to engage in family discussion about organ donation, they will be more likely to engage in family discussion one week later.

2. Method

2.1 Participants

Participants were 461 undergraduates (66.2% women, age M = 19.96, SD = 1.57) enrolled in a communication class at Michigan State University in the United States. The data were collected from a class in which 606 students were officially enrolled. The researchers explained the study to the students and sent e-mails that contained a description of the study and a link to an on-line survey. Of 606 students, 76% participated in the study voluntarily in exchange of extra credit. Students who did not want to participate in our study were provided with alternate tasks with which they could earn an equivalent amount of extra credit. In general, the ethnic make-up of Michigan State University students included 82% Caucasian, 8% African American, 3% Hispanic, 1% Native American, and 6% Asian/Pacific Islander. The participants completed the first survey before the Thanksgiving holiday (i.e., between the18th and the 23 of November, 2004) and then completed another survey one week later (i.e., the 29th of November and the 3rd of December, 2004) when they came back to the class after the holiday. The survey was administered before and after the Thanksgiving holiday because most undergraduates went back home to spend the holiday with their family and could have an opportunity to engage in family discussion about organ donation. This study received an approval of human subjects from the institutional review board (IRB) at Michigan State University in the United States.

2.2 Measures

Reliabilities (Cronbach's α), means, standard deviations, and correlations of the variables are shown in Table 1. All of the measures used a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). For all the measures, confirmatory factor analysis (CFA) showed a good fit with most fit indices greater than .90 for unidimentionality. For family communication patterns, a two-dimension model was tested as explained below.

Family communication patterns were measured with Ritchie and Fitzpatrick's (1990) revised version of the Family Communication Pattern scale. A CFA was performed to test the adequacy of two dimensions (a conversation factor and a conformity factor). Most fit indices for the two-dimensional solution with all 26 items did not reveal a good fit (Non-Normed Fit Index [NNFI] = .82, Comparative Fit Index [CFI] = .83, Incremental Fit Index [IFI] = .84, Adjusted Goodness of Fit Index [AGFI] = .89). A one-factor model with the 26 items did not show good fit either (NNFI = .73, CFI = .75, IFI = .76, AGFI = .87). After dropping the items (seven items from a conversation orientation factor and seven items from a conformity orientation factor) that did not load substantially on their respective factors (e.g., factor loadings < .30) and/or had larger errors, the resulting CFA showed a good fit for the revised two-factor model (NNFI = .92, CFI = .94, IFI = .94, AGFI = .94). For the 12 items, the two-factor model was a better fit to the data than a one-factor model (NNFI = .77, CFI = .82, IFI = .82, AGFI = .86), $\Delta\chi^2(1) = 178.76$, $p < .001$. Eight of the remaining items were averaged to a create conversation factor (e.g., "My parents like to hear my opinions, even when they don't agree with me.") and the other four items were averaged to form conformity factor (e.g., "My parents often say something like 'A child should not argue with adults'.").

Attitude about organ donation was measured with five items (e.g., "I support the idea of organ donation for transplantation purposes," "I believe that organ donation is an act of compassion"). Altruism was measured with eleven items (e.g., "Helping others is one of the most important aspects of life," "I enjoy working for the welfare of other."). Intention to sign an organ donor card was measured with five items (e.g., "I intend to, or I have previously, signed an organ donor card," "I have thought about signing, or I have already signed, an organ donor card").

Willingness to engage in family discussion about organ donation was measured with four items (e.g., "I am willing to talk to my family about my decision to become an organ donor," "I would feel comfortable talking to my family about becoming an organ donor."). A week after the initial data collection time, the participants indicated yes or no to the question, "In the past week, did you do the following? I engaged my family in a discussion about my wishes regarding organ donation." Of the participants, 16.7% answered yes to the question.

3. Results

3.1 Overview

Before conducting the analyses, the continuous predictor variables were mean-centered to avoid nonessential multicollinearity when creating product terms (cf., Cohen, Cohen, West, & Aiken, 2003). For interaction effects, the criterion variable was regressed onto the product terms of the predictor variables. Hierarchical multiple regression analyses were conducted with the five predictors in the first block and the interaction terms in the second block. No other types of interactions and higher-order interactions were statistically significant and thus are not reported. Neither gender nor age was a significant predictor or moderator of the other predictors on the criterion variable and thus are not reported.

3.2 Hypotheses Testing

The regression results for willingness to engage in family discussion about organ donation are reported in Table 2. The overall model was significant, F (11, 449) = 41.28, $p < .001$, $adj.R^2 = .49$. For the predictors in the first block of the regression analysis, neither conversation nor conformity orientations of family communication were significant. Consistent with H1, 2, and 3, attitude toward organ donation (H1), altruism (H2), and intention to sign an organ donor card (H3) were positively related to willingness to engage in family discussion about organ donation.

For H4, 5, and 6, which predicted conformity orientation as a moderator for how attitude toward organ donation (H4), altruism (H5), and intention to sign an organ donor card (H6) would be related to willingness to engage in family discussion, the interaction terms in the second block were examined. Consistent with H4, but inconsistent with H5 and H6, conformity orientation was a moderator for attitude, but not for altruism and intention to sign. A simple regression analysis showed that attitude was a weaker predictor of willingness to engage in family discussion about organ donation (unstandardized simple slope, $b = 0.07$, $p = .31$) for those who had higher scores (1*SD* above) than for those who had lower scores on the conformity orientation of family communication (1*SD* below), $b = 0.28$, $p < .001$. That is, the positive relationship between attitude toward organ donation and willingness to engage in family discussion about organ donation was weaker for those with stronger conformity orientations of family communication.

For H7, 8, and 9, which predicted conversation orientation as a moderator for how attitude toward organ donation (H7), altruism (H8), and intention to sign an organ donor card (H9) would be related to willingness to engage in family discussion, the interaction terms in the second block were examined. Consistent with H9, but inconsistent with H7 and H8, conversation orientation was a moderator for intention to sign, but not for attitude and altruism. A simple regression analysis showed that intention to sign was a stronger predictor of willingness to engage in family discussion about organ donation (unstandardized simple slope, $b = 0.70$, $p < .001$) for those who had higher scores (1*SD* above) than for those who had lower scores on the conversation orientation of family communication (1*SD* below), $b = 0.45$, $p < .001$. That is, the positive relationship between intention to sign an organ donor card and willingness to engage in family discussion about organ donation was stronger for those with stronger conversation orientations of family communication.

H10 predicted that participants with higher willingness to engage in family discussion about organ donation would be more likely to actually have performed the behavior a week later. As shown in Table 1, individuals who engaged in family discussion indicated higher willingness to engage in family discussion in the previous week than those who did not engage in family discussion. When a logistic regression analysis was done with family discussion as a binary outcome and conversation orientation, conformity orientation, attitude toward organ donation, altruism, intention to sign an organ donor card, and willingness to engage in family discussion as predictors, the model was significant, $\chi^2_{(6)} = 18.07$, p = .006, Cox & Snell $R^2 = .04$, Nagelkerke $R^2 = .07$. Among the predictors, only willingness to engage in family discussion was a positive predictor of actual engagement in family discussion, $B = .44$, Wald = 7.65, $p = .006$, whereas all of the other predictors were not significant, $B = .07$, Wald = 0.10, $p = .75$ for conversion orientation, $B = .07$, Wald = 0.20, $p = .65$ for conformity orientation, $B = .18$, Wald = 1.38, $p = .24$ for attitudes about organ donation, $B = .03$, Wald = 0.02, $p = .88$ for altruism, and $B = –.15$, Wald = 0.90, $p = .34$ for intention to sign an organ donor card.

4. Discussion

One important characteristic that should be considered in the examination of family discussion about organ donation is that it is a behavior that individuals cannot perform on their own. Individuals have to include their family members, and they are likely to communicate according to pre-existing patterns which already exist within the family structure. Though few people would dispute the benevolence of organ donation, some family members may find the topic uncomfortable or threatening, particularly when it involves their family members as donors. Faced with the potential to upset family members, individuals may decide whether or not they will engage in family discussion depending on the communication style that they perceive within the family. That is, while individuals are likely to engage in family discussion in an environment where free exchange of disparate opinions is encouraged, they might be less inclined to do so when family members expect agreement, or prioritize pleasant social interactions over heated discussions.

4.1 Interpretations and Implications of the Findings

The results showed that attitude toward organ donation, intention to sign an organ donor card, and altruism independently influenced willingness to engage in family discussion about organ donation. These results are consistent with past studies. A benefit of having family discussion about organ donation is that family members may be able to educate one another about organ donation and may motivate other family members to dispel misconceptions and to seek more accurate knowledge. As research has shown that factual knowledge about organ donation is related to intention to donate organs (Horton & Horton, 1990; 1991), individuals could be more willing to donate as a result of more accurate knowledge about organ donation they may gain through family discussions on the issue. If so, an important implication of the current finding is that individuals with positive attitudes toward organ donation, high intention to sign an organ donor document, and strong altruism may talk to their family members, not only to express their donation wishes to their family members but also to influence their family members to become more positive about organ donation processes.

The moderating roles of family communication patterns presented rather complex mechanisms underlying individual decision-making processes in relation to family discussion about organ donation. As conversation orientation and conformity orientation were theorized as two distinct dimensions (Ritchie, 1997; Ritchie & Fitzpatrick, 1990; Saphir & Chaffee, 2002) and the current data were consistent with a two-factor model, the effects of the two types of family communication patterns were not parallel.

A possible reason for the negative effect of a conformity orientation on the relationship between attitude toward organ donation and willingness to engage in family discussion could be that having a positive attitude about organ donation is not powerful enough to motivate people to engage in family discussion about organ donation when they perceive their parents and other family members are conformity-oriented. Even when individuals had positive attitudes about organ donation, expressing their attitudes to their conformity-oriented family members was often something to be avoided and not desired. It is interesting that despite the negative influence on the relationship between attitude and family discussion, the conformity orientation did not significantly affect the positive effects of altruism and intention to sign on willingness to engage in family discussion about organ donation. One possible reason for this pattern of findings could be that attitudes about organ donation might include more of a focus on death itself than do altruism and intention to sign an organ donor card. The conformity orientation may be a more relevant factor when the focus is on donating organs after death than on helping others in an abstract sense. That is, altruism is an idealistic notion about helping others. Intention to sign an organ donor card can mean that signing increases a chance to help others, however signing now does not result in donating organs now. Attitudes about organ donation, however, may have more direct relevance to the time and act of actually "donating" organs, which might be a more unpleasant and objection-invoking topic for family discussion. Thus, for individuals who were more likely to consider their families to be conformity-oriented, their positive attitudes about organ donation made them less willing to talk to their families about organ donation. However, regardless of how conformity-oriented individuals consider their families to be, individuals with stronger altruism and stronger intention to sign were more willing to talk to their families about the "benefits-of-helping-others" resulting from organ donation.

On the other hand, the positive effect of conversation orientation on the relationship between intention to sign an organ donor card and willingness to engage in family discussion implies that individuals' perceptions about their family communication being conversation-oriented is one of the crucial links which connects the two behaviors (signing an organ donor card and expressing one's wish to family members) critical to organ donation. This finding shows that individuals with stronger intentions to sign an organ donor card have greater motivation to have their wishes of being organ donors honored by their family members, and they appear to find it easier to

talk to their families about organ donation when they perceive their family members to be conversation-oriented. However, conversation orientation did not affect the effects of attitudes and altruism on willingness to engage in family discussion, possibly because attitudes about organ donation and altruism have less concrete implications for individuals and their family members than does the behavior of signing an organ donor card. That is, having a stronger intention to sign can imply stronger behavioral commitment to organ donor designation than can altruism and attitudes about organ donation, and this commitment has concrete implications about the death of a family member and other negative associations.

Because the current findings were based on responses of undergraduates in the United States, it remains unanswered whether the current findings could be generalizable to young adults in other countries. People in different cultures have different beliefs about the "ideal" ways of family interactions (Matsunaga & Imahori, 2009). But Koroshnia and Latifian (2008) showed that the revised family communication pattern scale had acceptable validity and reliability in Iran. Hsu (2002) showed that a conformity orientation and a conversation orientation had separate and differential effects on communication apprehension among undergraduates in Taiwan. Using the revised family communication pattern scale with people in other countries may reveal how cultures and family communication patterns affect the relationship between attitudes about organ donation and willingness to engage in family discussion about organ donation. Wu and Tang (2009) showed that attitudes were a significant predictor of family discussion among Americans and Japanese, but not among Chinese. Future studies may examine if a conformity orientation and a conversation orientation will further differentiate the relationship between attitudes and family discussion among people in different countries.

4.2 Limitations and Directions for Future Studies

As a limitation, the scale of revised family communication patterns in the current study had lower reliabilities than in previous studies using this scale (e.g., Ritchie & Fitzpatrick, 1990; Schrodt & Ledbetter, 2007). At this point, it is uncertain whether the scale needs improvement or whether the lower reliabilities in the current study were simply due to sampling error.

A second limitation is that the exclusive focus on participants' perception about their family communication patterns also resulted in the treatment of communication between participants and their parents as a unidirectional process as opposed to a bidirectional process. Considering that family communication patterns can change and be affected by sons and daughters initiating family discussions with their parents (Saphir & Chaffee, 2002), family discussions about organ donation initiated by undergraduates might influence their parents' opinions on the issue.

A third limitation is that the current study did not differentiate family members (e.g., mothers, fathers, and siblings) when participants were answering questions on family discussion. It is not certain whether the participants in the current study indicated their willingness to engage in family discussions as involving all members of their family or only one parent or perhaps only their siblings.

A fourth limitation is that this study examined only a small number of variables. There are many other factors to consider when attempting to understand family discussion about organ donation. For example, individuals' knowledge about organ donation may be another important variable because individuals with greater knowledge and accurate information about organ donation may feel more competent in responding to potential counterarguments from family members who oppose organ donation. Additionally, it would be informative to examine the situations or contexts under which families feel motivated to talk about organ donation. Future studies will need to make an effort to develop a more complex model of interrelated factors that provide comprehensive understanding of family discussion about organ donation.

The limitations of the current study provide some suggestions for future studies. It would be beneficial to examine both parents and their sons and daughters to fully understand individual, situational, and interactional factors affecting family discussions. The examination of both parents and their sons and daughters with a longitudinal study design would allow researchers to achieve this goal. The measurement of parents' opinions about organ donation and young adults' perceptions of their parents' communication orientations would make it possible to examine whether young adults have family discussions about organ donation as a result of their parents' positive attitudes toward the issue or the communication environment (i.e., conformity or conversation orientation) in which they are embedded. Additionally, considering that family communication patterns can differ across families with different ethnicities and individuals with different ethnicities may differ in their attitudes and intentions about behaviors critical to organ donation (Park, Shin, & Yun, 2009; Park, Smith, & Yun, 2009), it would be interesting to examine how people with different ethnicities undertake or avoid family discussion about organ donation.

5. Conclusion

The results of the current study replicated past research findings that attitude toward organ donation, intention to sign an organ donor card, and altruism were positively related to willingness to engage in family discussions about organ donation. Furthermore, the current study raised the important question of whether individuals' perceptions of their family communication patterns are an important factors affecting willingness to engage in family discussions about organ donation and found that they were. Although the current study is not without limitations, the results provide useful implications for communication campaigns to encourage family discussion about organ donation.

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Table 1. Reliabilities, means, standard deviations, and correlations of variables

		1	2	3	4	5	6	7
1. Conformity-oriented family communication		.68						
2. Conversation-oriented family communication		–.34***	.67					
3. Attitude toward Organ Donation		–.19***	.12*	.85				
4. Altruism		–.17***	.31***	.46***	.82			
5. Intention to Sign an Organ Donor Card		–.11*	.10*	.45***	.26***	.93		
6. Willingness for Family Discussions		–.16**	.17***	.48***	36***	.65***	.91	
7. Engaged in Family Discussions[§]		–.03	.05	.14**	.10*	.11*	.19***	—
total	*M* *SD*	2.77 (0.92)	3.00 (0.67)	3.29 (1.09)	3.02 (0.79)	3.18 (1.09)	3.09 (1.15)	0.17 (0.37)
Engagement in Family Discussion (*n* = 73)	*M* *SD*	2.72_a (0.86)	3.07_a (0.65)	3.64_a (1.07)	3.21_a (0.79)	3.45_a (1.20)	3.59_a (1.31)	
No Engagement in Family Discussion (*n* = 365)	*M* *SD*	2.79_a (0.93)	2.98_a (0.68)	3.22_b (1.08)	3.00_b (0.79)	3.15_b (1.05)	3.00_b (1.09)	

* $p < .05$, ** $p < .01$, *** $p < .001$, *df* ranged from 436 to 459

Reliabilities (Cronbach's α) are reported on the diagonal.

[§] Coded with engagement in family discussions in the next week = 1 and no engagement in family discussions in the next week = 0

Means with different subscripts (a and b) within each column are significantly different from one another at $p < .05$

Table 2. Multiple regression results

	B	*SE*		*t*	*sr*
First Block					
Conformity Orientation of Family Communication	–0.03	0.05	–.03	–0.75	–.03
Conversation Orientation of Family Communication	0.08	0.06	.05	1.21	.04
Attitudes about Organ Donation	0.19	0.04	.18	4.24***	.14
Altruism	0.18	0.06	.12	3.15**	.11
Intention to Sign an Organ Donor Card	0.56	0.04	.53	14.08***	.47
F (5, 455) = 85.95, p < .001, $adj.R^2$ = .48					
Second Block					
Attitudes about Organ Donation × Conformity Orientation	–0.11	0.05	–.10	–2.14*	–.07
Altruism × Conformity Orientation	0.10	0.07	.07	1.48	.05
Intention to Sign × Conformity Orientation	0.00	0.05	.00	0.00	.00
Attitudes about Organ Donation × Conversation Orientation	–0.09	0.07	–.06	–1.34	–.05
Altruism × Conversation Orientation	0.01	0.08	.00	0.08	.00
Intention to Sign × Conversation Orientation	0.19	0.07	.12	2.77**	.09
F_{change} (6, 449) = 2.57, p = .02, R^2_{change} = .02					

* p < .05, ** p < .01, *** p < .001

sr: semipartial correlation

Iranian Student's Emotion in Government University in Malaysia

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Abstract

Learning situations in modern society are getting increasingly complex and variable, and learners have to take more responsibility for their own learning. The main purpose of this study was to understand Iranian student's feelings**,** who studying in selected Government University in Malaysia. The study was carried out through three research questions: 1) How do the Iranian student's feel about life in Malaysia? 2) How these feelings do affects on Iranian student's educational progress? 3) What are the factors that contributed to these feeling? Due to the nature of study, a qualitative research method and techniques was used to enable the researcher to understand emotion of Iranian student whose study at one of Government University in Malaysia. Data was gathered from interview with 3 Iranian students via "convenience sampling". "Constant Comparative" method was used for data analysis. Eight major themes (worry, sad, happy and comfortable, socio-culture factors, economic factors, and good relationship and environment facilities) emerged from this study in relation to Iranian student's emotion in selected Government University in Malaysia. This study concludes that based on the findings, graduated student organization can designed intervention program base on International students' views in their social, cultural and economical content.

Keyword: Student's emotional, Learning strategy, Malaysia

1. Introduction

Learning situations in modern society are getting increasingly complex and variable, and learners have to take more responsibility for their own learning. In every day learning situations there are different kinds of competitive motives, disturbing emotions or environmental and social factors that influence the learning process (Pintrich, 2000).

In learning situations, individuals make personal appraisals of the situations, meaning based on their former knowledge and experiences. These appraisals along with situational factors and the individual's interpretations of them arouse emotions (Fredrickson, 2001).

In addition, research on emotions has shown that students experience a rich variety of emotions in academic settings. Also**,** the results of previous research show that academic emotions are significantly related to student monitoring, learning strategies, cognitive resources, self regulation and academic achievement. Moreover, not only do the emotions themselves vary, but also their sources. The student's emotion in adopting himself/herself with the new condition is very important, since this adaptation is very affective on the level of satisfaction and consequently on student's educational progress.

According to Ciccareli and Meyer, (2006) there are important links between emotions and cognition. Also the label a person applies to a subjective feeling is influenced by that person's language and culture. Therefore, what is the meaning of emotions for Iranian students**,** as the majority of international students**,** and how do these emotions affect their educational progress in selected Government University in Malaysia. Thus, this study aims to understand the Iranian postgraduate third semester student's emotions in selected Government University in Malaysia.

As the Iranian students is going to be the majority of international students in selected Government University in Malaysia, it seem that, paying due attention to their point of views and understanding their emotions are necessary, since these emotions influence on their educational progress. It seems the selected Government University in Malaysia lectures in general, and committee supervisory members in particular, do not pay enough attention to understand the Iranian students' emotions during their educational experience in selected Government University in Malaysia. Data is needed to help them plan appropriate programs for international students. In addition, there is not any research about concepts related to education emotions in cultural, social, and economic context to Iranian graduate students in overseas.

The purpose of this study is to understand Iranian student's feelings**,** who studying in selected Government University in Malaysia. The researcher questions to be answered through this study are:

1. How do the Iranian student's feel about life in Malaysia?
2. How these feelings do affects on Iranian student's educational progress?
3. What are the factors that contributed to these feeling?

2. Methodological Issues

Due to the nature of study, a qualitative research method and techniques was used to enable the researcher to understand emotion of Iranian student whose study at one of Government University in Malaysia. In this study researcher selected 3 Iranian students via "convenience sampling" because saves time, money, and effort, but at the expense of information and credibility. The following criteria were used in the sampling procedure; Being in the third semester of education and Interested to participate in the study. In the present study, in depth, semi structured interview (Berger, 2000; Mason, 1996) was the preferred method because they yield an understanding of a person's experiences and perspectives, help verify and validate information gleaned from other references, allow actors to relate accounts in their own words, and gather information that cannot be observed effectively (Lindlof & Taylor 2002).

2.1 Procedure of Interview

In this study before conducting interview, the researcher developed an interview guide for interview. Also, the questions for the interview guide were based on literature review. The interview questions consisted of two areas that were relevant to the phenomenon being studied. These areas were introduction and some questions related to emotion of Iranian student. The researcher herself conducted the interviews sessions. The sessions were done in one month that was October 2009. All of respondents were interviewed face-to-face. All subjects were also interviewed independently of one another in order to avoid "group speak".

Before interviewing the respondents, the researcher gave some background information of herself and also the purpose of study. All interviews were recorded on audio tape or digital recorder since all the respondents gave their consent.

Interviews ranged from 45 to 90 minutes in length, averaging about 65 minutes each. Following the completion of each interview, materials from the transcriptions were grouped by similarities as patterns emerged (tentative analysis). After each interview, tentative analysis was done and then was used for improving the following interview. In this study, interviews were done with 4 respondents because data saturation had been reached by then. This was discovered when all the tentative findings from respondent No.1 to respondent No. 3 seems to be same.

2.2 Ethical consideration

In qualitative research, when human participants are involved, some ethical and legal consideration should be taken into account. Since human beings have certain rights, the researcher must ensure that the rights of participants in a study are not violated. Although there is no universal definition of ethical issues, a series of guidelines, broad generalizations, and suggestions have been endorsed or at least accepted by most in the research profession.

For this study, before conducting data collection, a letter (inform consent) was sent to the selected participants describing the purpose of the study. All participants were informed that data recorded with special code names, so that is not link between these codes and the subject's identity. Names of the subjects were known only to the investigators, who will hold this information in the strictest confidence, coded, and securely stored in a stored in a locked file. All of tapes and documents related to research after completing research were destroyed.

Also, respondents were informed that an interview may take averaging about 70 minutes, or that a second interview is required. Besides these, whenever the interviewees requested a copy of the interview questions, it was

sent to them two or three days before the actual interview date. Therefore, all interviews were conducted only when potential subjects volunteered to participate in this study.

2.3 Data Analysis

The process of data analysis involves the organization and categorization of all the collected data from the available sources of evidence in such manner as to make sense of what has been learned. Merriam (1998) mentioned that in qualitative research, data collection and data analysis should be a simultaneous process as both occur in and out of the field. Based on her idea, therefore, data analysis is about organizing and interpreting data to make meaning. Since the researcher is the instrument, the analysis will depend on upon an investigator's creative abilities as much as upon his or her technical expertise.

In this study, the data mainly come from the transcripts of the interviews with the respondents. To triangulate this data, the interview transcript from the respondents was analyzed. The process of data analysis and data gathering were done simultaneously. The process of data analysis for interviews began after the first interview and tentative analysis for each transcribed interview was also done.

A technique called constant comparative method by Strauss and Corbin (1998) was used for data analysis. The Strauss and Corbin method (1998) involved three different types of analysis (open coding, axial coding, and selective coding) and resulted in increasing levels of interpretation and abstraction of the analysis.

In this study, when open-coding data was examined line by line to identify and name the concepts expressed by the respondents in each transcript, concepts and categories were labeled with words used by the students to ensure the respondent's meanings were captured as closely as possible.

In this study, during axial coding, memos and diagrams were used to document the process and to capture relationships between categories and subcategories. A coding paradigm was also used to specify a category in terms of the conditions that gave rise to its context, intervening condition, action, interaction strategies, and resultant consequences. For this study, because of limited number of respondents researcher could not find a core category.

3. Findings & discussion

In this study, the students shared their emotions of living and staying in Malaysia. Analysis of the data occurred by questions. In the first phase of the data analysis, student's different kinds of descriptions of their emotional expressions were identified. After several repeated coding sessions four coding categories were formulated based on the dialectics of data. The categories were worry, happy, sad and comfortable. The coding was conducted independently by researcher.

3.1 Feeling about living in Malaysia

When students were asked to reflect on their feeling about living in Malaysia, the following four categories were emerged from the participant's descriptions their feeling about their life in Malaysia included: (i) worry, (ii) happy, (iii) sad (iv) Comfortable.

3.1.1 Worry

Data from this study suggest that lack experience of living in abroad, economical issue, health issues and being safe important factors to make sense of worry in Iranian students.

For instance respondents number 2 said with serious tone: "I was very worry at the first because I have come with my family and we did not have any experience about living in abroad, I always thinking about bad occurring events for my family"

Also, this respondent believed that: "Here, having no monthly income leads to a feeling of insecurity".

3.1.2 Happy

The second category emerged from this study is "happy". For all respondents "happy" was along with new experience of life. This category further divided into two subcategories; including:

3.1.2.1 Achieve new experiences

All participants mentioned that they have had"unique experience, positive events', 'different living style', and 'adaptation with living in abroad.

For instance respondents number 2 said: "In order I am very happy that I experiencing different life style in my life"

Regarding to the above feeling respondent number 3 also said:

"Leaving in Malaysia was a good experience in my life, because it was my first time to live alone far from my family. I learned how to manage my daily life & how to answer to my inquires alone"

3.1.2.2 Good environment

The next subcategory for the "happy" was good environment. All respondents described that Malaysia has a good environment for living. They reasons for this opinion is "green country", "have some attractiveness", "peaceful social environmental", "having many international and local congress and conferences".

In this regard respondent number 3 was believed: "Malaysia's green life makes me feel fresher".

Along with the above argue; respondent number 4 also was agree; said: "This country has some attractiveness for living that need a few years time for understanding them… all creates a favorite place for living".

Also, respondent number 3 talked more about national and international events in Malaysia: "Take place of many international and local congress and conference should be considered as a one of the best advantages for educated people in Malaysia".

3.1.2.3 Relationship

The last subcategory for "Happy" is the concept of relationship. Two out of three respondents mentioned that good relationship with lectures, staffs and people has affect on their sense of happy.

According to respondent number 3:"In spite of some problems, I feel that I am happy in Malaysia due to friendly relationship of Malaysian people with the foreigners".

Also, respondent number 2 said: "Malaysian people are very calm and friendly. You hardly see a quarrel, therefore when you go out and come back then you do not upset".

3.1.3 Sad

The third category for the finding of this study is "sad". All respondents were believed that they become sad some times because of "food, unfamiliar condition, and homesickness, Malay-English accent".

For instance respondent number 1 said:
"When I live in Iran somehow my life is better than here. Now, I live far from my family, so I miss them. Also, in my country I eat healthy food and did some exercise. I familiar with my country and have a lot of closed friends."

Also, another respondent said:

"In my point of view, we all live a "student life" here in Malaysia. means feeling homesick, dining out instead of cooking at home, having no food schedule, staying up late at night, challenging to get used to the new food tastes, having some difficulties with understanding Malay-English accent".

Homesickness is among the most frequently reported concerns of international college students in the United States (Yi, Giseala Lin, & Kishimoto, 2003). Missing family, missing friends, feeling lonely, adjustment problems, and home ruminations cause homesickness among international students (Willis *et al*., 2003). Also, they found that international students experienced less social support than domestic students, most likely because their family and friends were at a greater distance.

3.1.4 Comfortable

The last for question number one is "comfortable". Participants describe their feeling of life in Malaysia comfortable. They feel here "more relax".

For instance one of the respondents when compare life experience in Iran and Malaysia said:
"Having the life expenses in both Malaysia and Iran compared, I surely am experiencing a much smoother lifestyle with least sense of daily stressfulness that I used to encounter at my office in Iran. Here – in Malaysia, stress has lost its very meaning"

Similarly respondent number 3 was believed that in Malaysia she is more relaxed because away from job: "My personal life in Iran was totally different from here. Here we feel more relaxed because we are away from work challenges and only focusing on the academic purposes".

3.2 Affect of feeling on students educational progress

Two categories emerged from the participants explain how their feelings affect on their educational progress include: positive affects, and negative affects.

3.2.1 Positive affects

When respondents explain about the positive effect of feeling on educational progress, two subcategories were emerged as (a) don't have any problem (b) relationship between students and Academic staff.

3.2.1.1 Don't have problem

True analyzing the data come from this study, several factors that participants mentioned that have positive effects on their educational progress are as bellow: "free of stress", "stability and feeling of secure" "environment is favor", "not financial problem", "quality of university".

Regarding the facilities of university respondent number 2 said:

"The facilities and encouragements supplied by the university and the supervisor(s) and the facilities provided by them, such as the encouragement supplied to the student to introduce to the academic life by publishing scientific journal paper or participating in either local or international conferences. The selected University is going in progress to improve this part of development magnificently."

Also this respondent believed the most important factor affecting the educational progress is stability. He said:

"The most important factor affecting the educational progress for a student is the stability and feeling of security not only for belongings, but for the educational scope. Beside that, the stability can be described as the chances for the student to improve himself with any effort the student give, while the security of the ownership of the work to be assigned to the student himself".

Same as the above argument respondent number 2 said:

"When we do not have any problem and there is nothing to district our mind. I mean our mind is free of some stress, my environment is favor. Also, have not financial problem we can focus on our studies and this brings about progress in education"

3.2.1.2 Relationship between students and academic staff

The nest subcategory of the positive effect of the feeling on educational progress is relationship between students and academic staff. All of participants believed that friendly behavior between students and academic staff has important affect on their educational progress, because this relationship increases their self confidence.

In this regard respondent number 2 talking about his relationship with his supervisor said:

"Here friendly behavior between students and academic staff well in one hand and availability of source of study and good facility in other hand, caused you are in good position of sense of education. This situation helps students enhance their quality of study and being more successful in their field study".

On the other hand this respondent believed that:

"The chairperson of my supervisory committee can be considered as a role model in being a friendly and encouraging academician who would like to share knowledge as much as possible with students".

This finding seems to support Bassnett (2003) findings in his study that a good relationship between supervisor and student is one of the most important factors for student education progress. Wisker (2003) commonly agreed that 'a good supervisor–student relationship can only thrive if both parties share mutual expectations and have established ground rules about the regularity, type and focus of supervisions'

3.2.2 Negative effects

The negative effect was the second category for the effect of feeling on educational progress. Participants described that having problem with methods of teaching, discriminate against international student, and communication which effects on their educational progress.

For instance respondent number 3 said: "Here in Malaysia, lecturers somehow discriminate against international students. For example in some of the international classes some lecturers distributed hand outs in Malay!"

While she was depressing about her situation, she continues:

"Other thing, lecture should work on their English language proficiency in order to communicate better with international students and only some of them are well-educated, not all! For example, one of the proficient lecturers of my own, was not able to convey his meaning in English, although he was unique in his field, jut in Malay"

Another respondent of this study agree that: "We have a workshop class with technician whom can't speak English at all".

One more things that were highlighted by respondent of this study was wrong method of teaching in Malaysia based on their opinion for example:

"Here you can't learn more in the class, the lecture just give you some outline and you have to go through it to learn more. The method of teaching so different from my country and I disturb a lot".

This finding can support by Jacob, (2001) that International students participating in a cultural exchange program with graduate counseling practicum students indicated a greater need to adjust to American culture, understand non-verbal behavior, develop friendships with diverse peers, communicate effectively with professors and are involved in the university community.

3.3 Factors affect on students feelings

The third question of this mini-research was about factors affect on student's feelings. During this study four categories emerged from the participant's descriptions of factors affect on their feelings; (i) socio-cultural factors (ii) economical factors (iii) good public relationship (iv), and environmental facilities

3.3.1 Socio-cultural factors

There are many complex challenges facing students travelling to other countries to undertake university or other educational courses, particularly if their home country culture is strikingly different from the host country culture (Garry *et al*. 2006). In this study, one of the participants believed that social and cultural factors have important affect on Iranian student's feelings. These international students provide evidence of feelings of discomfort, dislocation and distress but their responses are, for the most part, not at an extreme level.

For instance respondent number 1 said: "I miss the familiar way of life in my own country; people treat me differently because of my cultural background".

Also, she said: "Because the culture and behaviour of people whom I faced with them in my daily life is too different from mine and sometimes it's rude in my culture".

This finding also support Ward (2001) study that found the more differences between international students' home and host cultures, the more homesickness and acculturative stress experienced. Cultural stress is an obvious challenge to the well-being of international students, particularly where the home and host countries are culturally distant.

3.3.2 Economical factors

The second category of last question is economic factors. All of the participants described that economical factors such as "cost of living", "tuition fee" and etc have important role in making their feelings.

Respondent number one said:" It is very difficult to pay rent of my house monthly"

Accordingly respondent number 2 said: "Economic factor is the first factor, which can by itself improve the socio-culture and environment".

In the same vein, in the study conducted by Andrade (2006), he reported economic factors are the important factor for students from abroad.

3.3.3 Good public relationship

All of participants explained that relationship between students and the public is one important factor that affects their feelings. Also they believed that Malaysian peoples living very simple and they are much contented peoples. This type of living brings them to be very quit and satisfied in their living.

For example respondent number 3 acknowledged that:
"Malaysian people are so easy going people, encounter with problems easier than we do, obey the laws and respect to them and have good temper. This is the main issue that you habit to be patient even with your important jobs like your thesis".

3.3.4 Environmental facilities

The final category for question number three is environmental facilities. Participants described that environmental facilities such as availability of high tech material, access quipped library, having recreation activities have role in their feeling.

For instance respondent number 3 said: "The newest books and resources are available here and as a student I have no problem to find anything".

The finding of this study is similar to Gatfield (1999) among 359 undergraduate international business students studying at a South East Queensland University asking them what they considered important factors for good university. The study revealed that the following four factors were considered the most important for quality of university: Academic instruction (e.g. good teaching, course content), Recognition (e.g. by potential employer, by government, etc.), Campus life (e.g. campus housing, sports facilities, public transport), Guidance (e.g. handbooks, international office).

4. Conclusion

In conclusion, this study provides a better understanding on the emotion of Iranian student in Government University in Malaysia. From this study, certain socio-culture factors, economic factors, good relationship and environment facilities influence the emotion of Iranian students. On the other hand, theses emotion of students included worry, sad, happy and comfortable which has positive and negative effect on education progress in University and living in Malaysia. Consequently, based on the findings obtained from this study, graduated student organization can designed intervention program base on International students' views in their social, cultural and economical content? Also the strategies obtain based on the findings of this study improve relationship between University's staff and International student's. Graduated Student Organization should be increase attention to emotional domain, helps to adjustment with living in overseas and increase educational progress for international students.

4.1 Implication

The findings of this study have some implication for different parts of Selected University. For example, the graduated student organization can design intervention program base on International students' views in their social, cultural and economical content. Also, based on this result Graduated Student Organization can improve relationship between University's staff and International student's increase attention to emotional domain, helps to adjustment with living in overseas and increase educational progress. Finally, Graduated Student Organization can provide programs for better support of overseas students and improve their quality of life.

4.2 Recommendation for Future Studies

This study is limited to three participants studied at one Government University in Malaysia. A more in-depth study that involves more Iranian students those studied in different Universities in Malaysia with different program and field of studies. The finding from deeper and wider spectrum of study will provide more comprehensive and through collection of the understanding of emotion's Iranian students in Malaysia.

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Top 7 Issues in Medical Tourism: Challenges, Knowledge Gaps, and Future Directions for Research and Policy Development

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Abstract

Medical tourism is a general term that describes patients traveling to obtain health services. The growth of medical tourism is due to a broad range of motivators and increasingly, developing countries are seeking to capitalize on these flows and are linking medical care with actual tourist activities. This commercial linkage between healthcare and tourism is a rapidly developing and profitable industry that is attracting growing interest amongst health researchers. This article summarizes seven leading issues concerning medically-motivated travel that were identified by academic researchers during a November 2009 *Symposium on the Implications of Medical Tourism for Canadian Health and Health Policy*. These issues include emerging technologies, particular vulnerable populations, Canadian business ties to the industry, patient populations excluded from analysis, and comparative analyses between health service providers for medical travelers. This article aims to help guide researchers as they investigate ethical, legal, social, public health, and economic issues related to the growing medical tourism industry.

Keywords: Medical tourism, Strategic research, Health policy, Guidance

1. Introduction

In November 2009, the University of Ottawa Globalization and Health Equity Research Unit held the *Symposium on the Implications of Medical Tourism for Canadian Health and Health Policy* ("Symposium on the Implications of Medical Tourism for Canadian Health and Health Policy," 2009) (abbreviated hereafter as, *the Symposium*), sponsored by the Institute of Health Services and Policy Research (IHSPR) of the Canadian Institutes of Health Research (CIHR). Twelve leading researchers from a variety of scholarly disciplines including bioethics, public health, health policy, geography, health sciences and women's studies convened for a series of presentations and exchanges (Note 1). Numerous topics and issues concerning medical tourism and Canadian health policy were identified in the course of the Symposium, discussions which considered broad overviews, focused studies, summaries of ongoing research projects, and case studies concerning medical tourism (Note 2). At the end of the Symposium, a plenary discussion explored the current challenges and knowledge gaps pertaining to medical tourism, as well as tentative strategies on how best to advance research initiatives and investigate this emerging industry.

This article summarizes the findings of that plenary discussion as rendered by the authors of this work (thus, this article does not constitute as a position statement of the Symposium participants themselves). We begin our discussion by providing a contextual overview of the medical tourism industry, and follow with a discussion of seven promising areas for further research as identified by the Symposium participants. While this article does not present empirical findings from a specific research initiative, it does synthesize existing knowledge and identify gaps in scholarship, which the authors believe could serve as a guide for Canadian researchers in conducting their own independent investigations into the medical tourism industry.

2. Background

While not a new topic, medical tourism has received increased media attention in recent years due in part to the growing number of Canadians seeking healthcare abroad (CBC, 2004; Eggertson, 2006). Several key factors have been suggested to explain the growing phenomenon of medical tourism, including: soaring healthcare costs in some industrialized nations, notably the United States; longer wait times for medical procedures in countries such as Canada and the United Kingdom; and desire to gain access to services that are unavailable locally, such as innovative surgical techniques not yet approved by public or private insurance schemes.

While it is impossible to predict the future of medical tourism with absolute certainty, there is evidence to suggest that it will continue to grow in both developed and developing countries. First, a growing number of hospitals in lower-income countries such as India are obtaining international medical accreditation as a means to help allay medical travelers' concerns about the quality of health services available in the developing world ("Medical tourism: Consumers in search of value," 2008). Second, and more specific to European countries, a European Union Commission Directive has been introduced to address cross-border medical travel by clarifying the rights of patients obtaining healthcare in EU countries other then their country of residence (Healy, 2009; Hermesse, Lewalle, & Palm, 1997). Additionally, the number of countries that are developing their own medical tourism industries has increased, and so the provision of health services to foreigners for profit is becoming a highly competitive market. For example, wealthy individuals from developing nations have tended to seek care in North American and Western European nations, but this pattern is shifting to other developing countries (Kangas, 2007; Lautier, 2008), notably the United Arab Emirates, Jordan, Thailand, Singapore, and Tunisia, nations with increasingly sophisticated medical infrastructure and lower comparable costs in healthcare.

The industry also appears to be developing regional hubs that strategically cater services to potential tourists in proximity. For example, Latin American and Caribbean medical travelers demonstrate a preference for Cuba and Chile as popular medical destinations (Charatan, 2001; Cortez, 2008). Overall, many destination countries are aggressively marketing their medical tourism industry along with sophisticated promotional strategies that emphasize the affordability, high-quality and prompt access to their health services. One noteworthy example is India, where national policies support advertisements (CBC, 2009b) that target Canadian patients in conjunction with the development of trade treaties that aim to obtain coverage by private or public insurance schemes for care within their accredited facilities (IMTA, 2009).

This brief introduction to the medical tourism industry illustrates that the international provision of health services to Canadian patients is changing at an appreciable rate and occurring within an increasingly integrated global marketplace. Current trends raise important questions concerning present and future health policy implications. Will this rapid change and globalization of commercialized health services result in improvements for Canadian healthcare and population health? If not, why not? And what practical steps can Canadian policy-makers take to avoid foreseeable negative outcomes stemming from the development of this industry? Answers to these questions will emerge from future research into the specific features of medical tourism. The following sections offer expert opinions concerning the 'next step forward' in medical tourism research by highlighting emerging issues of importance to Canadian academics and policy analysts.

3. Discussion: What we do Not—and Should—Know About Medical Tourism

3.1 Abroad and at Home: Implication of Canadian Enterprises in Medical Tourism

Efforts aimed towards regulating the global medical tourism industry—in whatever form they may take—will undoubtedly face significant challenges. For one, government bodies have limited abilities to enforce regulations in jurisdictions beyond their national boundaries. Coupled with the fact that people with the necessary travel documents are free to travel internationally, it is thus unlikely that legislation enacted within Canada could have a significant impact on the actions of both Canadian medical tourists abroad as well as foreign heath systems. This premise is based on the assumption that medical tourism is a business that happens exclusively abroad. We note, however, that this is not always the case.

Medical tourism is similar to many contemporary industrial sectors in terms of globalization (Horowitz, Rosensweig, & Jones, 2007), defined here as *the growing interconnectedness of transnational economies*. Many companies strategically fragment their operations, such that a head office will reside in a nation with, say, a well-developed infrastructure, while its manufacturing sector may be outsourced to a nation with lower labour costs. Though medical procedures and health services are typically performed abroad, important sectors of medical tourism companies (e.g., administration), do exist on Canadian soil.

An example of a Canadian-based office of an international medical tourism enterprise was identified in a study examining reproductive tourism in Argentina (Smith, Behrmann, Martin, & Williams-Jones, 2010). While the private clinic, *Go Sculptura*, provides all medical services (ranging from plastic surgery, fertility treatments, and gastric bypass surgery) abroad, the authors observed that the company's website ("Go Sculptura Contact Page/Spanish ", 2010) lists their "home office mailing address" in Montréal, Québec. Furthermore, a report published by Herrick (2007) demonstrates that a collection of private insurance companies are offering insurance policies that compensate medical tourists in the event of malpractice, where some of these insurance claims are administered by independent, Canadian-based firms. Moreover, Turner (2007b) has identified an additional 15 companies located across Canada that arrange medical tourism vacation packages. In some respects these businesses provide services that resemble the services offered by travel agencies specializing in traditional "holiday" travel.

The preceding examples demonstrate that Canadian enterprise is implicated in the medical tourism industry in several ways. This finding is of particular significance to the initial topic of this section: Regulation. While there are many challenges to regulating activities beyond national borders, legislators can exercise significant control over business activities conducted locally, i.e., on Canadian soil. Future efforts to regulate medical travel should begin by focusing on these Canadian sectors of the industry. For example, legislation could stipulate that private malpractice insurance can only be sold to Canadian tourists if they obtain health services at a reputable facility with proven measures of quality and safety. This tentative regulatory strategy indicates that future research initiatives that aim to identify Canadian business ties to medical tourism would likely be of significant interest to health policy analysts. Overall, while most aspects of medical tourism happen abroad, identifying the minority of activities conducted on Canadian soil should be a priority for upcoming investigations.

3.2 The Forgotten Tourists: Do We Ignore Travelers Within Nations, as well as the Movement of Health Professionals?

Over the last five years, media coverage has focused mostly upon international travel of medical tourists (for an example, see (CBC, 2004)). This is also the main focus in the academic literature, where most definitions and descriptions of medical tourism emphasize the international dimensions of the industry. The definition offered by Conell (2006) is representative: "people travel[ing] often long distances to overseas countries to obtain medical, dental and surgical care". Thus, similar to the previous discussion of businesses involved in medical travel, current descriptions of Canadian medical tourists emphasize movement abroad, and pay little attention to intra-national health-related travel.

This focus on *international* travel can be considered misleading since many patients, notably in Canada, cross *provincial* or *regional* boarders to obtain health services. For example, it is common for women living in remote villages and aboriginal communities to travel to urban areas in order to give birth in a medically supervised environment (Moffitt & Vollman, 2006; Van Wagner, Epoo, Nastapoka, & Harney, 2007). There are also instances where province-specific health policies generate provincial differences in access to, and affordability of, health products, such as pharmaceuticals (Sibley & Glazier, 2009). This in turn motivates many Canadians to acquire medical goods and services by engaging in provincial cross-border travel.

These examples reinforce the fact that medical travel is a national or local phenomenon in Canada as well as international, and the research and policy communities must consider this in their analysis. Analyzing "endogenous medical travel" is relevant to ongoing Canadian health policy debates. Investigations into the underlying motives for endogenous medical travel can identify current weaknesses in the Canadian healthcare system and limitations in current health legislation. The Canada Health Act ("Canada Health Act," 1999) is a useful example. The Act stipulates that essential health services must be accessible to all Canadians, regardless of location. The observation that many Canadians must travel in order to obtain these services, however, raises questions as to whether all patients (e.g., disabled people, the financially impoverished) can actually travel to obtain medically necessary services, which in turn identifies important limitations in health legislation and patient rights. When taken as a whole, it is clear that the 'forgotten' endogenous medical travelers should be as important to the research and policy communities as the more sensationalized, cross-border travelers.

The omissions by academic researchers extend beyond that of specific patient groups. Many health professionals are travelers as well, and indeed they play an important role in the international trade of health services. These professionals, however, are largely excluded from discussions concerning medical travel, and thus represent an overlooked area of study. The international movement of Cuban doctors is one case in point. Originating from unique economic agreements, surplus Cuban physicians have been temporarily relocated to neighbouring countries with deficient health systems, such as Venezuela, in exchange for primary resources, namely petroleum (Alvarado, Martínez, Vivas-Martínez, Gutiérrez, & Metzger, 2008). This situation represents an interesting contrast to common definitions of medical tourism – it is the doctors who become tourists travelling to foreign patient populations. Note that this situation is for economic benefit much like most 'conventional' forms of medical tourism. Does this "reverse directionality" in the movement of health services raise novel ethical, social, and political concerns? If so, how so? And at a more general level, does the term medical tourism require a redefinition so that it is inclusive of the local and international movement of both patients and health professionals; and perhaps also medical equipment? These are important questions that will need to be addressed in future investigations and academic debates.

3.3 Heterogeneity in services and service providers

It is interesting to note that the term *medical* tourism is evolving. Once used as an umbrella term for the industry as a whole, growing specializations and heterogeneity in services have expanded the lexicon into sub-domains such as *reproductive* tourism*, organ transplant* tourism, and *abortion* tourism. This evolution in terminology reflects the growing diversity and heterogeneity in the medical tourism industry, which we believe can provide an interesting foundation for comparative analyses. To demonstrate this, we will describe the significance of heterogeneity in services and service providers.

While the fact that there is a medical tourism industry raises a variety of matters of interest (e.g., divergent medical standards of quality between host and destination countries), it is important to note that particular services offered within medical tourism sub-domains raise distinct medical, socio-ethical and policy challenges. For instance, travelling to obtain fertility treatment has different implications than those related to cosmetic surgery. For one, complications from cosmetic surgery impact the patient's health and appearance, while complications from fertility treatments (e.g., gestation of multiple embryos and the resulting low-birthweight babies) affect not only the mother, but the fetuses as well and could result in long term complications for the mother and future children long after they return home. The comparisons between these two services suggest that issues related to malpractice and/or responsibilities for medical complications are not equivalent within sub-domains of medical tourism.

Consider another comparison between organ transplant tourism and abortion tourism. The scarcity of donated organs affects a broad range of Canadians in need of a transplant, and the option to obtain an organ from abroad is often determined by one's ability to purchase such health services from the black-market (Turner, 2009). In contrast, abortion tourism is exclusive to women and is typically motivated in countries such as Canada—where access is not *legally* restricted—by factors such as social stigma (Sethna & Doull, 2009). From this comparison, it is apparent that sub-domains in medical tourism can be relevant to particular population groups in *exclusivity*, and can be motivated by radically different factors. Furthermore, certain categories of medical tourism are inherently unlawful since they involve the purchase of services from the black-market. Such differences identify notable areas for potential ethical concern, targeted policy development, and the need to understand underlying social and medical factors that encourage medical tourism.

Moving beyond comparisons between health services, researchers should also be aware that comparisons between service providers could identify important issues for investigation. This possibility is made evident from an analysis into the heterogeneity in service providers for fertility treatments in Argentina (Smith, *et al*., 2010). While several private fertility clinics offer services to tourists, these clinics are non-equivalent in terms of regulatory oversight. To expand, a majority of these clinics are certified as "accredited facilities", meaning that government organizations collaborate with these facilities in order to certify that health services are conducted according to established standards of quality and safety. A minority of private clinics, which aggressively market their services to tourists, are non-accredited, thus demarcating an important distinction in the regulatory oversight of private clinics *within* Argentina. While this study focused on fertility clinics in Argentina, it is important to note that heterogeneity in health service providers is a growing phenomenon in medical tourism around the globe (i.e., increasing—but not ubiquitous—government certification of private hospitals in India and Thailand that meet international medical standards of quality and safety (Marlowe & Sullivan, 2007)).

Examining differences between medical facilities for tourists is significant for many reasons. At a broader level, academic researchers might be mislead in analyzing health service providers for medical tourists as being differentiated solely by general characteristics, such as region, and otherwise assume providers to be roughly equivalent within the general category. Furthermore, cross-analysis of different service providers might provide a better understanding of the diversity of access to and quality of care within particular categories of medical tourism. Indeed, with the evolving nature of the medical tourism industry, it appears that future research investigations will likely identify topics of significant interest by studying the 'devil in the details' of service provision. To conclude this section, the key point is that researchers should scrutinize the growing heterogeneity in medical tourism since comparative analyses between both services and services providers can identify unique aspects of medical tourism that deserve particular regulatory or policy attention.

3.4 Patient Perspectives, Motivations, and Outcomes: Anecdotal versus Empirical

Several factors that motivate patients to travel in the pursuit of health services are noted in the academic literature. Most of these reported motivations appear obvious and are thus assumed, prime examples being the pursuit of lower costs for or greater access to healthcare. In addition to motivations, many popular destinations for medical tourists appear well founded and are reported in the academic literature. Rigorous empirical data on medically-motivated travel, however, is limited; and this applies particularly to Canadians seeking healthcare abroad. Provincial data exist for the number of Canadians who are authorized by their public health insurance plan for out-of-country medical care, but data on self-chosen medical travel or for out-of-country care not reimbursed by provincial plans remain sparse and incomplete (Turner, 2007a). Moreover, although there is evidence of Canadians seeking care in developing countries, robust accounts of patient motivations and their destinations are lacking. Little is known of the resulting health outcomes of medical tourism (e.g., patient satisfaction, incidence of complications), data that is essential for debates concerning the risks and benefits of medically-motivated travel. Overall, it is apparent that most of the discussion of the pros and cons of medical tourism are based on anecdotal evidence, questionable estimates and projections, or theory-based assumptions that, while useful, lack empirical validation (Crooks, 2009). For Canadian regulators to develop robust and sound health policies concerning medical travel, this knowledge base will need to move towards a more solid empirical foundation. The need for more empirical findings highlights a significant knowledge gap as well as promising areas for future research. As a further endorsement of this research initiative, a brief proposal for empirical economic analysis of medical tourist destinations will conclude this section.

One main purported benefit of the medical tourism industry is that it provides a lucrative source of income for developing world economies (Goodrich, 1993). However, a corollary critique is that the industry is unlikely to improve population health and access to healthcare for the majority of impoverished peoples within these nations (Turner, 2007a). To expand, the lucrative medical tourism market may encourage health professionals and governments to focus their careers and resources towards private facilities that treat the needs of foreigners. Such a development risks compounding existing health inequalities both locally (between rich and poor) and between the developed and developing world. A counterargument to this critique is that the injection of foreign capital into local economies as a result of medical tourism will in turn generate jobs, increase the tax base, and thus improve the aggregate level of social and economic wellbeing with eventual positive health externalities.

Which of these scenarios is most credible remains to be established; and whether the second scenario (aggregate welfare gain) leads to reduction in health inequalities within destination countries depends on state policies to tax such gains for programs (transfers, services) that are deliberately redistributive in design. Detailed economic assessments are required to establish broad social benefits and harms flowing from transnational medical travel. Of particular significance are empirical measures of the profits generated by healthcare institutions catering to foreigners and comparing that figure to the amount of revenue that actually enters as government revenue. These empirical economic measures merit priority in future research endeavors since they will provide objective data to establish whether medical tourism by Canadian patients indeed provides a net benefit for *both* Canadians and the communities that host these patient-visitors.

The methodology for such analyses involves relatively straightforward accounting. However, gaining access to the financial records of private companies in foreign nations will be challenging. Therefore, tentative strategies for economic assessments should include policy developments that would make such financial data accessible to researchers. For example, provincial governments could mandate through bilateral treaties that public funds will subsidize medical travel only if Canadian patients obtain care at foreign institutions that provide a degree of transparency with their financial records. And, in keeping with Canada's principles of universality, these treaties could stipulate that these foreign institutions must show how transfers of public revenues from Canadian health

insurance programs support more equitable access to healthcare across population groups in the destination country.

3.5 Vulnerable Populations and Inequities

When analyzing the cross-border movement of patients seeking out-of-pocket health services, it is reasonable for researchers to investigate the underlying economic and political factors that promote this phenomenon. Indeed, a significant number of procedures undergone by Canadian medical tourists (e.g., hip replacements, cataract surgery) are obtainable—and often publically subsidized—in Canada, but are not readily available due to lengthy wait times. Many other procedures sought-out by medical tourists are also available in Canada, but often require significant personal expenditures (e.g., dental and cosmetic surgery). These observations may lead observers to conclude that medically-motivated travel is often reducible to issues of cost and access. However, researchers need to be aware that these assumptions are generalizations that can inadvertently distract focus away from broader issues associated with medical travel, such as motivations for travel associated with particular conditions of vulnerability or inequities in healthcare access, despite the universality of the Canadian healthcare system.

Are there factors of Canadian society that encourage—and possibly even necessitate—that particular population segments engage in medically-motivated travel? The answer to this question remains unclear and merits further investigation. Some evidence, however, suggests that particular vulnerabilities correlate with medical tourism. For example, segments of the female population are known to be particularly vulnerable in their abilities to control their reproductive health, and specifically, terminate an unwanted pregnancy if they so choose (Jewell & Brown, 2000; Sethna & Doull, 2009). Despite abortion being legal in Canada, many women remain vulnerable by the fact that cultural taboos, religious ideologies, and social stigma can make abortion services unavailable or impractical in their communities (Eggertson, 2001). Moreover, the aforementioned social factors influence many politicians to avoid addressing this politically charged issue and ensuring that abortion services are widely accessible. It is important to note that in this situation, the determining factors for abortion tourism are thus entrenched in social and political mores and beliefs that render some women vulnerable to political neglect of their reproductive needs with consequent limited access to this specific health service.

A closely related topic to conditions of vulnerability is how social inequities can prompt medical travel. Access to fertility treatments by minority groups is one pertinent example. Technically, the primary limiting factor in receiving treatment from a private clinic is *the ability to pay*. However, this is not always the case. A survey (Gurmankin, Caplan, & Braverman, 2005) of private American fertility clinics demonstrates that there is no formal legislation or consensus amongst service providers that outlines which patients can receive treatment. Therefore, choice in service provision is decided by individual clinics, where some facilities openly deny treatment to certain population groups, such as would-be single mothers and lesbian couples (Gurmankin, *et al*., 2005). While the underlying reasons as to why certain clinics deny services to these minority groups is not stated, it is reasonable to assume that prejudice and unjust discrimination have a role in this patient selection process. One can speculate reasonably that these inequities in service provision may in turn motivate patients to seek treatment in other jurisdictions where social perceptions are not limiting factors. In sum, neither treatment costs, wait times, nor unavailability of services are necessarily the root factors underlying all medically-motivated travel. Rather, the research and health policy communities should be cognizant that medical tourism can also arise from existing social inequities or stigma affecting particular patient populations.

3.6 Emerging Technologies

Medical tourism is a growing industry both in terms of popularity and in the diversity of available medical interventions offered by foreign clinics (e.g., reproductive technologies, organ transplantation, pharmaceutical drugs). The term '*available*' is key – technological advancements in biomedicine will undoubtedly contribute to the growing array of services obtainable by medical tourists, especially when some countries with slight oversight are likely to introduce novel technologies more rapidly than countries that subject new procedures to detailed regulatory investigations. Due to this possibility, an interesting area of future research scrutiny will be how, and what, technological innovations may influence the medical tourism industry of tomorrow. We discuss two emerging technologies that serve as examples, one hypothetical and the other actual.

The first example of a technological innovation is genetic transfer. Unlike genetic modification, which signifies introducing a complete and stable genetic alteration in an entire organism, genetic transfer is a transient and localized genetic modification, usually of a given tissue. For example, plasmids containing a gene of interest are injected into muscle tissue so that muscle cells uptake the plasmid and express the foreign gene for a period of days, sometimes weeks, until the plasmid is finally degraded. Medical applications for genetic transfer remain limited; however, this technology could provide novel means to inoculate individuals against pathogens and

allergic hypersensitivities (Behrmann, 2007). This technology also raises concern since it could be used for non-health related enhancements, and some experts claim that this technology will be the "new steroids" for elite athletes who engage in "gene doping" (Haisma & de Hon, 2006). To expand, a marathon runner could obtain a competitive advantage by having their leg muscles injected with a gene that mitigates the effects of exercise-induced oxidative stress. The negative sentiments by both the public and professional organizations towards cheating in sport will likely push the provision of gene doping underground, or to nations that chose not to ban the practice. Thus, a new sector within the medical tourism industry may emerge as the technique of genetic transfer aimed at controversial enhancement purposes—for athletics or otherwise—reaches maturity.

While genetic transfer might become a draw for tourists in the future, the second example of a novel technological innovation has recently spurred a flurry of Canadian patients anxious to obtain a controversial medical procedure abroad: vein expansion as a treatment for multiple sclerosis (MS) (CBC, 2009a, 2010). Presently in the very early stages of clinical assessment, little evidence exists concerning the safety and efficacy of this experimental surgical procedure. Access to the medical intervention remains limited to a collection of hospitals outside of Canada, and the procedure must be paid for out-of-pocket. Despite these hurdles, many desperately ill MS patients have gone abroad in order to have the procedure. The experiences of Canadian (and other) MS patients demonstrates how sudden advancements in biomedical sciences can induce medically-motivated travel. Research and health policy communities should thus be aware that technological innovation is intertwined with—and perhaps predictive of—the future development of the medical tourism industry. Furthermore, as the medical tourism industry is rapidly expanding within the developing world, so too is the biotechnology industry (Thorsteinsdottir, Quach, Daar, & Singer, 2004), and the developing world may likely emerge as a significant contributor to biomedical innovation. Indeed, it would be interesting to investigate how the development of one industry might influence the other in these nations.

3.7 Human Tissues and Organs: Meeting Health Needs or Commodifying Populations?

Resource scarcity within the health sector is not exclusive to monetary constraints. Also significant are limitations in the number of human tissues and organs available for transplant, which in turn prevent access to potentially life-saving treatments for many Canadian patients. What may be scarce in one country, however, may be abundant in another, especially in contexts where desperately poor individuals may be all too often eager (having little other choices available) to sell a piece of their bodies as a means to afford their basic needs (Dickenson, 2005; T. Harrison, 1999). This section aims to inform the academic and health policy communities of how medical tourism can have a significant influence in the commodification of human tissues and the ethical concerns this economic reality will entail. Additionally, this section notes that researchers should be aware that the availability of particular tissues, such as human gametes, could serve as a tool to predict the future development of the medical tourism industry in particular regions of the globe.

Advances within the biomedical sciences have drastically expanded treatment options for numerous diseases; however, this scientific progress has also raised ethically contentious issues related to the commodification of human tissues and body parts (Nelkin & Andrews, 1998). Once discarded as medical waste, umbilical cords are now precious sources of stem cells, and excised tumors have become valuable tools in research; even genetic sequences are now patentable entities. Though a full description of the ethical implications is beyond the scope of this article, the transformation of human tissues into marketable goods has several ramifications. In brief, the commodification of such materials raises concerns related to the exploitation of peoples who provide the tissues, the association of monetary values to particular individuals and not others, and the increasing ownership of genes and cell lines that many believe should remain as universally shared components of humanity, amongst others (Dickenson, 2005; C. H. Harrison, 2002). Concerns stemming from the commodification of human materials of biomedical value are well known and aggressively debated. Stemming from these discussions, safeguards that mitigate these concerns are now present or in development, such as legislation that protect tissue donors from financial exploitation (C. H. Harrison, 2002) or the oversight of research projects involving human subjects to ensure that tissues are obtained through voluntary, informed donations or with adequate compensation (Siminoff, Arnold, Caplan, Virnig, & Seltzer, 1995). The same cannot be said of another, equally important factor that is encouraging the commodification of human materials, that is, the medical tourism industry and in particular the sale of human organs.

The global shortage of donated cadaveric organs has motivated the medical community to procure, where medically possible, organs from living donors (Barr *et al*., 2006). Despite increases in numbers of organs provided by living donors, severe shortages remain. The gap between supply and demand for organ transplants has encouraged some individuals with sufficient economic resources to travel to countries where organs are available for purchase (Turner, 2009). These arrangements commonly occur in settings with high levels of

corruption, poorly regulated medical facilities and healthcare professionals, and extreme poverty. In such contexts, organ trafficking is typically illegal but buying, selling, and brokering human organs occurs. Organ sellers often engage in commercial transactions where they are not informed of the possible consequences of their actions; some donors willingly sell an organ for as little as $1200, thus it should be obvious that in such cases organ sellers are routinely being exploited by professionals in the organ transplant tourism industry. When analyzed from a broader perspective, it is apparent that effective legislation (national or international) to protect individuals from organ exploitation is virtually non-existent, or not enforced. Moreover, debates centering on how to address the ethically contentious nature of buying organs from vulnerable populations are still in their infancy.

The current option to purchase an organ illegally from overseas will likely become even more popular with the passage of time since the priority list for recipients of organ transplants remains long and the shortage of donated organs shows little sign of improving (Kondro, 2006). While biomedical research is known to have a significant influence in the commodification of human tissues, the research and health policy communities must be aware that medical tourism might play an equally important role in the future commodification of the human body. This reality also highlights that the issue of medical tourism and commodification merits further research and debate in order to raise current knowledge of the subject to a level equal to that of ongoing debates concerning commodification due to advancements in the biomedical sciences. In fact, since organ transplant tourism inevitably requires the exploitation of the most poor and vulnerable populations of the globe, further research into this phenomenon is imperative.

The highly contentious issues associated with the black-market sale of human organs are quite clear. What may be less obvious to researchers is that the sale of minute quantities of human tissues, even when it constitutes a single cell, can raise questions of equal concern. The sale of human gametes (Dickenson, 2002) in the reproductive tourism industry is a notable case in point. While several countries currently offer affordable assisted reproductive medical services to tourists, an intriguing question is whether the phenotypic characteristics of a population, such as race, can favour the development of this industry in particular countries. An interrelated question is whether this 'racial-advantage' can in turn be morally problematic.

To expand, one study (Smith, *et al*., 2010) observed that some private fertility clinics in Argentina that cater to medical tourists offer the sale of human gametes in their list of assisted reproductive services. Considering that many medical tourists seeking fertility treatments are from the developed world and of Caucasian decent, could Argentina (with its dominant population constituted from European immigrants (Luna, 2002)) have an advantage in attracting prospective tourists relative to other countries?

The fact that reproductive tourists might be drawn to a particular country based on the availability of gametes obtained from a population of a defined race is not morally problematic per se; it is arguably defensible for parents to want their child to have a similar physical appearance to their own if they so choose. This issue becomes contentious, however, when gametes of a defined phenotype become limited and prized commodities for reproductive tourists, where economic laws of supply and demand then encourage price differentials based on race. Indeed, many would likely find the sale of human tissues that give more monetary value to a particular race to be morally indefensible. Thus, it is of considerable interest for future investigations to scrutinize whether the growing medical tourism industry will further globalize the market in human tissues and encourage ethically contentious associations between monetary value and particular human traits. Policy analysts will need to devise strategies to ensure a more ethical pricing and sale of human tissues throughout the globe; at a minimum, such efforts are essential for the reputation of the industry as a whole. In addition to ethical concerns, the above example demonstrates that researchers may be able to foresee the future development of the industry in specific regions of the globe based on the sale of human tissues and particular population characteristics of nations hosting medical tourists.

4. Conclusion

This article represents a collection of expert opinions by academic researchers from diverse disciplines, the goal of which was the identification of important knowledge gaps, current challenges, and strategic areas for future research into medical tourism and its relationship with Canadian health policy. Many of the issues raised in this article are pertinent to future regulatory efforts, such as the need to identify Canadian enterprises implicated in medical tourism and a need for greater attention towards endogenous medically-motivated travel within Canada. Other subjects highlighted in our paper include strategies for identifying important ethical and policy challenges associated with medical tourism, such as analyzing the growing heterogeneity of the industry. Comparative analyses between services, such as organ transplant and abortion, or between service providers, such as

accredited and non-accredited clinics, are exemplified as subjects for comparisons. Another important topic of investigation pertains to the future development of the medical tourism industry. In particular, scrutinizing emerging biomedical technologies and the availability of human tissues is proposed as a framework in predicting tentative characteristics of the medical tourism industry of tomorrow. This article also underscores the need for research to determine how the industry is related to the vulnerability of populations and how broader social factors pressure certain members of society to seek healthcare abroad. Finally, this article calls attention to the need for generating more empirical data that measures the underlying motives for and consequences of medically-motivated travel.

Whether one is "for" or "against" medical tourism, if current trends continue, this industry will undoubtedly play an increasingly important role in the provision of health services to Canadians. It is in our best interest to understand the intricate details of this industry. Only then will we be able to support potential benefits and avoid foreseeable harms, for both Canadians and the communities that play host to our medical travelers. This article presents seven major issues that merit further investigation by the Canadian research and health policy communities. While these seven issues are not an exhaustive list of all pertinent topics related to medical tourism, they can serve as a foundation for promising research initiatives that will arise in the near future.

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6. Conflicts of Interest

The authors declare no competing interests.

Notes

Note 1. The following is a listing of members who actively participated at the Symposium (names appear in no particular order): Ronald Labonté, Laura Hopkins, Mohamed Jamal Alsharif, Abdullahel Hadi, Chantal Blouin, Corinne Packer, Valorie Crooks, Raywat Deonandan, Leigh Turner, Christabelle Sethna, Elise Smith, and Jason Behrmann.

Note 2. In addition to this symposium, from the 25th and 26th of June 2010, Simon-Fraser University hosted the *International Conference on Ethical Issues in Medical Tourism*, also sponsored by CIHR. This conference brought into question "whether medical tourism is ethically defensible and, if not, whether reforms and regulations would make it so" ("Conference web page call for abstracts: Ethical issues in Medical Tourism ", 2010) . Together, these symposiums exemplify the increasing research investment and academic interest within Canada regarding the medical tourism industry.

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Impact of Implementation of Case-mix System on Efficiency of a Teaching Hospital in Malaysia

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Abstract

University Kebangsaan Malaysia Medical Center (UKMMC) is the first government hospital in Malaysia which has taken the initiative to implement the case-mix system since July 2002. Established in 1997, this 873 bed teaching hospital provides tertiary level services to around 600,000 people in two southern districts of Federal Territory Kuala Lumpur.

The objective of this research is to assess the impact of implementation of case-mix system on efficiency of clinical services provided by UKMMC using Stochastic Frontier Analysis.

The hypothesis for this study is that the implementation of case-mix system has improved the level of efficiency at UKMMC.

Results of SFA models proved that implementation of case-mix system have decreased the technical inefficiency 1.93 percent yearly during study period at UKMMC.

Keywords: Technical efficiency, Stochastic frontier analysis, Teaching hospital, Case-mix, UKMMC

1. Introduction

The demand for health care services and medical costs has been observed to be on the increasing trends worldwide, while governments in most countries have limited ability to continue providing subsidy for such services. Increasing health care cost is one of the most hotly debated policy issues in developed and developing

countries in recent years. Most of the debates revolved around issues related to how best to control costs while sustaining the provision of services. Measures such as rationing, effective management of waiting lists, human resource management, global capping on budgets and capitation through managed care has been suggested in that regards. However, these measures have often resulted in negative publicity for governments and purchasers of health care.

The most important approach dealing with this problem is to introduce an efficient healthcare administrative and financing system. Effective and efficient health care service will result in good quality service and cost containment. Therefore, an effective and resilient system is required to achieve this target.

With regards to this, case-mix system seems to be a good option for achieving this efficient system. Case-mix is a generic term that describes the mixture of patients present within a healthcare setting. Case-mix system also facilitates implementation of quality enhancement programs in line with the original objective of classification. Case-mix system has many applications including hospital payment system (prospective payment mechanism), performance monitoring and quality assurance.

In Malaysia the work on case-mix system based on Diagnostic Related Groups (DRG) was initiated in 1996, with the establishment of a case-mix research team consisting of representatives from Ministry of Health, University of Malaya, University of Kebangsaan Malaysia and University of Science Malaysia. This team conducted a research project involving 12 public hospitals in Malaysia including three university hospitals (Zafar, 2005). University Kebangsaan Malaysia Medical Center (UKMMC) is the first hospital in the country to fully implement the case-mix system since July 2002.

According to Freisner *et al*. (2006) research on efficiency measurement in health care has focused on three key issues. One issue is the approach used to generate efficiency scores. The two most commonly used approaches are Data Envelopment Analysis (DEA) and Stochastic Frontier analysis (SFA) (Hollingsworth, 2003). Efficiency is measured relative to the best practice (or efficient) frontier. Deviations from this frontier give measures of (relative) efficiency. Some has developed comparing the two existing techniques (DEA & SFA) and examining their statistical properties. The second major area of research used one of the two approaches (DEA or SFA) to look at efficiency in a single area of health care production. Such studies have covered almost every area of health care, including hospitals, nursing homes, dental services, pharmacies, organ procurement, stroke treatment and neonatal care. These studies look for systematic differences in efficiency across firms, patients or other decision-making units(DMUs), and try to identify the factors causing (or correlated with) those differences. A third area of research used a mixture of different efficiency calculations to measure other aspects of health care practice. A broad literature used technical efficiency calculations to form Malmquist indices of technological change (Hollingsworth, 2003).

The research question in this paper is, has the efficiency of UKMMC improved by implementation of case-mix system?

The remainder of the paper is organized as follows. The next section discusses about technical efficiency. Section 3 provides the methodology has used in this study. Section 4 contains the result and section 5 and 6 present the discussion and conclusion.

2. Technical efficiency

The history of microeconomic efficiency began in 1950 when Koopmans defined technical efficiency for production possibilities as a situation in which it is impossible to increase any more output without simultaneously increasing the input. Debru (1951) is the first economist to measure efficiency while Farrell (1957) defined a simple measure of firm efficiency that could account for multiple inputs within the context of technical, allocative and productive efficiency.

Technical efficiency of hospitals can be measured by parametric and non-parametric methods that permit simultaneous comparison of the inputs and outputs of a hospital's production process and produce concise indicators of efficiency. Technical efficiency shows the capability of production units to transform inputs into outputs. In this sense, hospitals are perceived as efficient if they produce the maximum possible outputs given their available inputs, or equivalently, if they utilize a minimum level of inputs to produce a given amount of outputs. This study has focused on technical efficiency analysis.

3. Methodology

For this research, UKMMC data were obtained from Medical Record and Human Resource department. Data from 1998 to 2006 were analysed and subjected to SFA model.

The variables for inputs were number of beds as a representative of capital, and number of doctors, nurses, non-medical staff as representatives of labour. The output variable was number of inpatient discharged from each clinical department. Case-mix effect is labelled as dummy variable in the analysis. This variable is allocated as value of 0 for the period before the introduction of case-mix system and given value of 1 after that period.

The Stochastic Frontier Analysis was independently proposed by Aigner, Lovell and Schmidt as well as Meeusen and Broeck in 1977. Their approach in estimating production function involved the specification of the error term which is made up of two components: one from normal distribution and another from one-sided distribution. Thus the Stochastic Frontier Analysis model has the advantage compared to the other approach such as Data Envelopment Analysis because it is able to decompose the two sources of error into random noise and efficiency (Dor, 1994). The model used in this study is based on the Battes and Coelli (1995) approach which uses a stochastic frontier model to estimate efficiency. In its original form, as outlined in following equation;

$$Y_i = \beta x_i + \varepsilon_i \quad (1)$$

Where Y_i is the production (or the logarithm of the production) of the i^{th} firm;

x_i is a kx1vector of (transformations of the) input quantities of the i^{th} firm;

β is a vector of unknown parameters and;

$$\varepsilon_i = v_i - u_i$$

v_i is two-sided error term representing statistical noise, which is assumed to be independently and identically distributed as $N(0,\sigma_v^2)$ and independent of u_i;

u_i is the one-sided error term representing technical inefficiency and satisfies $u_i \geq 0$

Parameter u_i is assumed to be truncated normally with variance σ^2 and the mean $u_i = \delta_i Z_i$ is represented as a linear combination of the inefficiency variable

The inefficiency determinant function following the general model is:

$$U_i = \delta_i + \delta_i Z_i + w_i \quad (2)$$

Where Z_i is a vector of factors affecting the efficiency level, case-mix effect,

δ_i is a vector of parameters and w_i is error term.

Following Battes and Corra (1977) and Battes and Coelli (1993) variance terms are parametrized by replacing σ_v^2 and σ_u^2 with $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and $\gamma = \sigma_u^2/(\sigma_v^2 + \sigma_u^2)$.

The maximum likelihood estimation procedure is proposed for the simultaneous estimation of the parameters of the Stochastic Frontier model and technical efficiency model. The likelihood function and its partial derivatives with respect to the parameters of the model are presented in the Battes and Coelli (1993)

4. Results

Table 1 shows the simple output input ratio at clinical departments in UKMMC. Number of inpatient discharged from each department was considered as output and number of doctors, number of nurse, number of beds and number of nonmedical staff were considered as inputs. The ratios were calculated in two different time period (before and after 2002).

Table 2 shows the results of Stochastic Frontier Analysis. In this table, logarithmic form of number of inpatient discharged from each department was considered as output and logarithmic form of number of bed, doctors, nurses, and non medical staff was considered as inputs.

The signs of the all variables (bed, doctors, nurses and non-medical staff) are positive and also expected.

The Table 3 shows the result for inefficiency model. The sign of case-mix effect variable is statistically significant.

Table 4 presents the statistical summary of above model.

5. Discussion

The mean value of single output to single input ratio was higher after the introduction of case-mix system in most clinical departments in the study.

On the other hand in the stochastic frontier model, positive signs for number of beds, number of doctors, number of nurses, and number of non medical staff suggest that a one unit increase in each of these variables results in an increase in the inpatient discharged in each department. (Table2)

As shown in table 3 the sign in the inefficiency model was also expected. The result for case-mix effect suggests that if a clinical department in the case-mix environment, it reduces the inefficiency effect by 1.93 percent

To test the goodness of fit for the model, the generalized likelihood ratio test for the null hypothesis that the γ parameter and the $\sigma 2$ parameter are jointly equal to zero was calculated by using the value of the log likelihood function estimating the frontier model. (Stevenson 1984). The likelihood ratio test for null hypothesis that $\gamma=0$ and $\delta 0=\delta 1=0$ with 1 degree of has been rejected.

The γ parameter lies between zero and one, and its value provides a useful test of relative size of the inefficiency effects. If $\gamma=0$, this would indicate that deviation from the frontier are due to entirely to noise and if $\gamma=1$ however, this would indicate that all deviations are due to entirely to economic inefficiency. Since the estimation of γ is close to 1(here is 0.78), we conclude that the most of variation in the total error, comes from the inefficiency component

6. Conclusion

The outcome of the study clearly demonstrates that by adopting case-mix system in 2002, UKMMC is able to mobilize the resources in the hospital to improve efficiency. UKKMC did not use case-mix system for reimbursement of services provided by the physicians, since all heath workers in public hospitals in Malaysia is on salary scheme and social insurance has yet to be implemented in the country (Aljunid, 2008). It is likely that the gain in efficiency is achieved through internal competition created by providing regular feedback to the clinicians in all the departments on the unit cost of their services as well as outcome of care. Both results of using single output to single input ratios and the SFA models proved that introduction of case-mix system has enhanced efficiency of clinical services provided by UKMMC

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Tabel 1. Simple input-output ratio by Clinical Departments in UKMMC*

DEPARTMENTS		#IPDIS / #BED	#IPDIS / #DOC	#IPDIS / #NRS
Department A	Before 2002	38.65	125.92	294.3
	After 2002	52.32	125.42	445.78
Department B	Before 2002	38.23	234.88	235.17
	After 2002	45.09	243.52	270.04
Department C	Before 2002	56.13	156.9	117.23
	After 2002	54.32	167.04	139.56
Department D	Before 2002	67.91	310.18	707.42
	After 2002	68.28	375.4	123.3
Department E	Before 2002	52.23	189.6	249.3
	After 2002	61.27	204.24	197.25
Department F	Before 2002	13.24	66.09	211.36
	After 2002	16.23	59.35	273.54

#IPDIS : number of inpatient discharges

#DOC : number of doctors

#NRS : number of nurse

*Clinical departments are anonymised.

Table 2. Results of Stochastic Frontier Analysis

Explanatory variables (*ln*)	Coefficients	Standard Error	p value
Constant	2.56	0.46	0.073
no. of bed	0.02	0.26	0.043
no. of doctors	0.42	0.36	0.018
no. of nurses	0.11	0.04	0.071
no. of non-medical staff	0.74	0.22	0.011

Table 3. Result of Analysis of Inefficiency

Variable	Coefficient	Std. Error	p value
Constant	0.26	0.033	0.03
Case-mix Effect	-1.93	0.328	0.02

Table 4. Statistical Summary

Statistics	Coefficients	St. error	p value
Log Likelihood Function	-101.45		
σ^2	0.38	0.051	0.03
est γ	0.78	0.016	0.0415

Viral Hepatitis in India: A Report from Delhi

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Abstract

Present study reports the etiological spectrum of viral hepatitis in different types of liver diseases in north India. Sera from a total number of 370 adult patients belonging to various liver diseases were analysed for different markers of hepatitis virus A, B, C, D and E infections. These sera were also tested to detect Torque Teno Virus (TTV) infection in them. The results of analysis show hepatitis A virus (HAV) infection to be rare with hepatitis B virus (HBV) and hepatitis C virus (HCV) as the predominant cause of acute and chronic liver diseases. Similarly, hepatitis E virus (HEV) infection is quite common in acute viral hepatitis (AVH) and fulminant hepatic failure (FHF) patients. Hepatitis D virus (HDV) infection could not be detected in these patients. TTV-DNA was detected in high proportions in all the disease groups. All types of viral hepatitis in these liver diseases have been discussed for various aspects.

Keywords: Hepatitis, HBV, HCV, TTV, Infection, DNA, Epidemiology, CLD

1. Introduction

Viral hepatitis is a major public health problem throughout the world. This is a serious problem in India also and has been reported from all parts of this country. Moreover, all types of viruses, already characterized and identified as the causative agent of viral hepatitis infect Indian populations. Our earlier reports (Irshad M, 1994) clearly demonstrate that all these hepatitis viruses reside in this country, usually in endemic forms. Hepatitis A virus (HAV) is an RNA virus that infects mainly children and develops protective immunity till the adult age is attained (Tandon BN, 1984). It is not detected commonly in adult. HAV infection remains either asymptomatic or resolves with mild symptoms without development of chronic disease. However, once it occurs as a co-infection with other viruses, it may develop serious disease (Tandon BN, 1984).

Hepatitis B virus (HBV) is a double stranded DNA virus, and an established cause of acute and chronic liver disease with its major role in causation of hepatocellular carcinoma (Si Ahmed SN, 2009). It is a blood transmitted virus and spreads in the community both via vertical as well as horizontal modes. Although in majority of cases, it resolves with time, however, nearly one tenth of infected populations develop chronic infection that may remain asymptomatic for years.

Similarly hepatitis C virus (HCV), which was earlier known as blood borne non-A, non-B hepatitis virus, was characterized in 1989 (Choo, Q. L., 1989; Bradley DW., 1992) and since then, has been reported to be an important cause of chronic liver disease and HCC throughout the world. Hepatitis D virus, an incomplete RNA virus requiring presence of HBsAg for its replication and sustenance in circulation, has been reported from various countries with its significant presence in certain specific pockets of the world (Farci P, 1986). Hepatitis E virus, a component of non-A, non-B hepatitis viruses and earlier known as orally transmitted or water borne non-A, non-B infection, has also been reported to be prevalent in different countries(Irshad M., 1999;

Crawczynski K, 1993), of course, in different proportions. Although, viral hepatitis is assumed to be caused by several other viruses including hepatitis G virus (Linnen J, 1996), EBV and TTV etc.(Irshad M, 2006), however, their role in causation of liver diseases and its severity is not fully established. Besides, there is still a group of viruses that cause hepatitis but have not yet been identified and termed as non-A-E hepatitis viruses.

Present report describes the etiological spectrum of viral hepatitis in various forms of liver diseases to update our knowledge about their relative status in reference to the new markers available to diagnose these infections using more accurate and sensitive techniques. This study in a large population of patients belonging to each disease group, gives out a clear picture on the status of viral hepatitis in this country. These informations are also supposed to help in the clinical management of diseases and predict prognostic significance of the ongoing infection.

2. Material & Methods

2.1 Patients and blood samples

Three hundred and seventy patients of both sexes and in adult age group were included in the present study. Seventy six patients (age range: 21-48years) were diagnosed as having acute viral hepatitis (AVH); 102 patients (age range: 19-48 years) with chronic viral hepatitis (CVH), 96 patients (age range: 34-57 years) were found to have cirrhosis of the liver, 54 patients (age range: 28-46) with fulminant hepatic failure (FHF) and 42 patients (age range: 47-68 years) with hepatocellular carcinoma (HCC). None of the subjects belongs to more than one disease group. Each group has separate patients' population. All these patients attended either outpatient department or were admitted to the liver unit of All India Institute of Medical Sciences, New Delhi, from October 2006 to March 2009. They were evaluated clinically and biochemically and their sera were tested for hepatitis viral markers. The diagnosis of different types of liver diseases was based on accepted clinical, biochemical and histological criteria as outlined elsewhere (Tandon BN, 1986). All procedures including selection of patients were followed as per guidelines of ethical regulations at this institute. AVH was diagnosed when patients exhibited overt jaundice and / or increased alanine aminotransferase levels (at least 3 times above the normal value) documented at least twice at a 1-week interval without any history of pre-existing liver disease. None of the patients had a past history of alcohol intake or using any drug. We also could not find any clinical or serological evidence of autoimmune diseases or biliary infection in these patients. The patients with CVH and cirrhosis of liver were diagnosed by histopathological criteria laid down by international study group on chronic hepatitis (International Study Group on chronic hepatitis, 1977). All these CVH patients had persistent elevation of transaminases level (at least 2 times the upper limit of normal range) for more than six months, histologic evidence of chronic hepatitis on liver biopsy at the beginning of follow-up and exclusion of alcohol abuse and other possible causes of chronic liver diseases. Cirrhosis patients were not found to have history of chronic alcohol intake. Fulminant hepatic failure was diagnosed if the patients developed hepatic encephalopathy within 4 weeks of the onset of acute hepatitis as outlined elsewhere (Tandon BN, 1986). Hundred age and sex matched healthy subjects were used as controls.

From each of the above patients, 6-10 ml of venous blood was drawn and aliquoted in plain tubes without anticoagulant. Serum was separated after centrifugation and then stored at -70°C until further analyzed. Repeated freezing and thawing of serum was avoided as far as possible. These sera samples were used to analyze various hepatitis markers, liver function tests and hepatitis C virus (HCV) core protein.

2.2 Hepatitis viral markers

Sera were investigated for hepatitis B surface antigen (HBsAg) and IgM antibodies to hepatitis A virus (IgM anti-HAV), hepatitis B core antigen (IgM anti-HBc), hepatitis D virus (IgM anti-HDV) and hepatitis E virus (IgM anti-HEV). Similarly, all these sera were also tested for total antibodies against hepatitis C virus (anti-HCV). The serological analysis was done using enzyme immunoassay kits of high sensitivity and specificity obtained from internationally known firms. Kits for HBsAg, IgM anti-HBc and IgM anti-HAV were purchased from Abbot Laboratories, USA. Anti-HCV was tested using highly sensitive third generation ELISA kit from Ortho Diagnostics. This anti-HCV kit used peptides versus core, NS3, NS4 and NS5 regions of HCV genome, as antigen to coat the ELISA plate. IgM antibody to hepatitis D virus (HDV) was tested using an enzyme immunoassay kit from Wellcome. Similarly, IgM anti-HEV was tested using third generation ELISA kit from Genelabs and Diagnostics, Biotechnology, Singapore.

2.3 HCV Core Ag Assay

Sera samples were assayed for HCV core protein according to the manufacturer's instructions using EIA kit from Ortho Diagnostics, UK. One hundred μL of samples and controls were mixed with 100 μL of a

pretreatment buffer. For the ELISA reaction, 200 μL of pretreated samples and controls were incubated for 95 minutes at 37°C with continuous shaking in the antibody-coated wells of a microtiter plate. The plates were washed and incubated for 30 minutes at 37°C with 200 μL of conjugate, washed again, and incubated for 30 minutes at 37°C with 200 μL of substrate. The optical densities (ODs) were read in a spectrophotometer at 490 nm using a 620 nm reference. The samples and controls were tested in duplicate and the mean OD of each duplicate testing was used. The samples that exhibited more than 25% variation between the two ODs were considered invalid and retested. As recommended by the manufacturer, the lower detection cutoff was established for each run and corresponded to the mean OD of the 2 negative controls plus 0.040. A sample was considered positive only when the mean OD was higher than the cutoff OD of the corresponding run.

2.4 Detection of HCV-RNA by RT-PCR

HCV-RNA was isolated from 100-μl serum or plasma using High Pure Isolation kit from Roche, Germany, according to the method given in instructions manual. It was immediately used in reverse transcriptase (RT) PCR experiments or stored at -70°C. Five μl of the isolated RNA was applied to reverse transcription and nested PCR with primers located in the highly conserved 5` noncoding region (5` NCR) using BIOHCV kit (B&M Labs., Madrid, Spain). The reverse transcription mixture was incubated for 1 min at 85°C, followed by 30 min at 60°C. First PCR was performed in whole content after adding 40 μl of HCV amplification mixture. Thermal cycler was programmed as follows: 85°C for 30 sec, 94°C for 2 min followed by 40 cycles of 94°C for 30 sec, 55°C for 30 sec and 72°C for 30 sec and then incubation of samples for 5 min at 72°C. Five μl of first PCR product was subjected to nested PCR using nested PCR mixture containing second round primer and enzymes etc. The protocol on thermo cycler was the same as mentioned in first PCR. The PCR product was subjected to electrophoresis in 2% agarose containing ethidium bromide and was visualized under UV. A positive control provided in the kit was used as control. All positive and negative controls were tested in parallel with test samples throughout the entire procedures, starting with RNA extraction.

2.5 Detection of TTV-DNA by PCR

Viral DNA was extracted from 200μl sera stored at -20^{o}C using QiAmp Mini Elute viral spin kit (Qiagen, Germany) following manufacturer's instruction. The nucleic acid was eluted in 50μl of elution buffer supplied with the kit. TTV-DNA (N-22) was detected by nested PCR using N-22 specific primers. Briefly, first round amplification was performed with sense primer NG059 – 5' ACA GAC AGA GGA GAA GGC AAC ATG 3' and anti-sense primer NG063 – 5' CTG GCA TTT TAC CAT TTC CAA AGT T 3' for 10 min at 95^{o}C (initial denaturation) followed by 35 cycles of denaturation at 95^{o}C for 30 sec, annealing at 55^{o}C for 1 min, and extension at 74 ^{o}C for 1 min with final extension at 74 ^{o}C for 5 min. The second round of PCR was performed using sense primer NG061 – 5' GGC AAC ATG YTR TGG ATA GAC TGG 3' and anti-sense primer NG063 – 5' CTG GCA TTT TAC CAT TTC CAA AGT T 3' following same conditions as used for first round amplification in a thermocycler. 3μl of the PCR product were electrophoresed on 2% agarose gel and stained by ethidium bromide for the detection of 271 bp product of N-22 region.

2.6 Biochemical tests

Liver function tests including transaminases levels were performed on autoanalyser Hitachi-717 by the established techniques.

2.7 Diagnosis of viral hepatitis

The diagnosis of different types of viral hepatitis was established as follows : The diagnosis of hepatitis A virus (HAV) infection was confirmed by the presence of IgM anti-HAV in serum. Hepatitis B virus (HBV) infection was established by finding IgM anti-HBc in sera of AVH and FHF patients and by the persistent HBsAg antigenemia in sera of CVH and cirrhosis cases. Similarly, total anti-HCV and IgM anti-HDV in sera samples were used for the diagnosis of HCV and recent HDV infections, respectively. Active or recent hepatitis E virus (HEV) infection was diagnosed by the presence of IgM anti- HEV in serum. Sera positive for HBsAg but negative for all other viral markers were labeled as HBV-carriers. Absence of all the markers including HBsAg labeled the patients with hepatitis non-ABCDE infection on exclusion criteria.

3. Results

Present report mentions the status of different types of viral hepatitis markers in sera samples from patients with various liver diseases. All the patients studied were in adult age group and belonged to both the sexes. Analysis of sera samples demonstrates that hepatitis A viral (HAV) infection is rare in adult population. IgM anti-HAV was present in 6 of 74 patients (8.1%) with acute viral hepatitis (AVH) and none of 52 patients with fulminant hepatic failure (FHF), 102 patients with chronic viral hepatitis (CVH), 96 patients with cirrhosis and 42 patients

with hepatocellular carcinoma (HCC). Hepatitis B infection was indicated by the presence of IgM anti-HBc in sera from AVH and FHF patients, whereas by the presence of HBsAg with or without IgM anti-HBc in sera from chronic viral hepatitis (CVH), cirrhosis of liver and hepatocellular carcinoma (HCC). Presence of IgM anti-HBc in 9 of 72 patients (12.3%) and HBsAg in 18 of 67 patients (26.9%) with AVH shows acute HBV infection in mere 12.3% cases with rest of population carrying HBsAg as HBV-carriers without symptoms of acute HBV infection. Similarly, IgM anti-HBc and HBsAg were noted in 11 of 53 (20.8%) and 16 of 52 (30.8%) cases respectively, in patients with FHF. In other disease groups, like CVH, Cirrhosis and HCC, these two markers were recorded in different proportions as shown in Table 1. HBV infection in these groups was found to be in 36%, 37.6% and 42.1% cases, respectively.

HCV infection in all the disease groups was detected by the presence of anti-HCV in their sera. Simultaneously, it was further confirmed by testing HCV-core antigen and HCV-RNA in sera samples. On the basis of anti-HCV in sera, HCV infection in these disease groups was demonstrated in 8 of 75 (10.6%) patients with AVH, none in patients with FHF, 18 of 102 (17.6%) patients with CVH, 25 of 69 (36.2%) cases with cirrhosis and 8 of 19 (42.1%) cases with HCC. However, HCV core-antigen was present in higher number of cases as compared to anti-HCV in FHF and CVH patients. In other disease groups, HCV core-antigen was recorded in lesser number of cases. Presence of HCV-RNA in relatively higher percent cases in CVH and cirrhosis points out it to be a better diagnostic marker in chronic and HCC patients. IgM-HDV infection was not recorded in all these disease groups. HEV infection, indicated by the presence of IgM-anti-HEV in sera was found in 19 of 75 (25.3%) cases with AVH and 16 of 36 (44.4%) cases with FHF, respectively. Presence of IgM-HEV was also noted in 2 of 14 (14.3%) sera from cirrhosis of liver but none of CVH and HCC patients tested.

In order to find out the pattern of different types of infection in these disease groups (Table 2), it was noticed that HAV infection was detected in mere 8.1% cases of AVH without showing its presence in other groups. HBV infection was recorded in 12.3% cases with AVH, 20.8% cases with FHF, 36% cases with CVH, 37.6% cases with cirrhosis and 42.1% cases with HCC. Similarly, HCV infection was detected in 10.6% cases with AVH, none in FHF, 52.2% with CVH, 36.2% with cirrhosis and 42.1% with HCC. Hepatitis D infection was not seen in all these cases. HEV infection was recorded in 25.3% patients with AVH, 44.4% with FHF and 14.3% with cirrhosis. It was absent in CVH & HCC patients. Simultaneously, TTV infection was also noted in 75.6%, 47.4%, 53%, 48.4% and 66.6% cases of these groups respectively. TTV infection was also tested positive in 27 of 100 healthy persons (27%). In each disease group, there is a population of patients carrying no known marker in their sera. It is presumed that hepatitis is caused in these patients by viruses belonging to non A-E viruses group. These viruses have to be characterized. Analysis in this patients' population has shown that non-A-E hepatitis is present in 14.5% cases with AVH, 29.6% with FHF, 19.6% with CVH, 19.8% with cirrhosis and 19.0% cases with HCC.

Table 3 demonstrates the simultaneous occurrence of different types of infections in these study groups. HBV & HCV co-infection was recorded in 1.3% patients with AVH, 0% with FHF, 3.9% with CVH, 9.4% with Cirrhosis and 7.1% with HCC cases, respectively. HCV super-infection in HBV carriers was found in 2.6%, 0%, 2.9%, 0% and 0% cases of these disease groups, respectively. The combined HBV, HCV and HEV infection was recorded as super-infection in 1.3% cases with AVH only and no other disease group. Similarly, HCV & HEV co-infection was found in 3.9% cases with AVH only. Thus, co-infection and super-infections were not detected as common infection in these diseases groups.

4. Discussions

Viral hepatitis is one of the major public health problems in India. In last several years, policy makers in this country have paid special attention towards prevention and management of HIV infection. However, there was very little focus on viral hepatitis which is an equally important problem of our country. This appears the probable cause of frequent epidemics of water borne hepatitis and common occurrence of blood transmitted hepatitis reported from various set-ups with people working in high risk areas. In spite of an effective vaccine against hepatitis B to be commonly available and the basic awareness in public to prevent blood borne infections including hepatitis C, there appears to be no substantial change in the prevalence rate and rate of incidence of viral hepatitis in different populations in this country. This leaves with no alternate than to know the exact cause of viral hepatitis and manage it with whatever therapeutic measure is available for clinical management of diseases. With this understanding, we have made further efforts to assess the etiology of viral hepatitis in different forms of liver diseases using recent viral markers and sensitive techniques.

The data of this study demonstrate the presence of all major hepatitis viruses as the causes of liver diseases in India. Hepatitis A infection, which is a common infection in children, but quite rare in adults, follows the same

trend in this study. It was detected in very small proportion (8.1%) of patients with AVH. In other groups, it could not show its presence. These results are in support of our previous findings (Irshad M, 1994). Hepatitis B infection was reported in more 12% cases with AVH and 20.8% cases with FHF. At the same time, it was detected in more than one third population of patients with chronic infection and hepatocellular carcinoma (HCC). As reported from several other countries (Chang MH., 2009; Wursthorn K, 2008), HBV infection appears to be one of the major causes of chronic liver diseases and liver cancer in India also. In South-east Asia, high prevalence rate of HBV infection in their populations makes it a major cause of liver cancer (Yuen MF, 2009). Exact same situation may not be here in our country as its prevalence in healthy population is relatively low. However, HBV remains as the major cause of HCC in relation to other hepatitis viruses.

HCV infection, another blood transmitted infection was diagnosed using three important HCV-markers, notably, anti-HCV, HCV-core Antigen and HCV-RNA. HCV-core Antigen was tested both in anti-HCV negative as well as positive cases. HCV-RNA was determined in anti-HCV positive and anti-HCV core antigen positive cases. Based on the presence of these markers, we noticed HCV infection to be present both in acute as well as chronic infections in India. It was comparatively more frequent in CVH, Cirrhosis of liver and HCC than AVH and FHF when diagnosed by anti-HCV level. HCV-core Antigen was present in high proportion of FHF as compared to anti-HCV. This needs further investigation before drawing any conclusion. If anti-HCV is taken as the criteria, HCV infection in AVH and FHF was noted in only 10.6% and 0% cases, respectively. Presence of HCV to be frequent in CVH, Cirrhosis and HCC supports various other studies reported from different parts of the world (Reiser M, 2009; Imperial JC, 1999). HCV has been found to be one of the major cause of HCC and an important cause of mortality in South-East Asia (Kao JH, 2005; Anthony PP., 2001).

As reported earlier also, HDV infection in all these groups is absent (Irshad M, 1994). HDV infection is not very common in Indian populations. HEV infection on the contrary, has remained a major cause of several water borne epidemics in this country. In present series of patients, we found HEV infection to be the major cause of acute infection. HEV never causes chronic infection and therefore, its presence in small proportion of patients with cirrhosis may be explained mere by its occurrence and not the cause of cirrhosis. Since HEV is endemic in India and in certain areas, it is very highly prevalent; its occurrence with several other infections and in all types of population is quite common. In all sub-groups, stated percentage of cases reflects the percentage of number cases tested and not the overall population (Table-1).

In addition to the groups of already identified and characterized viruses, there are presumptive viruses causing hepatitis and accordingly they have been named as non-A-E viruses. The association of TTV infection with liver diseases as reported in several previous studies (Kanda T, 1999; Tanaka H, 1998), has forced many to explore the possibility of TTV infection causing liver diseases in India also. We studied the presence of TTV-DNA in all above cases and could find the presence of TTV infection to be substantially high in all disease groups. Simultaneously, TTV-DNA was also noted in sera from 27% healthy persons also and thus it appears to be highly prevalent in Indian populations. TTV does not prove to be the cause of liver diseases, but of course, it is frequent in Indian populations. At present we are not using TTV infection in the category of hepatitis viral infection and would conduct more studies to establish its role. On exclusion criteria, we find that there is a large population of patients in each category that do not carry any known marker but remain infected by unknown viruses grouped as non-A-E viruses. This is still a problem in India and needs extensive research to further characterize this group of viruses. In addition to this, co-infection and super-infection is also not infrequent and detected in many cases. Both co-infection and super-infection usually develop serious diseases leading to high morbidity and mortality (Sagnelli E, 2009).

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Table 1. Spectrum of Hepatitis Viral Markers in Different Liver Diseases

Hepatitis Viral Markers	Liver diseases														
	AVH (n = 76)			FHF (n = 54)			CVH (n = 102)			Cirrhosis (n = 96)			HCC (n = 42)		
	T.No.	+veNo.	%age	T.No.	+veNo.	%age	T.No.	+veNo.	%age	T.No.	+veNo.	%age	T.No.	+veNo.	%age
IgM Anti-HAV	74	6	8.1	52	0	Nil	102	0	Nil	96	0	Nil	42	0	Nil
HBsAg	67	18	26.9	52	16	30.8	97	35	36	85	32	37.6	38	16	42.1
IgM Anti-HBc	73	9	12.3	53	11	20.8	99	13	13.1	84	4	4.7	39	4	10.3
IgG Anti-HCV	75	8	10.6	39	0	Nil	102	18	17.6	69	25	36.2	19	8	42.1
HCV-core Ag	31	1	3.2	31	12	38.7	76	27	35.5	33	8	24.2	16	2	12.5
HCV-RNA	2	0	Nil	12	0	Nil	23	12	52.2	21	7	33.3	5	0	Nil
IgM Anti-HDV	18	0	Nil	16	0	Nil	35	0	Nil	32	0	Nil	38	0	Nil
IgM Anti-HEV	75	19	25.3	36	16	44.4	25	0	Nil	14	2	14.3	38	0	Nil
TTV-DNA	41	31	75.6	19	9	47.4	64	34	53.1	62	30	48.4	9	6	66.6
Non-A-E hepatitis	76	11	14.5	54	16	29.6	102	20	19.6	96	19	19.8	42	8	19.0

Diagnostic criteria :

HBV infection	:	IgM anti-HBc in AVH & FHF ; HBsAg / IgM anti-HBc in CVH, Cirrhosis & HCC
HCV infection	:	Anti-HCV in all groups.
HDV infection	:	IgM anti-HDV in presence of HBsAg in all groups.
HEV infection	:	IgM anti-HEV in all groups.
TTV infection	:	TTV-DNA in all groups.
Non-A-E infection	:	Absence of all markers in all groups.

Table 2. Different Types of Viral Hepatitis vs. Liver Diseases

Type of infection	AVH	FHF	CVH	Cirrhosis	HCC
Hepatitis A :	8.1 %	Nil	Nil	Nil	Nil
Hepatitis B :	12.3 %	20.8 %	36 %	37.6 %	42.1 %
Hepatitis C :	10.6 %	Nil	52.2 %	36.2 %	42.1 %
Hepatitis D :	Nil	Nil	Nil	Nil	Nil
Hepatitis E :	25.3 %	44.4 %	Nil	14.3 %	Nil
TTV infection :	75.6%	47.4%	53.1%	48.4%	66.6%
Hepatitis non-A-E :	14.5%	29.6%	19.6%	19.8%	19.0%

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Table 3. Status of Co- And Super-Infection in Different Liver Diseases

	AVH			FHF			CVH			Cirrhosis			HCC		
	T.No.	+veNo.	%age	T.No.	+veNo.	%age	T.No.	+veNo.	%age	T.No.	+veNo.	%age	T.No.	+veNo.	%age
1. HBV and HCV															
(a) Co-inf.	76	1	1.3	54	0	Nil	102	4	3.9	96	9	9.4	42	3	7.1
(b) Super-inf.	76	2	2.6	54	0	Nil	102	3	2.9	96	0	Nil	42	0	Nil
2. HBV+HCV+HEV															
(a) Co-inf.	76	0	Nil	54	0	Nil	--	--	--	--	--	--	--	--	--
(b) Super-inf.	76	1	13.3	54	0	Nil	--	--	--	--	--	--	--	--	--
3. HCV+HEV															
(a) Co-inf.	76	3	3.9	54	0	Nil	--	--	--	--	--	--	--	--	--

(i) Co-infection of HBV & HCV is indicated by presence of IgM anti-HBc & anti-HCV in AVH & FHF and HBsAg / IgM-anti-HBc and anti-HCV in CVH, Cirrhosis and HCC cases.

(ii) Co-infection of HBV, HCV & HEV is indicated by IgM-anti-HBc with anti-HCV and IgM anti-HEV in acute cases and HBsAg / IgM-anti-HBc with these markers in CVH, Cirrhosis and HCC cases.

(iii) IgM-anti-HEV was not tested in CVH, Cirrhosis and HCC cases.

(iv) % value was computed on the basis of total number of cases tested in each disease group.

T.No. = Total number ; +ve No. = Number of sera detected positive ; %age = Percentage of cases detected positive ; Inf. = Infection.

A Study on Selected Demographic Characteristics and Mental Health of Young Adults in Public Higher Learning Institutions in Malaysia

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Abstract

Early adulthood is the transitional period between adolescence and adult life. As with other general young adult population, university students carry along several of life's issues such as a personal and social adjustment, academic and career concerns, stress and other related psychosomatic issues which may lead to an unhealthy mental condition. These "life baggage" and stress must be managed well in order to prevent them from interfering with normal adult development and growth processes. The purpose of this study is to determine the association between several selected demographic characteristics and the mental health status of young adults studying in public Malaysian universities. A total of 1467 respondents were recruited using a multistage cluster sampling. General Health Questionnaire (GHQ-12) (Goldberg, 1978) was the research tool utilised to assess the undergraduates' mental health status. Findings indicate that a majority of undergraduates exhibit a healthy mental state while a minority has some mental health concerns. One-way ANOVA tests showed that the mental health of undergraduates in this study differed in terms of ethnicity, year of study and academic field. In conclusion, these findings can assist student development personnel and academicians in enhancing their understanding of the current mental health status of undergraduate students and the demographic factors that relate to it.

Keywords: Demographic characteristics, Mental health and undergraduate

1. Introduction

Mental health is an important part of a person's life besides physical, spiritual and financial well being It is believed that a healthy mind is key to an individual attaining satisfaction in life. (Swami, Chamorro-Premuzic, Sinniah, Maniam, Kannan, Stanistreet & Furnham, 2007). The World Health Organization (WHO) Report (2003), defined mental health as an individual's state of well-being when he realizes his abilities, has the ability to cope with the normal stresses of life, able to work productively and fruitfully and can contribute to his community. As such, issues concerning mental health should be given due attention since an individual needs to deal with various

kinds of stressors in his life, perform daily tasks with ease and fulfil responsibilities to his family and the nation at large.

According to the same WHO report, mental health issues are expected to increase by 15% by 2020. Additionally, the number of cases documenting mental health problems among university students are on the increase each year (Zivin, Eisenberg, Gollust & Golberstein, 2009). Students studying in institutions of higher learning are more at risk of developing mental health problems or disorders compared with their peers of similar age groups in the general population. (Hamdan-Mansour, Halabi & Dawani, 2009; Stewart-Brown, Evans, Patterson, Petersen, Doll, Balding & Regis, 2000; Humphrey, McCarthy, Popham, Charles, Garland, Gooch, Hornsby, Houghton & Muldoon, 1998). Obviously, as university undergraduates are considered to be the country's leaders of the future, these issues need to be looked into with utmost urgency.

Various studies have been carried out in different parts of the world to identify factors that impact on students' mental health since poor mental health has been recognised as the leading cause of suicidal behaviour, a sense of helplessness (Kay, Li, Xiao, Nokkaew & Park, 2009) and lower academic achievements (Puskar & Bernardo, 2007). However, a review of literature on the subject reveals that information regarding mental health among undergraduates were derived from studies done outside Malaysia (McKinney, 2005; Sreeramareddy, Shankar, Binu, Mukhopadhyay, Ray & Menezes, 2007; Hamdan-Mansour *et al*., 2009; Uner, Ozcebe, Telatar & Tezcan, 2008; Abdulghani, 2008; Biro, Balajti, Adany & Kosa, 2009). In Malaysia, research on mental health was more focused on medical students rather than on the general students population. (Zaid, Chan & Ho, 2007; Sherina, Lekhraj & Nadarajan, 2003). This lack of information entails that no clear image or comprehensive understanding of the mental health status among Malaysian students is available Hence, it was for this reason that this research was undertaken.

Bronfenbrenner's ecological systems theory states that, psychological health is affected by different structures of the environment (Bronfenbrenner & Morris, 1998). The theory puts forward five systems of environment i.e. microsystem, mesosystem, exosystem, macrosystem and chronosystem. Each system has a reciprocal relationship and affects the individual's psychological health in different ways. According to previous studies, factors that influence mental health are demographic backgrounds such as age and gender (Yen, Hsu, Liu, Huang, Ko, Yen & Cheng, 2006), academic field and academic year (Dahlin, Joneberg, & Runeson, 2005), personality traits (Goodwin & Friedman, 2006) and loneliness (Wang, Yuen & Slaney, 2009). These factors either increase or decrease the mental health status of undergraduate students. These factors are part of the structure of environments in ecological theory.

Previous studies have revealed that a certain proportion of university students experienced mental health problems. The studies have also called for serious attention to be given in terms of specific intervention to be undertaken by university authorities. This is important as mental health problems will lead to poor academic performance. This research was carried out to identify selected demographic factors that contribute to a students' mental health. The objectives of this study is to determine the association between gender, ethnicity, academic field of study, year of study and the mental health of undergraduates in Malaysian public universities**.**

2. Methodology

2.1 Sample

The respondents consisted of 1467 undergraduates enrolled at five public universities in Malaysia i.e. Universiti Putra Malaysia (UPM), Universiti Sains Malaysia (USM), Universiti Kebangsaan Malaysia (UKM), Universiti Malaya (UM) and Universiti Malaysia Sabah (UMS). The sample of respondents were calculated based on G* Power 3 Software (Faul, Erdfelder, Lang & Buchner, 2007). At the confidence interval level of .95, with the power of 95% and the alpha of .05 and with small effect size of .02, calculations, found an estimated sample size of 1229. Thus, the total number of respondents recruited for this study was sufficient to represent the young adult population studying in Malaysian public universities. A multistage cluster sampling was utilized to recruit the respondents based on their field and year of study.

2.2 Procedures

A self-administered questionnaire was used for data collection. A pilot test was administered to a group of undergraduate students to determine whether the questionnaire was appropriate for usage. Permission was then sought from the respective deans of faculty or school to distribute the questionnaires to targeted respondents. Researcher and enumerators distributed the questionnaire to the respondents during class hours.

The researcher also gave a brief explanation regarding the purpose of the study, reminded their respondents of their rights to not answer any question and how to fill in the questionnaire. The questionnaire comprised of two sections

namely mental health and demographic details. The respondents were also told that their response would be treated with utmost confidentiality. The questionnaire took only 30 minutes to complete.

2.3 Measures

2.3.1 Demographic Characteristics

A general demographic characteristics form was used to obtain respondents' information such as age, gender, ethnicity, religion, field of study and year of study.

2.3.2 Mental Health Measure

Mental health status was assessed using General Health questionnaire (GHQ-12) by Goldberg (1978). The GHQ-12 is a reliable instrument that has been used in Malaysia to measure psychological health among undergraduates (Nor & Rozumah, 2010). The scale consists of 12 items and was rated on the 4-point Likert scale, ranging from 1 (better than usual) to 4 (much less than usual). In this study, the bimodal method was applied (0-0-1-1) and the cut-off point of 5/6 was used. Scores below 5 indicate a positive mental health while scores above 6 indicate a mental health problem. Higher scores indicate a poor mental health status and potential of mental health issues.

2.4 Data Analysis

Data was analyzed using the Statistical Package for the Social Science (SPSS version 16). Reliability analysis was performed to determine the internal consistency of GHQ-12. The internal consistency of the GHQ-12 was tested using Cronbach's alpha value. Descriptive statistics (mean, standard deviation, minimum and maximum) and Bivariate Statistic such as t-test and one-way ANOVA analysis were used to answer the research objectives.

3. Results

3.1 Reliability

The Cronbach's alpha value of the GHQ-12 in this present study was 0.63. According to Nunnally (1976), Cronbach's alpha of 0.6 is sufficient to be an acceptable value for research purpose.

3.2 The Demographic Characteristics of undergraduates

The total sample comprised 21.9% of UPM undergraduates, followed by UMS (20.4%), UM (20.3%), USM (20.2%) and UKM (17.2%). A total of 892 respondents (61.3%) were female while 564 (38.7%) was male. The average age of respondents was 20.82 years (SD = 1.452) while the majority (57%) were in the 20 to 21 years old range, followed by 22 to 28 years old (27.5%) and 18 to 19 years old (15.5%). As for ethnicity, 57.4% were Malays, 28.7% Chinese, Sabahans or Sarawakians (8.7%) and Indians (4.7%). As for ethnicity, 60.3% of the respondents were Muslims, Buddhists (22.9%), Christians (12.2%) and Hindus (4.6%). In addition, 34.4% (n = 495) were social science undergraduates, 33.3% (n = 480) were science students and 32.3% (n = 466) were undergraduates in the technical field. Finally, 30.4% of undergraduates were First Year students, 33.3% were in their Second Year while 36.2% were Third year students.

3.3 The mental health of undergraduates

Table 1 presents the result of descriptive statistics for mental health status of undergraduates. On average, undergraduates in this study scored 4.436 (S. D = 2.444) on GHQ-12. The descriptive statistics shows that a majority (65.5%) of undergraduates' exhibit positive mental health (score 5 and below) while 34.4% has some possible indication of mental health problems and concerns (scored 6 and above).

3.4 The difference in mental health between male and female

Table 2 presents the result of t-test for difference in mental health status between male and female undergraduates. The t-test result shows that no significant differences of the mental health state between male and female undergraduates ($t = -.506$ and $p > .05$). However, males (Mean = 4.396 and S.D = 2.504) displayed slightly better mental health compared to females (Mean = 4.463 and S.D = 2.413).

3.5 The differences in mental health by ethnicity

Table 3 presents the result of one-way ANOVA for difference in mental health according to ethnic group. The one-way ANOVA shows that there is a significant difference in mental health between the various ethnic groups ($F = 3.534$, $p \leq .05$) with Indian (Mean = 4.044 and S.D = 2.195) having better mental health than Malays (Mean = 4.310 and S.D = 2.438), Sarawakians and Sabahans (Mean = 4.413 and S.D = 2.350) and Chinese (Mean = 4.743 and S.D = 2.499).

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3.6 The differences in mental health by field of study

Table 4 presents the result of the one-way ANOVA for difference in mental health in terms of field of study. From the one-way ANOVA, it can be seen that mental health status differs between fields of study (F = 5.793, p=.003). Social science (Mean = 4.154 and S.D = 2.365) undergraduates have better mental health than technical (Mean = 4.475 and S.D = 2.522) and science undergraduates (Mean = 4.683 and S.D = 2.449).

3.7 The differences in mental health by year of study

Table 5 presents the result of the one-way ANOVA for difference in mental health by year of study. There was a significant difference in mental health among undergraduates according to year of study (F = 3.926, p = .008). Third Year (Mean = 4.220 and S.D = 2.340) having the best mental health score, followed by First Year (Mean = 4.363 and S.D = 2.444) and Second Year (Mean = 4.721 and S.D = 2.540).

4. Discussion

Firstly, this study reveals that a majority (65.6%) of undergraduates are mentally healthy. Only 34.4% showed a signs of potential mental health problems. This means that a third of the Malaysian undergraduate population in public universities are experiencing anxiety and worries, confronted with issues of social dysfunction and confidence levels in their daily life. However, the proportion of undergraduates in this study experiencing mental health problems or above the GHQ-12 threshold is lower compared to the study done by Zaid *et al*., (2007) and Sherina *et al*., (2003). Nevertheless, respondents in those studies were medical students and thus were not representative of the overall general undergraduate population in Malaysian universities.

Secondly, the study found that the mental health state of undergraduates was different in terms of several demographic characteristics except for gender. Male undergraduates showed better mental health status than females but the difference was not statistically significant. This finding was similar with the results of previous study done by Song, Huang, Liu, Kwan, Zhang, Sham & Tang (2008), Biro *et al*., (2009), Pavot, Fujita & Diener (1997), Zaid *et al*., (2007) and Sherina *et al*,. (2003).

Thirdly, the different mental health status among the various ethnic groups was found to be statistically significant. Indian undergraduates displayed better mental health in comparison to their Malay, Sabahan or Sarawakian and Chinese counterparts. However, this finding contradicted the study conducted by Sherina *et al*., (2003) which claimed that there was no difference in emotional disorder amongst Indian, Malay, Chinese and medical students of other ethnicity in a Malaysian university. Taking religion into consideration, these present findings also contradicted with the findings from a study conducted by Muhamad and Jaafar (2009) that the subjective well-being of Malaysian youths does not differ despite their different beliefs.

Fourthly, this study found that there was a significant difference in mental health among undergraduates in the different fields of study. Social science undergraduates were found to be mentally healthier compared to technical and science undergraduates. Social science undergraduates were better able to cope with stress. This supports the findings of Dahlin *et al*., (2005) and Chen, Wong, Ran and Gilson (2009) that science students exhibit lowest levels of psychological health.

Lastly, this study also reveals that mental health of undergraduates was significantly different when it comes to year of study. Second Year students have the lowest level of mental health compared to First Year students and Third Year undergraduates. However, this finding contradicted with previous studies that found first year students as less healthy in terms of psychological health (Dahlin *et al*., 2005; Abdulghani, 2008; Zaid *et al*., 2007). However, this present finding was similar with Chen *et al*., (2009) who stated that second year undergraduates have the highest level of stress.

5. Conclusion and Recommendation

In conclusion, this study shows that mental health of Malaysian undergraduates differed in term of ethnicity, year of study and field of study except for gender. In addition, the study's significant results were in line with other previous studies. These findings provide some indication on the groups of undergraduates that would benefit from intervention with the aim of improving their mental health. This can act as a guide to university administrators, counsellors, governmental and private agencies to enable them to understand the state of mental health among Malaysian undergraduates. Additionally, in light of this findings, even though a majority of the undergraduates were mentally healthy, the proportion of undergraduates exhibiting mental health problems must be given due attention. This is important since previous studies indicate that poor mental health status have a negative effect on students' academic performance (Puskar & Bernardo, 2007), and promote negative behaviour and hopelessness (Kay *et al*., 2009).

A structured developmental and preventive program can be organized to address the issue of poor mental health among undergraduates. Specialized intervention programs such as stress management, time management, study techniques and coping skills workshop can be organized for the targeted groups. In addition, mental health services offered to undergraduates should be focusing on risky groups and especially tailored to the needs of science and second year undergraduates as they have been identified as such. University counselling services must also extend their working hours and be more flexible because most psychological issues do not occur during regular ordinary office hours. Counselling programs and clinics can be jointly organised at faculty level where attention can be given to the students in the at risk groups.

Like all young adults undergraduate students are constantly learning to adapt to their surroundings, to take added responsibilities, establishing personal identities and developing interpersonal relationship with their peers, academic staffs and society. Along the way they will encounter academic as well as social stresses and need help in order to manage their study. Therefore, undergraduates who exhibit clear indication of mental health problems need immediate help especially from those responsible for student welfare. University authorities can play a more pro-active role by creating awareness on the importance of mental or psychological health through information printed in student handbooks and through purposeful on-ground campaigns and via websites. Finally research on mental health among undergraduates should be continuously carried out to improve and broaden the scope of mental health in Malaysian universities.

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Table 1. Descriptive statistics of mental health among Malaysian undergraduates (n = 1461)

Variable	n (%)	Mean	S.D	Min	Max
Mental Health		**4.436**	**2.444**	**0**	**12**
≤ 5	958 (65.6)				
≥ 6	503 (34.4)				

Note: S.D = Standard Deviation, Min = Minimum, Max = Maximum

Table 2. T-test result for difference in mental health by gender

Variable	Gender		t	Sig. (2-tailed)
	Male (Mean)	Female (Mean)		
Mental Health	4.396	4.463	-.506	.613

Note: p > .05

Table 3. One-way ANOVA result for difference in mental health by ethnicity

Variable	Ethnicity				ANOVA (F)	Sig. (2-tailed)
	Indian (mean)	Malay (mean)	Sabahan or Sarawakian (mean)	Chinese (mean)		
Mental Health	4.044	4.310	4.413	4.743	3.534*	0.014

Note: *p ≤ .05

Table 4. One-way ANOVA for difference in mental health by fields of study

Variable	Field of Study			ANOVA (F)	Sig. (2-tailed)
	Social Science (mean)	Technical (mean)	Science (mean)		
Mental Health	4.154	4.475	4.683	5.793*	.003

Note: *p ≤ .05

Table 5. One-way ANOVA for difference in mental health by years of study

Variable	Year of Study			ANOVA (F)	Sig. (2-tailed)
	First Year (mean)	Second Year (mean)	Third Year (mean)		
Mental Health	4.363	4.721	4.220	5.528*	.004

Note: *p ≤ .05

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To Study the Prevalence of Chronic Respiratory Morbidities and Related Epidemiological Factors among Spinning Mill Workers

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Abstract

Background: Cotton and synthetic textile industry in India is the largest industry in the country accounting for 14 percent of industrial output and providing employment to around 35 million workers. The workers are at risk of suffering from various chronic respiratory illnesses like byssinosis, chronic bronchitis due to exposure to the cotton dust in the worksites. Even though quite a few studies have been conducted in textile mills in India enough emphasis has not been given on the epidemiological aspects of chronic respiratory illness among the workers in these mills. The present study was, therefore, undertaken with two fold objectives to determine prevalence of respiratory morbidities and to find out the epidemiological aspects of the respiratory morbidities in spinning mill workers.

Methodology: A Cross sectional study was conducted among 462 cotton textile workers in *Babashaheb Kedar Sut Girni Pvt. Ltd.* of Central India. Interview technique was used to collect sociodemographic, anthropometric & addiction information on a predesigned proforma followed by detailed general and systemic examination.

Results: Present study revealed that among 462 workers (25.3%) workers had chronic respiratory morbidities. The morbidities included Byssinosis (11.7 %), chronic bronchitis (5.8%), Bronchial asthma (4.5%), Tuberculosis (1.5%), other obstructive pulmonary diseases (1.7 %) All the workers were male and age ranged from 21 – 58 years. Majority of the workers 450 i.e (97.4 %) were literate and 437 (94.6%) belonged to class III & IV according to modified Kuppu swamy's classification. The spinning process was carried out in seven main sections. Majority of the workers belonged to ring frame section 217 (47%). The present study showed that 151 (32.7%) had cotton dust exposure for more than 20 years. Only masks were provided as protective devices and 191 (41.3%) of the workers were using it. Total 160 (34.7 %) workers were smokers.

Conclusion: Advancing age, sections, duration of exposure, non usage of protective devices and smoking were seen as major determinants of chronic respiratory morbidities in spinning mill workers.

Keywords: Spinning Mill worker, Smoking, Byssinosis, Chronic respiratory morbidities

1. Introduction

Occupational health is branch of community Medicine which deals with the effects of occupation of workplace on human health (Park. JE, 2009). Every occupation is associated with one or other ill effects on health. One such occupational group is cotton textile workers (Hunter's disease of occupation, 2000). Indian Textile Industry is one of the leading textile industries in the world and also contributes nearly 14% of the total industrial production of the country. It also contributes around 3% to the GDP of the country. India textile industry is also the largest in the country in terms of employment generation, currently generates employment to more than 35 million people. It is also estimated that, the industry will generate 12 million new jobs by the year 2010 (India business directory, 2010). Cotton textile workers are susceptible to various respiratory morbid conditions, by virtue of workplace and working conditions and are at risk of suffering from various chronic respiratory illnesses like byssinosis, chronic bronchitis due to exposure to the cotton dust in the worksites (Hunter's disease of occupation, 2000).

Byssinosis is an occupational lung disease often observed among workers exposed to cotton, flax, and hemp dust. Despite the fact that byssinosis has been recognized for over 100 years the etiology and pathogenesis remain obscure. The ability of textile fibres to produce byssinosis is determined by fiber type- cotton being the most potent, followed by flax, hemp and finally possible sisal. Harvested cotton consists of a mixture of plant materials including leaves, bracts and stems, fibre, bacteria, fungi and other contaminants. An important fact is that the compounds which cause byssinosis are water soluble. The biological activity of cotton can be greatly reduced by either steaming or washing the cotton before processing (David Son's Principles, 1996).

Respiratory symptoms related to cotton dust exposure may be reversible after removal from exposure with decreasing risk with increasing year since exposure cessation but can progressed to an advanced stage if exposure continues (X-R. Wang, 2005). The occurrence of respiratory symptoms represents the earliest response to cotton dust exposure, followed by lung function changes. Early respiratory symptoms may be a risk factor for subsequent loss of pulmonary function in cotton textile workers (David Son's Principles, 1996).

The severity and extent of problem are well recognized in the developed countries and control measures have been implemented to prevent the disease. This is not true, however, for the developing countries where the severity and extend of the problem are not well studied and preventive measures are far from adequate (J.R.Parikh, 1989).

Even though quite a few studies have been conducted in textile mills in India enough emphasis has not been given on the epidemiological aspects of chronic respiratory illness among the workers in these mills. The present study was, therefore, undertaken to determine prevalence of chronic respiratory morbidities and to find out the epidemiological aspects of the respiratory morbidities in spinning mill workers.

2. Material and Methods

A cross-sectional study was undertaken among spinning mill workers of Babasaheb Kedar Sut Girini Pvt. Ltd. Nagpur during Nov 2008 to Oct 2009. Total number of workers of this mill are 685, working in three shifts, there are seven main section involved in the spinning process wherein mixing and blowing of cotton is done in a common section. Various techniques are being used for reducing the dust concentration in the mill like Underground vacuum suction facilities is available to remove dust particles, also vacuum suction (Rider) which moves automatically from one end to another end of ring frame machine to remove dust. In mixing & blow room there is arrangement for humidified air through special type of fan from roof corner.

In Carding, Speed Frame, Ring Frame and Winding section arrangement for cold air through humidification plant is available. Arrangement for discharge of hot air through exhaust fan is also available.

Medical facilities were not available in the premises. Neither pre employment nor periodic medical examination was available for worker. There was an allopathic dispensary, where treatment for minor ailments was available previously, but unfortunately it is also not running since last few years. Ambulance facilities are not available. In the event of occupational accident of emergency the workers are referred to E.S.I. hospital or other Govt. Hospital.

Of the total 685 workers of this mill 171 workers were not involved in the actual spinning process. Therefore these workers were excluded from the study.

Out of 514 workers who were directly involved in the spinning process 462 workers participated in the current study. The list of workers was prepared section wise. The purpose of the present study was discussed and a written permission was taken from concerned authority to carry out study. The purpose of the study and its objectives were explained to the workers. Complete history was recorded on predesigned proforma followed by detailed general and systemic examination.

Standard diagnostic criteria were used for diagnosis of various morbid conditions ICD-10

1). Byssinosis – (J66):- The Clinical Diagnosis and a grading of byssinosis was based on Roach and Schilling's Criteria-

Grade 0: No Symptoms of chest tightness or breathlessness on Mondays.

Grade½: Occasional Chest tightness on Mondays or mild symptoms as irritation of the respiratory tract on Mondays.

Grade 1: Chest tightness and /or breathlessness on Mondays only.

Grade 2: Chest tightness and/or breathlessness on Mondays and other days.

Grade 3: Grade 2 + Evidence of permanent respiratory disability from reduced ventilatory capacity.

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2). Chronic Bronchitis - (J44):- A patient is said to have chronic Bronchitis if sputum has been coughed up on most days on at least 3 consecutive months for more than 2 successive years.

3). Tuberculosis - (A15):-

A. Sputum positive symptomatic after doing sputum for AFB staining in those having –

a) Persistent cough for more than 15 days b) Continuous fever c) Chest pain

d) Hemoptysis.

B. Old TB case- All those who gave past history of TB and took treatment for it but having respiratory symptoms at the time of study.

4). Bronchial Asthma - (J45):- Either a previously diagnosed case of bronchial asthma taking treatment or those having history of paroxysms of breathlessness, chest tightness and wheezing.

5). Other Chronic Obstructive pulmonary diseases – (J44.9):- All those having respiratory symptoms for more than 15 days but the symptoms were not classical of any of the above mentioned respiratory morbid conditions.

Statistical Analysis: Data analysis was done by using Epi info software. Chi square test was used to determine the association of risk factors with chronic respiratory morbidities. Univariate analysis for risk calculation was done by odds ratio and their 95% Confidence Intervals.

3. Results

Present study revealed that among 462 workers (25.3%) workers had chronic respiratory morbidities. The morbidities included Byssinosis (11.6%), chronic bronchitis (5.8%), Bronchial asthma (4.5%), Tuberculosis (1.5%), other obstructive pulmonary diseases (1.7%). **(Table-1)**

Most of the workers were Hindu by religion. All the workers were male. Majority of workers (92.2%) had average BMI and (7.8%) were obese. The age range was from 21 to 58 years maximum number of workers (45.7%) belonged to 40-49 years of age group.

Majority of the workers (33.5%) had education up to middle school and (27.3%) up to high school. Almost (94.6%) of the workers belonged to class III & IV as per modified Kuppu Swamy's scale (Park. JE, 2009). The spinning process was carried out in seven main sections. Majority of the workers belonged to ring frame section (47%). The present study showed that Average years of exposure are 15.62 ±6.06 yrs, wherein (32.7%) workers had cotton dust exposure for more than 20 years. Only masks were provided as protective devices and (41.3%) of the workers were using it. Total (34.7%) workers were smokers and among them about 40% were found to be using 10 cigarettes/bidis per day for 20 years or more. **(Table-2)**

Univariate analysis of risk factors for chronic respiratory morbidities showed that Age, dusty worksites such as mixing / blow room and carding sections, duration of exposure, non usage of protective devices and smoking were found to be significantly associated. (**Table-3)**

4. Discussion

Respiratory morbidities are well known disease entity of old age. The problem becomes grave in presence of other conditions, which have an irritant effect on the lung mucosa like smoking, other indoor and outdoor pollution and incriminate worksites.

Present study revealed that among 462 workers 148 (25.3%) workers had respiratory morbidities, Byssinosis (11.6%), chronic bronchitis (5.8%), Bronchial asthma (4.5%), Tuberculosis (1.5%), other obstructive pulmonary diseases (1.7%). Similar study by Rajnarayan R. Tiwari *et al*, (2001) chronic bronchitis, upper respiratory tract infection and ½ grade byssinosis were 4.5%, 7.2% & 2.3% respectively, which were comparable to findings of our study.

Though cotton dust has been established as a causative agent for respiratory morbidities, it is important to determine the other risk factors associated with the occurrence of diseases so as to implement comprehensive preventive measures. So we tried to determine the association of various factors such as advancing age, lower socioeconomic status, obesity, sections, duration of exposure, non usage of protective devices and smoking.

In general, the higher age has been established as a risk factor for respiratory morbidities. A study by A.K. Mishra *et al* (2004) on cotton textile workers with age over 40 years was more likely to suffer from respiratory morbidities. This was quite similar to the findings of our study wherein significant association was seen between chronic respiratory morbidities and age group >40 years (OR–1.79). In a cotton mill, various sections are

contaminated with different levels of cotton dust. The section of a mill in which a person works can have a definite association with the prevalence of disease, as reported by Altin *et al*. (2002), consistent with the findings of J P Parikh *et al* (1989) and Farooque *et al*. (2008), we found a positive association in mixing/ blow room and carding sections of the mill (OR-2.32 & 1.59 respectively). Beside this, smoking was also found to be a significant risk factor (OR-1.75). The prevalence of chronic respiratory morbidities was 32.5% among smokers and 21.5% among non-smokers in the present study. Our finding regarding influence of smoking was very much similar to those reported by other studies (10, 13, and 14). An association of duration of exposure with respiratory morbidities has been previously reported (5, 7). In the present study, we also found significant association with duration of exposure of >20 years (OR-2.79). Among workers using masks (17.2%) had respiratory morbidities compared to (30.9%) among workers not using. The difference was significant (OR-2.15). Consistent findings have been reported by other authors also (9, 12). In the present study lower socioeconomic status and obesity were not found to be significant risk factors.

5. Conclusion

It is concluded that advancing age, sections, duration of exposure, non usages of protective devices and smoking were seen as major determinants of respiratory morbidities in spinning mill workers. Efforts should be strengthened like enclosure, steaming, processing etc for reduction of dust concentration especially in mixing & blow room and carding section. Tobacco smoking and chewing should be dissuaded and efforts should be made to improve the overall health status of spinning mill workers. Need of health education regarding use of personal protective devices such as masks and other respiratory devices. Workers having respiratory morbidities must be removed from the section of the work with high dust concentration to better assign work in other dust free sections. Pre employment and periodic examination of workers should be carried out.

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Table 1. Distribution of workers according to chronic Respiratory Morbidities

ICD10	**Respiratory Morbidity**	**Number of workers**	**Percentage**
J 66	Byssinosis	**54**	**11.7 %**
J 44	Chronic Bronchitis	**27**	**5.8%**
J 45	Bronchial Asthma	**21**	**4.5%**
A 15	Tuberculosis	**7**	**1.5%**
J 44.9	Other obstructive Pulmonary Disease	**8**	**1.7%**

Table 2. Distribution of workers according to personal and Occupational characteristics

Characteristics	**Number of workers**	**%**
Age (in years)		
20 -29	**35**	**7.6**
30 39	**103**	**22.3**
40 -49	**211**	**45.7**
>50	**113**	**24.4**
Obesity (BMI)		
Obese (>30)	**36**	**7.8**
Non –obese (<30)	**426**	**92.2**
Socioeconomic status		
Upper/upper middle	**25**	**5.4**
Lower middle/upper lower/lower	**437**	**94.6**
Smoking status		
smoker	**160**	**34.7**
Non smoker	**302**	**65.3**
Sections		
Mixing/blow room	**19**	**4.1**
Carding	**33**	**7.1**
Ring frame	**217**	**47.0**
Other *	**193**	**41.8**
Duration of exposure		
> 20 Years	**151**	**32.7**
< 20 Years	**311**	**67.3**
Safety gadgets (mask)		
Using	**191**	**41.3**
Not using	**271**	**58.7**

*Speed frame, Doubling**,** Reeling and winding section

Table 3. Prevalence of respiratory morbidities with odds ratio (95%CI), by different characteristics

characteristics	Workers	Chronic Respiratory morbidities%	OR (95%CI)
Age (in years)			
>40	**324**	**28.4**	**1.79 (1.09-2.94) ***
<40	**138**	**18.1**	
Obesity (BMI)			
>30	**36**	**13.9**	**0.45 (0.17-1.19)**
<30	**426**	**26.3**	
Socioeconomic status			
Lower middle/upper lower/ lower	**437**	**25.6**	**1.37 (0.50-3.75)**
Upper/upper middle	**25**	**20**	
Smoking status			
smoker	**160**	**32.5**	**1.75 (1.14-2.69) ***
Non smoker	**302**	**21.5**	
Sections			
Mixing/blow room	**19**	**42.1**	**2.87 (1.08-7.62) ***
Carding	**33**	**36.4**	**2.26 (1.02-4.97) ***
Ring frame	**217**	**26.7**	**1.0 (0.9-2.28)**
Other **	**193**	**20.2**	
Duration of exposure			
> 20 Years	**151**	**39.0**	**2.79 (1.81-4.31) ***
< 20 years	**311**	**18.6**	
Safety gadgets (mask)			
Not using	**271**	**30.9**	**2.15 (1.36-3.38) ***
Using	**191**	**17.2**	

CI=Confidence Interval ** Speed frame**,** Doubling**,** Reeling and winding section

*Significant $P < 0.05$

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Metabolic Syndrome in Iran

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Abstract

Metabolic Syndrome (MS) also known as syndrome X, the Dysmetabolic Syndrome and Insulin resistance syndrome, refers to a cluster of cardiovascular risk factors including hypertension, glucose intolerance, triglyceridemia and low HDL cholesterol concentrations in blood. This syndrome consists of multiple metabolic risk factors. The significance of MS is that MS and its components seem to be underlying factors for the development of atherosclerotic cardiovascular disease and diabetes type 2. The current article reviews the literature on the prevalence of MS in Iran. According to global statistics, a quarter of the adult population suffers from metabolic syndrome. The prevalence of MS in United States is 24% and 44% of adults over 50 years old suffer from MS. In contrast to this high prevalence of MS in United States of America, its prevalence in some countries such as South Korea is less than 14.2% in men. However, its prevalence in two neighbor country of Iran including Saudi (39.3%) and Turkish (33%) populations is relatively high compared to other countries. We know that 30% of adults in Tehran (Capital city of Iran) suffer from MS and more than 45% of adults older than 20 years old in the Khorasan province (in north east Iran) have MS. This statistics reveal that the prevalence of MS in Iran is even higher than the developed countries and the relation between MS and Coronary Artery disease

suggests that we need to continue research on MS, its components, and the association between MS and Coronary Artery Disease.

Keywords: Metabolic syndrome, Coronary artery disease, Risk factor

1. Introduction

1.1 Definition of Metabolic Syndrome

Metabolic Syndrome (MS) also known as syndrome X, comprises of hypertension, glucose intolerance, high triglycerides, and decreased level of high density lipoproteins (HDL), which are considered risk factors of cardiovascular diseases (Reaven,1988). Additional terms, which define the same clinical entity, include the Deadly Quartet, the Dysmetabolic Syndrome, and Insulin Resistance Syndrome. The above mentioned MS components are known risk factors for development and progression of atherosclerosis, which in turn results in a higher risk for coronary artery diseases. It has also been shown that the MS components are associated with a higher risk for diabetes type 2. Our current knowledge suggests that there is no single cause for MS; however, abdominal obesity and insulin resistance are the most important risk factors for MS. Furthermore, it has been documented that other underlying risk factors such as physical inactivity, aging, hormonal imbalance, and race can increase the risk of MS (Grundy, 2005). These risk factors suggest that there exists an interrelation between combinations of risk factors which may predict the development of MS.

1.2 Diagnostic Criteria for Metabolic Syndrome

The National Cholesterol Education Program (NCEP)-Adult Treatment Panel (ATP), has introduced one of the most widely accepted diagnostic criteria for the diagnosis of MS. This criteria works on some measurements including waist circumference, serum triglyceride (TG), HDL-C, Blood pressure (BP), and fasting blood sugar (FBS). Additionally, and as it is illustrated in Table 1, the American Heart Association/National Heart Lung & Blood Institute (AHA/NHLBI) made some minor modification on the NECP criteria which is currently considered more in research focusing on MS and its association with Coronary Artery Diseases (CAD) (Grundy SM, 2005). According to the new International Diabetes Federation (IDF), the metabolic syndrome is diagnosed if a person have central obesity plus one pair of any of the "increased level of TG (≥150 mg/dL), "decreasded level of HDL cholesterol (<40mg/dL)", "increased blood pressure (systolic BP ≥ 130 m Hg or diastolic PB ≥ 85mm Hg, or a diagnosed hypertension patient under treatment) ", increased FBS (≥ 100 mg/dL).

1.3 Risk Factors of Metabolic Syndrome

Similar to most of clinical syndromes, there exist groups of underlying risk factors for the development of MS. These risk factors have a metabolic origin known as MS components (Table 1) and are shown to be the risk factors for CAD. The metabolic risk factors of MS are as following:

- Atherogenic dyslipidemia.
- Elevated serum LDL level.
- Low HDL cholesterol (HDL-C) concentration.
- Elevated blood pressure.
- Elevated plasma glucose.
- Prothrombotic state.
- Proinflammatory state.

According to some research, physical inactivity, aging, hormonal imbalance, and genetic predisposition other underlying conditions associated with MS.(Grundy SM, 2005). Additionally, according to Maki (2004), Lee (2005), Niaura (2000), and Raikkonen (2002), biological, behavioral, and social factors may influence MS.

1.4 Prevalence of metabolic syndrome

According to IDF, the global prevalence of MS is about 25% in adult populations (IDF 2008). A 2005 study on the prevalence of MS among the general population in the United States revealed that 24% of participants had MS (MC Neill AM. 2004) where Grundy (2005) found 44% of adults over 50 years old suffered from MS. In contrast to this high prevalence of MS in the United States, an age adjusted prevalence statistics on MS in South Korea indicated only 14.2% of men and 17% of women had MS (Hye SP. *et al*. 2004). Similarly, a low prevalence of MS was reported by Boonyavakul (2005) in rural Thai populations where only 18% of the population was diagnosed as having MS. Numerous studies on the prevalence of MS in different countries reported a high prevalence of MS, specifically, 20.7% in the 50-69 year old population, 19.8% in adults over 18

years old, 31.6% in populations over 20 years old, and 24.3% of adults over18 years old in Ireland (Villagas *et al*. 2003), Greece (Panagiotakos *et al*. 2004), India (Gupta *et al*. 2004), and Canada (Liu *et al*. 1999), respectively. The results of two studies in Saudi (39.3%, Al-Nozha M. 2005) and Turkish (33.4%, Ozsahin AK. 2004) populations illustrated a high prevalence of MS where both countries are neighbors to Iran. All of the above mentioned researchers employed NCEP criteria for the diagnosis of MS, and findings indicate variance in the prevalence of MS for different communities and ethnic groups.

1.5 Prevalence of MS in Iran

Several studies in Iran reported a considerably high prevalence of MS in some regions compared with other countries; however, the prevalence of MS was comparable with the global prevalence in some other areas in Iran. Sarrafzadegan (2008) found 23.3% of adults over 19 years old in three central cities of Iran had MS, while Ghayour Mobarhan (2007) found a much higher prevalence of over 45% of adults 20 years old and older in the Khorasan province suffered from MS. Azizi (2003 & 2004) is among the scholars who conducted several studies on MS in Iran. The statistics from his study in Tehran (2003) showed 30.1% of adults over 20 years old had MS.

We can categorize the literature on MS and its significance, in five categories as follows:

The first category consists of the articles which illustrated the high prevalence of MS globally, regionally, and in Iran (Ford ES, 2002; Azizi F, 2004; Ghayar mobarhan M, 2007). The second category includes the group of articles which emphasized the independent CAD prediction role for MS (Sattar N, 2003; Hunt K, 2004; Lakka HM, 2002; Sadeghi M, 2006; Chen Q, 2008). The next group of literature attempted to show the biomolecular basis of MS components and their atherogenicity (Villena JA, 2004; Ginsberg HN, 2006; Szapary Po, 2004). The effect of dietary factors, as well as physical factors on the risk of MS is beautifully depicted by the fourth category of the literature (Clark SD, 2000; Maki K, 2004; Haffner SM, 2007). Laaksonen (2002), and Lee (2005) are among the researchers whose work proved that life style factors (e.g., physical activity, smoking habit, etc.) have an impact on the risk of having MS. These studies are listed in our fifth category of literature. Finally, numerous studies have suggested the need to explore the matter in different populations and as a multivariable model (Ford Es, 2005; Ghayour M, 2007; Azizi F, 2004; Sadeghi M, 2006).

2. Discussion

Review of the literature on metabolic syndrome demonstrates that MS is a prevalent syndrome both throughout the world and in Iran (Sarti S, 2006, and Azizi F, 2004). As we discussed before, the noteworthiness of the epidemiologic studies on MS in Iran is that the prevalence of this syndrome is considerably higher in this region than throughout the world. Evidence of this comes from McNeil (2005) who found that 24% of general population in United States suffers from MS. Similarly, Azizi (2004) reported that 30% of adults in Tehran (Capital city of Iran) suffer from MS. These statistics reveal that the prevalence of MS in Iran is even higher than in developed countries.

As a rule, the prevalence of MS is increasing parallel to the trend in overweight and obesity. In general, the prevalence of MS increases with age and its prevalence are considerably different among races and ethnic groups, which supports the probable genetic predisposition. It seems genetic, social, environmental, psychological, and behavioral factors are linked to this clinical syndrome. The results from previous studies strongly emphasize the need for more studies to explain the interrelation between MS components and their association with MS.

A problem, which shows the significance of MS is that patients with MS have a higher risk of developing CVD mortality & morbidity (Isomma B 2001, Qingwe C, 2008). In addition, coronary artery disease is a common cause of death in Iran (Azizi F, 2004). Thus, it is expected that preventive measures such as, early diagnosis and appropriate management of MS can be considered the key to success in our efforts in reducing the risk of future development of coronary artery disease in our society (Chen Q, 2008).

3. Conclusion

In summary, a strong link between MS and coronary artery disease (CAD) has not been well documented (Petra M, 2004). Additionally, only a few studies conducted on the prevalence of MS and its risk factors in the general population in Iran (Zabetian A, 2007) and rare supplemental information is available regarding MS in CAD patients and the determination of risk factors of MS for this high risk group. Review of the literature and our knowledge on MS suggests the need for future study concerning the association between MS and its components with coronary artery disease in Iran.

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Table 1. Diagnosis of MS. National Cholesterol Education program (NCEP)-Adult Treatment Panel III (ATP III) last modified by AHA/NHLBI 2005/update 2008

Measure any 3 of 5 Constitutes Diagnosis of MS	Categorical Cutoff Points
Elevated waist circumference	**102 cm (40 inches) in men** **88 cm (35 inches) in women**
Elevated TG	**150 mg/dL (1.7 mmol/L)** **or** **Drug treatment for elevated TG**
Reduced HDL-C	**40 mg/dL (1.03 mmol/L) in men** **50 mg/dL (1.3 mmol/L) in women** **or** **Drug treatment for reduced HDL-C**
Elevated BP	**130 mm Hg systolic BP** **or** **85 mm Hg diastolic BP** **or** **Drug treatment for hypertension**
Elevated fasting glucose	**100 mg/dL** **or** **Drug treatment for elevated glucose**

Table 2. Literature on MS and its significance

Categorized Literature	Main References
Articles illustrated the high prevalence of MS (Global, Regional/Country)	**Ford ES (2002); Azizi F(2004); Ghayur Mobarhan M (2007)**
Articles illustrated the MS as an independent predictor of CAD	**Sattar N (2003); Hunt K (2004); Lakka HM (2002); Sadeghi M (2006); Chen Q (2007)**
Articles illustrated the Biomolecular basis of the MS components and their atherogenicity	**Villena JA (2004); Ginsberg HN (2006); Szapary PO (2004)**
Articles illustrated that life style factors (dietary factors, physical activity, smoking habit) have an impact on the risk of having MS	**Laaksonen D (2002), Lee WY (2005); Clark SD (2000); Maki K (2004); Haffner SM (2007)**
Literatures suggesting the need to explore the matter in different populations and as an multivariable model	**Ford ES (2005); Ghayur Mobarhan M (2007); Aizi F (2004); Sadeghi M (2006)**

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Determinants of TB Case Detection in Nigeria: A Survey

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Abstract

This paper presents results from a survey carried out in Benin City, Nigeria to determine factors that could enhance the case detection rate for tuberculosis. Studies have shown that while the treatment rate is impressive, notification rates over the last decade have been discouraging. Results from the survey identified four key factors that must be combined to increase case detection rates. These factors are effective awareness programme, active cough identification, associated cost factor for treatment of identified cases, stepping up screening exercises and conducting routine tests at regular intervals especially in high population density areas.

Keywords: Tuberculosis, Survey, Case detection

1. Introduction

It is estimated that a third of the world's population is infected with *Mycobacterium tuberculosis*. Of the 1.7 billion people estimated to be infected with TB, 1.3 billion live in developing countries (Ssematimba et.al., 2005) while those infected are responsible for 8 to 12 million active cases of TB and 3 million deaths (Magombedze et.al, 2006; North & Yu-Jin, 2004; Schluger & Rom, 1998).

Nigeria experienced upsurge of tuberculosis (TB) cases over the past decade. In 2003, there were 44,184 notifications across the country (WHO, 2005), as compared to an estimated 362,819 new cases. The World Health Organization in its 2007 report estimates TB prevalence in Nigeria to be 536 per 100,000 populations (WHO, 2007). The Nigeria National Programme has adopted the WHO recommended strategy as enshrined in the expanded Directly Observed Treatment Short-course (DOTS) strategy. However, a considerable proportion of the Nigerian population lives in areas still not covered by the DOTS services. In 2005 the DOTS coverage in Nigeria was estimated at 65% (Okeibunor et.al. 2007; WHO, 2007). Nigeria has been ranked fourth among the 22 countries designated by the WHO as the high-burden countries (HBC) for TB. Nigeria is also said to have the highest number of new TB cases in Africa (Soyinka, 2007; WHO, 2006) having about 300,000 of estimated TB cases recorded each year, which result in 30,000 deaths annually.

With introduction of DOTS in Nigeria, the situation has not improved significantly as detection rate remains at a low 21% while treatment rate is 59% in 2003, which are the lowest levels among the high burden countries (HBC) (WHO, 2006); this even when DOTS coverage increased to about 60%. As shown in (Okuonghae & Aihie, 2008), the case detection parameter is extremely crucial to the dynamics of TB in Nigeria, either as a means of reducing a backward bifurcation range in a TB model with exogenous re-infection and thereafter make the reproduction number useful in disease control and reducing the impact of the TB burden by directly reducing the value of the reproduction number.

This work is a descriptive survey carried out in Benin City, Edo State, Nigeria. The aim of the survey was to obtain peoples attitude and knowledge on TB. Most people may not quickly understand the signs and symptoms of TB and this could lead to increases in the incidence of TB in the community even before the index case commences treatment. Knowledge can help in increasing case detection as you can only report what you have an idea of, at most. Information on Peoples attitude and knowledge on TB can be used to increase case detection rate.

Usually, descriptive epidemiological studies are generally concerned with obtaining information on the distribution and causes of disease in the community. It usually involves survey of the community or specified population and obtains descriptive information such as cause of the disease, the age, sex, occupation, education, socio-economic and cultural habits of the population as well as the environmental factors (Ezenwa, 1985). (Note 1)

2. Survey

The works in Okuonghae (2008), Okuonghae & Aihie (2008) and Okuonghae & Korobeinikov (2007) has identified case detection as key to the effective functioning of DOTS in Nigeria.

According to the report in WHO (2006), the notification rate of young adults is almost equal to the notification rates of older adults. Hence our focus was on young adults in secondary schools as well as students in a university. The average age of the secondary school students was 16 years, the average age of the university students was 24 years while the average age of the students of a computer college also included in the survey was 30 years. In all, the average age of the respondents in the survey was 23 years. We used a self administered questionnaire in the survey.

3. Study Area

We selected different segments of the population in an urban city, Benin City, Edo State, using the simple random sampling technique. We conducted the survey in two secondary schools (One of the school is a government secondary school and the other is a demonstration secondary school of one of the Federal Universities), one computer college, final year students of two faculties in a Federal University and a sample of lecturers from one department in the University. Out of the 553 questionnaires sent out, 450 were returned (81.4%).

4. Questionnaire distribution and collection

The questionnaires were sent to the various groups in the target city. No financial incentive was offered at all levels and the participants received no preliminary information about the study.

For the secondary schools and the computer college, the teachers of the classes involved were used in sending the questionnaires to the respondents. They also collected the questionnaires. Thus the teachers served as the basic channel of distributing and collecting the answered questionnaires. The researchers carried out the distribution and collecting of the questionnaires to the university students and lecturers involved in the study.

5. Data Analysis

The data collected was analyzed using the Statistical toolbox in **MATLAB Release 12**. We also crosschecked the results using **R**. We performed a Krustall-Wallis test (a non parametric test) on the results from a group of five questions in order to determine whether there are significant differences in the categorical responses of the respondents on the questions.

6. Findings

6.1 How people get infected with TB

The question asked was, How do people get infected with TB? In the validation survey, 33.1% of the respondents think people get infected with TB from the air while 47.3% thinks people get infected by contact with a TB infected person. 19.3% don't know how people get infected with TB while 0.3% thinks people get infected with TB from dust.

6.2 Signs and symptoms of TB

The question asked was, What signs would you observe to know that someone has TB? 39.1% of the respondents mentioned at most 3 signs of someone having TB while about 32.2% were able to mention more than three signs of someone having TB. Also 28.7% could not mention any symptoms for TB. This is, to our mind, a high proportion of the people in the sample considering the nature of the issue under consideration. Those who mentioned the symptoms included chronic cough as a symptom of tuberculosis.

6.3 Sources of information on TB.

The question asked was, From what sources do you get information on TB? 19.8% of the respondents get their information on TB from health workers, 70% gets such information from TV and radio, 6.2% from newspapers and magazine while 4% from other sources (internet, casual discussions). The electronic media is seen as the most powerful tool for obtaining information on TB among those sampled.

6.4 Federal Ministry of Health advertisements on TB

The question asked was, Have you watched the Federal Ministry of Health advertisement on TB and TB treatment? 46.7% have watched the Nigerian Federal Ministry of Health advertisement on TB and TB treatment while 53.3% have not seen the advert. Those who have watched it stated that it was seen on the Nigerian Television Authority (NTA) while about 0.05% watched it on privately/State owned television stations viz: Silverbird TV- Lagos, RSTV-Port-Harcourt and EBS/ITV-Benin City. It seems the advert is concentrated on the NTA stations. Of those who have not seen the advertisement, 42.7% claims this was due to lack of electricity while 57.3% thinks the adverts may not have been featured frequently on TV for them to have seen it. Some of the respondents in this latter group feel government enlightenment programs are more on HIV/AIDS. They insist that there are more adverts on HIV/AIDS than TB.

6.5 Chronic cough as a sign of TB

The question asked was, Do you think someone with chronic cough, for at least two weeks, could have tuberculosis? 58.3% of the respondents think that someone with chronic cough (for at least two weeks) could have TB while 12.4% thinks otherwise. About 29.3% of the respondents don't know if someone with chronic cough could have TB. This implies that about half of the population may not be able to use chronic cough as a marker for identifying a likely potential TB case. A study in Odermatt *et al.* (2007) showed the impressive increase in case detection through the informal use of chronic cough as an identifying characteristic of TB cases in the Lao People's Democratic Republic.

6.6 TB Notification

The question asked was, Do you think families with a TB patient may fail to notify the relevant health officials about that person because of the stigma it may bring upon the family? 46.4% of the respondents thinks families with a TB case may fail to immediately notify the relevant health officials about the case because of the stigma it brings on the family members, 24.4% thinks otherwise while 29.2% don't know if such could bring any stigma on the family of the TB case.

6.7 Cough medicine

The question asked was, Do you think people should just go to a pharmacy/chemist and buy cough medicine whenever they have cough? 38.2% of the respondents think people should go to the pharmacy or chemist and buy cough medicine whenever they have cough, 47.6% thinks it is not right, while 14.2% don't even know whether people can go over the counter and buy cough medicine. It was further observed that 53.6% of the respondents thinks making cough medicine a prescription drugs could compel people to see the doctor and possibly carry out medical tests whenever they have persistent cough, 18.4% thinks making cough medicine a prescription drug it will not compel people to go to the hospital and undergo medical tests while 28% don't know if making cough medicine prescription drugs could compel people to see the doctor and carry out medical tests if they have persistent cough.

6.8 Analysis using the Kruskal-Wallis test

Using the Kruskal-Wallis test, we compared the categorical responses of the respondents to the questions related to the results showed in subsections (6.1), (6.2), (6.3), (6.6) and (6.7). Using the statistical toolbox in **MATLAB** (and comparing the results using **R**), we see from Table 1 below that the p-value from the Kruskal-Wallis test is 0.8376; a highly significant result. The result of the test also showed that the Kruskal-Wallis chi-squared value is 1.4379 while the degrees of freedom (df) is 4. Clearly, this shows that the categorical responses of the respondents on the questions whose results are stated in the five subsections listed above are not significantly different; we hereby accept the hypothesis that the responses to the questions are not significantly different. There is consistency in the answers provided by the respondents to the questions under consideration. Hence, respondents with a lack of information on tuberculosis cannot say much on the symptoms and signs of TB and cannot use chronic cough as a marker for identifying a potential TB case which may lead to failure to notify the TB case to the relevant health authorities.

7. Discussion of Findings

The results from the survey showed that many people don't know how someone could get infected with tuberculosis while a vast majority don't know any sign and symptom of TB. This shows that government still has much to do in terms of increased enlightenment campaign on tuberculosis and its treatment. The campaign should be in both the print and electronic media. Flyers and posters on the signs and symptoms of TB and the Federal Government treatment policy on TB should be printed and distributed especially in rural areas. The flyers, posters and billboards should be written in English language and at least in the three major languages in

Nigeria: Hausa, Igbo and Yoruba. These sources of information should clearly state the signs and symptoms suggestive of tuberculosis which includes cough lasting more than two weeks, unintentional weight loss, loss of appetite, swelling of glands, night fevers and drenching night (Guwatudde et.al. 2003). It is interesting that while a good number of the secondary school students were able to mention more than three signs of TB, only a handful of the respondents from the computer training college could mention at least three symptoms of TB. All respondents included cough as a symptom of TB.

It is very good that people can readily identify a 'potential' TB infectious case using chronic cough as a marker, although about half of the population in the survey either didn't know if chronic cough could be used as a marker for identifying TB cases or disagreed completely with the idea that chronic cough could be a marker for someone with tuberculosis. However the study in Odermatt *et al.* (2007) showed that actively identifying patients with chronic cough in the community has the potential to improve case detection rates as shown in the study conducted in the Lao People's Democratic Republic. The study suggested that rapid, low-cost and easily applicable approaches are needed for improving detection rates of TB in the locality. In this case, chronic cough is an easily recognizable symptom for laypersons. Basically the objective of the study in Odermatt *et al.* (2007) was to validate a rapid and low-cost questionnaire to identify patients with chronic cough and assess its relevance in TB case detection in six provinces. The result from the study in Odermatt *et al.* (2007) showed that the lay informant questionnaire method performed moderately. It allowed the detection of several hitherto undiagnosed smear-positive TB cases. In fact in one of the selected province, nine new TB cases were diagnosed, yielding an incidence rate of 342/100,000, which is three times higher than the national incidence rate. Hence being able to identify a TB infectious case using chronic cough that lasts for more than two weeks as an important marker could help in increasing case detection in Nigeria as many in the population are ready to use such a means of identifying TB cases Odermatt *et al.* (2007).

Our survey also revealed that a vast majority of members of the surveyed community rely on the electronic media (TV and radio) for their sources of information on TB. This shows that the use of TV and radio for TB enlightenment programmes cannot be overemphasized. It is imperative to state that the survey was carried out in an urban area, where electricity and electronic appliances, like television and radio, are readily available unlike in the rural areas. However, with more rural areas having electricity, the use of TV and radio for TB programs should be greatly encouraged. Even in places where there is no electricity, most rural dwellers have small transistor radios. TB programmes should be featured regularly on radio programs most especially in the local languages of the community. Moreover, it seems the TB enlightenment programme and advertisement under the Nigerian Federal Ministry of Health is shown exclusively on the Nigerian Television Authority (NTA), a Federal Government owned electronic media outfit. Only a few of the respondents mentioned state or privately owned TV stations as airing TB information programmes. It is therefore suggested that TB enlightenment programmes be aired in all TV stations nationwide. Most local TV stations have programs in the local language. This is an excellent platform for informing the local populace about the Federal government policy on TB and TB treatment. Radio stations should also have programmes on tuberculosis. Newspapers should regularly feature commentaries on TB, paid for by the government at all levels.

The TB programmes should be featured regularly as most of the respondents from the survey indicated that they may not have been aware of the Federal Government treatment policy on TB because the advertisement may not have been featured regularly on TV. In fact most of the respondents feel that there is more information on HIV/AIDS than TB in Nigeria. This lapse should be addressed. It should be noted that while HIV is primarily a 'behavioural' disease (a persons behaviour may determine if he gets the disease), TB is airborne and easily contracted by both adults and children irrespective of your behaviour (Sharomi et.al. 2008). Improvement in electricity is greatly encouraged as about 42.7% of the respondents claimed that they have not seen the TB advert on TV due to lack of electricity.

The survey also revealed that places with a TB case, and especially when there is a recorded death resulting from TB, was not visited by the relevant health officials for screening and contact tracing. This is very disturbing especially if it is a school that is involved. There is a high rate of mixing in schools and an unidentified TB case could well have started the spread of the disease in the school. It is important that schools are screened once the health authorities are notified of a TB case in such a school, even before such a case results in death. Also simple basic preventive measures, such as covering of the mouth when coughing, should be encouraged.

It is important that people carry out medical tests when they experience persistent cough for at least two weeks. The study found out that most people have the tendency in engaging in self-medication when they have persistent cough; they simply go over the counter and procure a cough mixture. Many persons, though, thinks making cough medicines a prescription drug will compel people to see a doctor and undergo medical tests to

properly diagnose what is wrong with the patient. The Federal Ministry of Health and other relevant health agencies could insist on making cough medicines prescription drugs. Other preliminary measures could be taken as first aid' measures e.g. stop the taking of cold water, as some of the respondents suggested, take more vitamins especially vitamins C from fruits e.t.c. If symptoms persist, then a doctor should be seen and the individuals should not engage in self-medication, especially when the cough persists.

Notification rates will increase if families readily open up to relevant heath officials about any TB case in the family (46.4% of respondents thinks families with a TB case may fail to immediately notify the relevant health officials about the TB case because of the stigma it may bring on the family). They should not allow the so-called 'stigma' that could come upon the family prevent them from notifying the health workers about one of their own having tuberculosis. Many agree that stigmatization could prevent families from revealing TB cases to health officials and instead resort to alternative, ineffective measures for treating the disease (measures that may not even deal with the problem), hereby increasing the infectious period of the person and putting other family members at risk of infection.

The study further showed that many agree that the cost of undergoing a thorough and comprehensive TB medical test could prevent them from commencing treatment on time, especially in rural areas. Investigations once revealed that on the average, about N5,000 - N12,000 (Nigerian naira) may be spent on such tests and pre-treatment drugs at a TB specialist hospital in south-western Nigeria, as at 2001; this, even when the actual TB treatment drugs was perceived free since the hospital is under the Government and supported by international agencies. This is quite a big amount considering that the minimum wage in Nigeria then was about N5, 500 and most people in the rural areas may not even be able to afford it. This cost may compel people to resort to alternative means like uncontrolled and unprofessional use of traditional or herbal medicine, hereby increasing the infectious period of the TB patient. We encourage making TB tests, as well as the entire treatment regimen required for a comprehensive and effective cure, free. This will readily make people undertake such tests and treatment for TB if necessary.

The public should also be enlightened about TB medical tests. From the survey, well below 1% of the total sample size could mention tests such as Mantoux test and sputum test. In fact from some of the sub-sampled population, well over 95% of the respondents could not mention one TB tests. None mentioned X-ray, a very important TB test. It is therefore important that people are enlightened on TB tests so as to allay their fears about TB and its treatment. We encourage making TB tests, such as the Mantoux test compulsory. Routine tests should be carried out in high density areas like markets, schools e.t.c. In markets, routine tests can be done once a year. At schools and places of employment, TB tests should be made compulsory at 'point of entry' i.e. first year of school or employment. Then the students and the workers should be tested every other year to see if the prevalence and incidence of TB is going down or even spiralling out of control.

Generally, we can say that the studies showed that people could be ignorant of the cause of tuberculosis and as such may not be able to give specific attention to those suffering from the disease. These may adopt alternative such as native medicine until the health condition have worsened before they are presented at the hospital. Hence the likelihood of transmission is already high before the commencement of treatment. Also there could be a high probability of lack of adequate coverage of the population by health workers, especially in relation to screening or contact tracing of persons living with a TB infectious case.

In summary, the key aspects of the conducted survey that could lead to a great improvement in case detection include:

- effective enlightenment or awareness programmes on tuberculosis shown on TV (if possible all TV stations) and featured on radio programmes, use of flyers, posters and billboards to serve as 'vaccine' against TB, for as they say "Knowledge is power",
- actively identifying TB patients with chronic cough lasting more than two weeks,
- making both TB medical tests and treatment free under the federal government TB management policy,
- stepping up screening and contact tracing in places where there are identified TB cases or places where a TB case have died, and
- conducting routine tests in high density areas in the society like markets and schools and conducting the tests at regular intervals in these places.

All of these could go a long way in addressing this very important aspect of tackling tuberculosis in Nigeria: improve on the case detection rate.

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Note

Note 1. Epidemiological studies usually involve the survey of a defined population. This can be grouped as descriptive, analytical or experimental.

Table 1. Results from the Kruskal-Wallis test

Kruskal-Wallis chi-squared	1.4379
Degrees of freedom (df)	4
p-value	0.8376

Table 1 above shows the results from the Krustal-Wallis test performed to compare the categorical responses of the respondents to five questions as discussed in subsection (6.8).

A Comparative Study of Metallothionein Gene Expression in Peripheral Lymphocytes and Blood Cadmium Level among Die Casting Male Workers

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Abstract

Cadmium were found in the die casting factory as by product of zinc alloy that used in the manufacturing of die cast. Metallothionein (MT) a carrier protein plays an important role in the detoxification process of cadmium in human. The usefulness of MT gene expression in peripheral blood lymphocytes (PBLs) as a biomarker of cadmium exposure and susceptibility could be determine by reverse transcriptase–polymerase chain reaction (RT-PCR). 41 male workers from die casting factory were involved in the cross-sectional comparative study and were divided into exposed and comparative group. MT gene expressions were found to proportionates increase with blood cadmium (BCd) levels. MT basal expression levels were significantly correlated with the BCd levels with r-value 0.616 for exposed group and 0.639 for comparative group. MT induction expression level were significant correlated with BCd level ($r = 0.188$ for exposed group, $r = 0.342$ for comparative group). This suggested that MT gene expression in PBLs can be used as a biomarker of susceptibility to cadmium.

Keywords: Metallothionein gene expressions, Blood cadmium, Reverse transcriptase-polymerase chain reaction, Die casting, Male workers

1. Introduction

Casting is a manufacturing process by which a liquid material is usually poured into a mold, which contains a hollow cavity of the desired shapes, then allowed to solidify. The casting process is subdivided into two distinct subgroups: expandable and non-expandable. Die casting is one of the methods in non-expandable mold casting that the mold need not be reformed after each production cycle. It is the process of forcing molten metal under high pressure into mold cavities from non ferrous metals.

Zinc alloy is the major contain in the die casting manufacturing company. Cadmium is one of the heavy metal that contain in the zinc alloy. Cadmium is isolated from zinc alloy by vacuum distillation, or cadmium sulfate is precipitated out of the electrolysis solution in the die casting manufacturing process. Die casting workers were exposed to emitted cadmium in the workplace.

Emitted Cadmium is an extremely toxic metal, particularly where any of it is being processed or smelted (16).The permissible exposure limit (PEL) is five micrograms per cubic meter of air (5 $\mu g/m^3$), calculated as an eight-hour time-weighted average exposure (TWA), overexposures may occur even in situations where trace quantities of cadmium are found in a smelter dust (2).

1.1 Health Effect of cadmium to human body

Cadmium is known as worldwide pollutants. With long half life (10-30 years) and in human body, it poses several adverse health effects (4) (15). Cadmium causes multi organ health effects at molecular, cellular and organ function. Studies have associated chronic occupational exposure to cadmium fumes and dusts with increased risk of chronic obstructive lung disease and emphysema (8). Other respiratory effects of chronic occupational exposure to cadmium include chronic rhinitis, destruction of the olfactory epithelium with subsequent anosmia as well as the development of bronchitis (1) (17). Cadmium exposure also causes renal dysfunction and resorption of cadmium at the anterior part of vertebrate (itai-itai disease) (12). In addition, cadmium has the ability to cause mutation, DNA damage in the form of strand break, disruption the synthesis of Nucleic Acid and protein, DNA mismatch and also expression of the Metallothionein(MT) gene.(6)

1.2 Metallothionein gene expression

Metallothionein gene has its role in the detoxification of toxic metal especially cadmium. The expression of the MT suggesting an indicator of both cadmium exposure and of cadmium caused kidney dysfunction (10). MT is a family of stress proteins with a high content of cysteine and divalent metal. MT genes are ubiquitously expressed in many tissues of basal levels, and their expressions are induced readily by many factors, especially by metal ions such as cadmium, zinc, and copper (9). Studies on the metabolism of cadmium have proven the role of MTs in the absorption, transport, and excretion of heavy metals (5). Thus, MT expression could be specific biomarkers for cadmium exposure in industrial.

MT is synthesized and bind with cadmium in liver on cadmium induction. Cadmium were then entered the hematology system and blood were filtered through the kidney glomerular membrane. In tubular cells, cadmium MT degraded and free cadmium that left in the blood stream will still exert adverse effects because it exceeds the synthetic capacity of tubular cells. (7),(9)(11)(12)(13).

The validity of MT expression in peripheral lymphocytes (PBLs) as a biomarker of cadmium exposure was measured in messenger RNA (mRNA) level in PBLs from cadmium exposed workers using reverse transcriptase–polymerase chain reaction (RT-PCR). Hence, the relationship between blood cadmium and MT gene expression could be determined.

2. Materials and Methods

2.1 Study Design and Study Population

A cross-sectional study involving 41 die casting workers was conducted from 6 May 2009 until 7 October 2009 in a die casting company in Selangor, Malaysia using stratified random sampling methods.

2.2 Socio demographic data collection

Each subject was requested and facilitated by trained interviewer to answer a questionnaire. Personal data, such as incomes, education level, life style including smoking and drinking habits, working experience, and also health status were asked in the questionnaire section. Blood sample were collected in the same day.

2.3 Biological sample analysis

A total 10 ml of fresh blood were drawn from the worker's cubital vein into a lithium heparin vaccutainer. 2ml of blood were used to analyze blood cadmium (BCd) to estimate the occupational uptake exposure of cadmium

using Graphite Furnace Atomic Absorption Spectrometry (GFAAS) by National Institute of Occupational Safety and Health (NIOSH), Malaysia.. Lymphocytes used for MT mRNA level measurement were isolated from the whole blood by using Ficoll-Paque(GE Health Care) and Accuspin tubes (Sigma-Aldrich).

2.4 Culture and treatment of PBLs

PBLs were isolated using Accuspin tubes and Ficoll-Paque from 8 mL of freshly collected vein blood. 15ml of Ficoll-Paque was pipetted into upper chamber of Accuspin tubes and was centrifuged for 1 minute. Whole blood was poured to the Accuspin tubes into the upper chamber of each Accuspin tubes. Lymphocytes were collected at the interface after centrifugation at 2000 rpm for 30 minutes. Lymphocytes were washed twice in phosphate-buffered saline and once in RPMI 1640 (Gibco). Isolated PBLs were then divided into 2 aliquots and incubated in 48 well cell culture plate containing RPMI 1640 supplemented with 20% heat-inactivated fetal bovine serum and 2% penicillin-streptomycin. Cadmium chloride (CdCl2) was added to 1 aliquot to the final concentration of 10 µM from a stock solution, and the same volume of ultra pure water (UPH2O) was added to another aliquot as control. After culture for 6 hours, cells were harvested and total RNA isolated.

2.5 RNA isolation and RT-PCR

Total RNA was isolated from harvested PBLs using QIAamp RNA Blood Mini kit (Qiagen) according to manufacturer's direction. Quantification and integrity of RNA were measured to check the concentration and total of RNA. Absorbences at 260 and 280 nm were measured using formaldehyde agarose gel electrophoresis.

MT mRNA level was measured by using semiquantitative RT-PCR. RT-PCR was performed in a 50 µl reaction mixture containing 10 µl of 5 x buffers, 2 µl of dNTP mix, 0.4 µl of ß-actin primer and 1 µl of MTII primer. (QIAGEN One-step RT-PCR kit). The following RT-PCR cycle was used: Reverse transcriptase in 50°C for 30 minutes, Initial PCR activation step in 95°C for 15 minutes, Denaturing process in 94°C for 30 seconds, Annealing temperature is 60°C for 1 minute and extension for 1 minute in 72°C. These cycles were repeated 30 times. PCR products (15µl) were electrophoresed through 1.3% agarose gel. Gel was stained in ethidium bromide for 10 seconds followed by 10 minutes of destaining. Results were photographed under UV illumination and subjected to densitometer analysis using Image J software. To normalize the difference in efficiency of reverse transcription and cDNA amplification, MT mRNA levels were calculated using the formula below: (density of MTII/198)/ (density of ß-actin/469). MT mRNA level of PBLs cultured with saline represented the basal expression; while MT mRNA level of PBLs treated with CdCl2 represented the MT induction expression.

2.6 PCR primers

Primers specific for MTII and ß-actin were referred from ref. (9) studies. Primers used to amplify MTII (5) were 5'- TCTTCAGCACGCCATGGATC-3' and 5'-CGGATGTCCACGTCACACTT-3'. They yielded a fragment corresponding to 198 bp coding region of MTII gene. Primers for ß-actin (9) were 5'-CGGATGTCCACGTCACAC- TT-3' and 5'-GTTGCTATCCAGGCT- GTGCT-3'. They amplified a 469 bp of ß-actin gene.

2.7 Statistical methods

The database was constructed in a computer using SPSS version 17. Independent T-test was used to analysis the difference of the blood cadmium between exposed and comparative group. The efficiency of MT basal expression and MT induction expression was performed using independent T-test as well. Relationship between MT gene expression and blood cadmium were determine using simple linear regression.

2.8 Ethical considerations

The ethics committee of Faculty Medicine and Health Sciences, University Putra Malaysia approved this study.

3. Results

3.1 Descriptive univariate analysis

3.1.1 Socio demographic data

Mean age for exposed group were 30.32±6.74 and 29±5.89 for comparative group while mean BMI for exposed group were 21.65±2.65 and 23.13±5.76. Statistic analysis showed that there were no significant different between exposed and comparative group in age ($t=0.525$, $p>0.01$) as well as body mass index ($t=0.457$, $p>0.01$).

3.1.2 Blood Cadmium concentration

The mean blood cadmium concentration in exposed group were 0.65±0.11µg/L while 0.31±0.19µg/L in comparative group. There was a significant different of of blood cadmium (BCd) between exposed and comparative group and exposed group had higher level than comparative group with $t = 6.927$, $p\leq0.01$ (Table 1).

3.1.3 RT-PCR analysis

A test was conducted for the sensitivity and specificity of the RT-PCR method. MT-II and ß-actin were amplified in the same reaction tube, enabling subsequent standardization of MT-II quantification. This co-amplification balances the difference of the amount of total RNA used and the difference of efficiency of transcription between reactions. We found that this method can detect MT expression using as little as 0.1 mg of total RNA, and there is no interference between the 2 sets of primers.

The mean MT basal expression was 1.89±0.32 for exposed group and 1.69±0.29 for comparative group while MT induction expression was 2.14±0.41 for exposed group and 2.10±0.49 for comparative group. To investigate which form of expression, ie, basal expression or induced expression, of MT in PBLs will better reflect exposure, we measured both basal and induced MT expression in this study (Table 2). Results show that MT basal expression within exposed and comparative group ($t=1.932$, $p<0.1$) is more reflect than MT induced expression ($t=0.342$, $p>0.1$).

3.2 Bivariate analysis

3.2.1 Relationship between sociodemographic and blood cadmium

There were no significant correlation between age and blood cadmium where $r=0.088$, $p>0.1$ similar for correlation between smoking status and blood cadmium ($r=0.105$, $p>0.1$).

3.2.2 Relationship between MT Gene Expression and Blood Cadmium

To further elucidate the relationship between MT expression and internal dose index, blood cadmium (BCd) was compared between MT gene expressions. It shows a statistically significant increase in both MT basal and induction expression, in relation to BCd. There is a significant correlation between blood cadmium and MT basal expression where $r = 0.616$ $p<0.001$ for exposed group and $r = 0.689$ $p<0.005$ for comparative group. For correlation between MT induction expression and blood cadmium, it show only low correlation and it is not significant result ($r =0.188$ $p=0.368$ for exposed group and $r = 0.342$ $p=0.195$ for comparative group).

4. Discussions

4.1 Respondent Background Data

Forty one respondents participated in this study and categorized into two different groups exposed and comparative. Twenty five workers who work in die casting process were selected as the exposed group (stamping, tumbling, shot blast and flatness). Sixteen workers who are working except in the process listed above were selected as control group. All studied subjects were men between the ages of 21-34 years.

4.2 Metallothionein gene expression

MT mRNA levels in PBLs are related to cadmium exposure, suggesting this measurement could be an indicator of cadmim exposure (9). The reason MT expression is involved in this research is MT induced in human tissues when cadmium is exposed and it also play a role in detoxification of cadmium. Expression of MT gene showed that organism is exposed with cadmium and has adverse effects of cadmium. Most cadmium in blood is found in blood cells, and PBLs provide a good source for measuring MT synthesis.

Ref. (5) experiment that MT basal expression in cadmium exposed workers is significantly higher than non exposed workers. In Ref. (15) studies, in vitro induced MT mRNA levels in PBLs is significantly correlated with cadmium exposure but not MT basal expression. In the previous studies, there is some argument whether basal or induced MT mRNA levels better reflect the cadmium exposure. Hence, in this research, both basal and induced expression was measured. The research indicate basal expression is significantly elevated in exposed group compared with the comparative group ($t=1.932$, $p<0.05$). Induced expression is not significant correlation within exposed and comparative group ($t=0.342$, $p>0.05$). Further analysis showed that MT basal expression is significantly correlated with blood cadmium ($r=0.616$, $p<0.001$ for exposed group and $r = 0.689$, $p<0.005$ for comparative group). Due to cadmium in the blood influences the MT mRNA levels in PBLs, since blood provides the microenvironment in which PBLs exist.

4.3 Blood Cadmium and Associated of Age and Smoking Status

Cadmium concentration is strongly age related, and usually it reaches a plateau at 50 years of age, consonant with an age-related degeneration of kidney reabsorption function (14). Smoking increase whole body cadmium level including blood, urine and renal cortex, (3) since tobacco in cigarettes contain cadmium. Age and smoking status and its correlation with blood cadmium level also included in this research. Particularly, it shows not significant correlation in the fact of this research analysis. One explanation is the age range is too narrow for the

general age effects to be seen (9) as the age group of the workers in the organization who were participated in this research are between 20 and 30 for expose group, and the workers who is over 30 normally were on the control group where exposure were minima. Actually, blood cadmium level in smokers is relatively higher than non smokers although the difference is not statistically significant. It is just that more than two third of the workers in this organization is smokers influence the peculiar result.

5. Conclusion

In conclusion, this study showed that MT basal expression level in PBLs is closely related to cadmium exposure. Hence, study indicated that MT basal expression in PBLs as biomarkers of cadmium exposure. Further studies should be done for environment population with exposure of cadmium in their residential area.

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Table 1. Blood cadmium between exposed and comparative group

Group	n	Blood Cadmium	t	p-value
Exposed	25	0.65±0.11	6.927	0.004
Comparative	16	0.31±0.19		

Table 2. MT gene expression between exposed and comparative group

Group	n	MT basal expression	MT induction expression
Exposed	25	1.89±0.32	2.14±0.41
Comparative	16	1.69±0.29	2.10±0.49

Table 3. MT basal expression between exposed and comparative group

Group	n	MT basal expression	t	p-value
Exposed	25	1.89±0.32	1.932	0.041
Comparative	16	1.69±0.29		

Table 4. MT induction expression between exposed and comparative group

Group	n	MT induction expression	t	p-value
Exposed	25	2.14±0.41	0.342	0.734
Comparative	16	2.10±0.49		

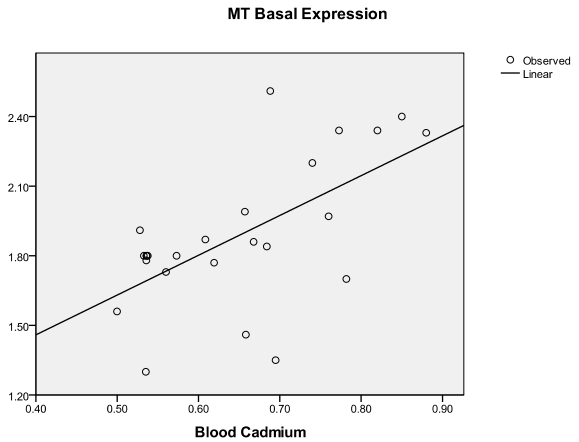

Figure 1. Regression Analysis for MT basal expression and blood cadmium for exposed group

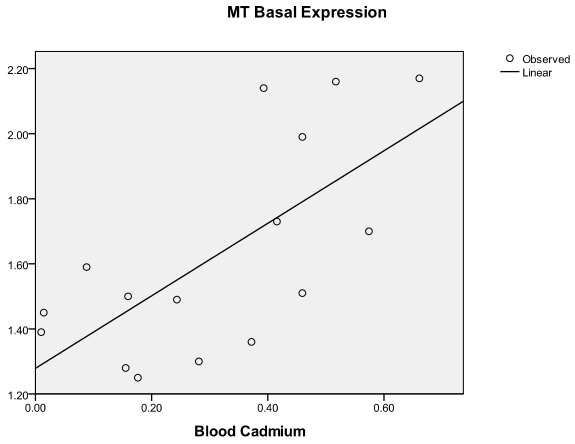

Figure 2. Regression analysis for MT basal expression and blood cadmium for comparative group

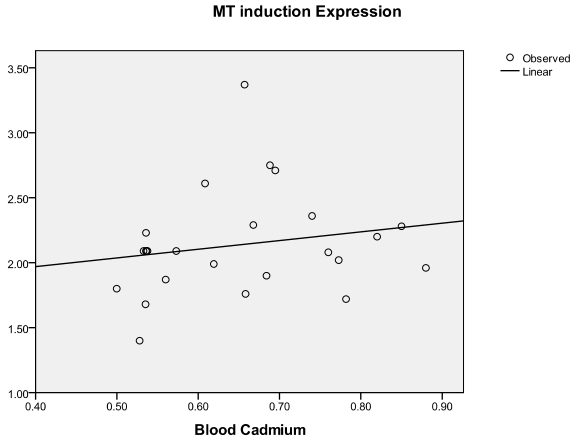

Figure 3. Regression analysis for MT induction expression and blood cadmium for exposed group

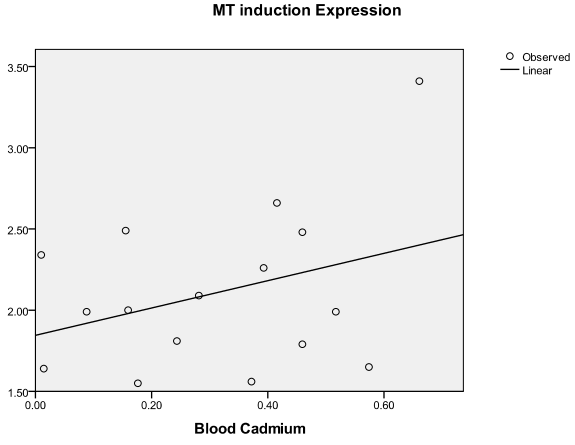

Figure 4. Regression analysis for MT induction expression and blood cadmium for comparative group

Figure 1-4 showed Regression analysis between MT gene expression and Blood Cadmium. It showed significantly correlate with r = 0.616 for exposed group and 0.689 for comparative group for MT basal expression while r =0.188 for exposed group, r=0.342 for comparative group for MT induction expression.

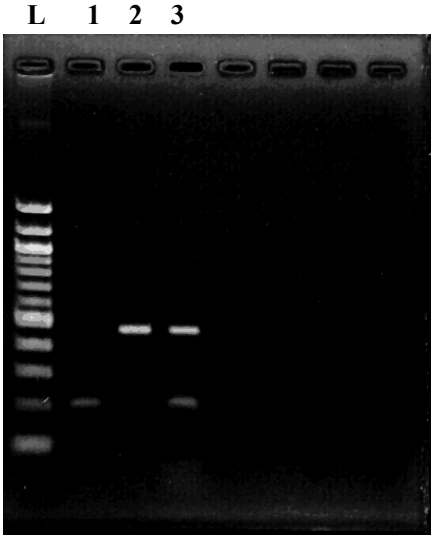

Figure 5. Amplification of MTII and ß-actin. L represented the 100bp DNA ladder (New England Biolabs); Lane 1 represented the MT II primer, Lane 2 represented the ß-actin primer whereas Lane 3 represented the duplex amplification within 2 primers.

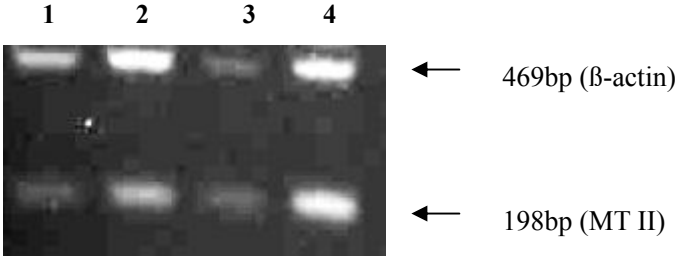

Figure 6. Representative result of a RT-PCR of MTII and ß-actin. This figure showed 2 subjects of respondents. MT mRNA levels in PBLs cultured with saline represented the MT basal expression (lane 1 and 3), whereas MT mRNA level in PBLs treated with $CdCl_2$ represented the MT induction expression (lane 2 and 4)

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Therapeutic Results of Transcutaneous Electrical Nerve Stimulation in Post Laminectomy Syndrome

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Abstract

Objectives & Background: Post-laminectomy syndrome specifically refers to pain associated with symptoms not relieved following laminectomy. This entity is a very disabling and hard to manage problem in patients undergoing spinal procedures. Transcutaneous electrical nerve stimulation has been introduced as a non invasive modality for pain control. This study was aimed to determine the effectiveness of TENS in the management of postlaminectomy syndrome. No similar study has been performed in our country yet.

Materials and Methods: In this study 35 patients among 85 serial cases with post laminectomy syndrome from 2008-2009 were treated by transcutaneous stimulation. Age, sex, duration and type of symptoms, topographical locations, radiological and the results, for pain control were analyzed. Pain degree determined before stimulation and then 2 hours and 48 hours afterwards using visual analog scale.

Results: This study is based on the data from 35 serial patients visited in the senior author's clinic. 60% of the patients were male. The average age of our patients was 49.5 years. The most common location was L4-5 interspace (40%). Average pain score before stimulation was 7 and declined to the mean 5 after 2 hours and to 4 after 48 hours.

Conclusions: According to our study the successful results of transcutaneous stimulation occurred in 17.14 % after 2 hours and 22.8 % after 48 hours. In the management of postlaminectomy syndrome the patients need individualized approaches. Further multicentric clinical trials are needed to generalize the results in these patients.

Keywords: Laminectomy, Syndrome, Pain, Electrical, Stimulation

1. Introduction

Post-laminectomy syndrome specifically refers to pain associated with symptoms not relieved following laminectomy. However, the term often is used more broadly to describe poor outcomes following any type of spinal surgery (1). The classic term laminectomy often is used to describe a partial laminotomy, which is removal of only a portion of the lamina to provide access to a disc herniation. The most frequent surgery preceding a diagnosis of post-laminectomy syndrome is lumbar discectomy (2). Spinal surgery may be performed in patients who do not improve with nonsurgical (conservative) treatment, even though surgical

results are less predictable in the absence of correlation between specific clinical findings and imaging study results. In those cases, decompression may fail to provide relief, and the result is postlaminectomy syndrome (3, 4).

The causes of poor results or failed back surgery syndrome, a term inclusive of postlaminectomy syndrome and persistent pain after other spinal procedures, including spinal fusion, include poor patient selection (i.e., operating when nerve compression did not exist), nerve root injury at the time of surgery, delayed surgery, infection in the disc space or epidural space, unrecognized lateral spinal stenosis or instability, arachnoiditis, and reherniation. Rarely, the first surgery will have been performed on the wrong side or at the wrong level (malpractice). Surgery may have been performed appropriately and the pathology corrected; however, psychosocial factors may contribute to chronic pain that develops after surgery (2, 3).

Transcutaneous electrical nerve stimulation (TENS) is a non-invasive therapeutic modality that was added, more than 30 years ago to existing physical agents used in medicine and physiotherapy for the management of LBP (5,6). TENS units stimulate peripheral nerves via skin surface electrodes at well tolerated intensities and are capable of being self-administered (7).

The development and application of TENS was based on the "Gate Control Theory" conceptualized by Melzack and Wall (8).

The clinical benefit provided by TENS remains controversial. According to the clinical practice guideline developed by the Philadelphia Panel (9), there is poor evidence to support either including or excluding TENS as an intervention for chronic LBP. An earlier systematic review by Van Tulder and colleagues found conflicting results from randomized control trials, concluding that there was no evidence of benefit of TENS for individuals with chronic LBP (10). In contrast, the much earlier Québec Task Force on Spinal Disorders recommended TENS as a rehabilitation modality for symptomatic pain relief, although, in their recommendation, the aim of this systematic review was to determine the effectiveness of TENS in the management of postlaminectomy syndrome (11).

2. Materials and methods

From September 2008 till September 2009, all of the patients with postlaminectomy syndrome after lumbar discectomy who were referred to the pain clinic due to failure of conservative treatment including the use of non steroidal anti-inflammatory drugs, different analgesics, anti-depressive, steroid medications, physiotherapy and hydrotherapy were determined. All of the cases were examined by the neurosurgical team and in all of them lumbosacral MRI w/o gadolinium injection performed to detect cases with recurrence of disc herniation or incomplete neural decompression.

For all the cases dynamic radiographies of the lumbosacral spine performed to rule out instability of the spinal anatomy. The patients with recurrence of disc herniation, compressive neural canal or foraminal stenosis or unstable spinal structures were omitted. Our inclusion criteria were as follows: Stable chronic low back pain or stable chronic lumbo-radicular pain in patients with a pain score according to VAS (Visual Analog Scale) equal or more than 4 and patients followed in pain clinics who accepted and signed the informed consent. Other exclusion criteria were: prior ambulatory TENS practice, metabolic lumbo-radicular pathology, surgery within 3 months before inclusion, acute low back pain or bilateral lumbo-radiculalgia, acute radiculalgia, surgery planned within 6 months, pacemaker and symptomatic low back pain. In the selected patients the age, sex, duration of illness following their laminectomy, signs and symptoms and the level of disc herniation were recorded (12). In all the selected cases transcutaneous electrical nerve stimulation performed and the degree of pain were recorded according to VAS before TENS and the after 2 and 48 hours afterwards. Our indicator of successful treatment was reduction of pain score at least 50% compared to the score before TENS. The protocol of TENS in our patient was conventional with frequency of 40-150 Hz and the applied amplitude was 50-100 μ with low intensity according to the patient tolerance. To determine the effectiveness of treatment we used Z statistical analysis and to determine the role of intervening factors we used $\chi 2$ analysis.

3. Results

This study is based on the clinical data of 33 patients selected from 85 cases with postlaminectomy syndrome referred to the pain clinic from September 2008 to September 2009, according to the inclusion criteria. 14 cases (40%) were female and 21 (60 %) were male. The male to female ratio was 1.5. The average age of our patients was 49.5 $\pm$ 12.5 years (range: 24-65 years). Mean duration of postlaminectomy pain was 4.7 $\pm$ 1.3 years.

The most common location of spinal lesion was L4-5 in 14 cases (40%). In 10 cases the impaired level was L5-S1 (20%), in 4 cases at the level of L3-4 (20%) and in the rest 10% at other levels.

In all our cases the pain score was determined using VAS. Before TENS the average pain score was 7 $\pm$ 2. After performance of transcutaneous nerve stimulation the pain score was recorded in each case. After 2 hours of the mean pain score was 5 $\pm$ 3. The patients discharged from the Hospital and followed up after 48 hours. In the follow- up exam after 48 hours from TENS, the mean pain score was 4 $\pm$ 2. The success criteria defined as more than 50% decrease in the severity of pain. According to this point the successful transcutaneous nerve stimulation occurred in 17.14% after 2 hours and 22.8 % after 48 hours. We also assessed the statistical relevance of intervening factors with the success of treatment but we found no statistically related intervening factor (Table 1). Complication occurred in only one case as skin redness and slight pain at the site of TENS which improved completely with analgesics.

4. Discussion

TENS is a non-invasive, very safe method to reduce pain, both acute and chronic. While controversy exists as to its effectiveness in the treatment of chronic pain, a number of systematic reviews or meta-analyses have confirmed its effectiveness for postoperative pain, osteoarthritis, and chronic musculoskeletal pain (13). Conversely, results from the Bone and Joint Decade 2000 - 2010 Task Force on Neck Pain accumulated data showing no clinically significant benefit to TENS for the treatment of neck pain when compared to sham treatment (14). Recent clinical studies and meta-analysis suggest that using adequate intensity of stimulation is necessary to obtain analgesia with TENS. Basic science studies show that high and low frequency TENS produce their effects by activation of opioid receptors in the central nervous system. Specifically, high frequency TENS activates delta-opioid receptors both in the spinal cord and supraspinally (in the medulla) while low frequency TENS activates mu-opioid receptors both in the spinal cord and supraspinally (15). Further high frequency TENS reduces excitation of central neurons that transmit nociceptive information, reduces release of excitatory neurotransmitters (glutamate) and increases the release of inhibitory neurotransmitters (GABA) in the spinal cord, and activates muscarinic receptors centrally to produce analgesia (in effect, temporarily blocking the pain gate). Low frequency TENS also releases serotonin and activates serotonin receptors in the spinal cord, releases GABA, and activates muscarinic receptors to reduce excitability of nociceptive neurons in the spinal cord (16).The development and application of TENS was based on the Gate Control Theory conceptualized by Melzack and Wall (8) According to this theory, the stimulation of large diameter, (A-beta) primary sensory afferents activates inhibitory interneurons in the substantia gelatinosa of the spinal cord dorsal horn and, thereby, attenuates the transmission of nociceptive signals from small diameter A-delta and C fibers (8). Supraspinal mechanisms involving the endogenous opioid system have also been described (17).

Several types of TENS applications, differing in frequency, amplitude, pulse width and waveform, are used in clinical practice. The two most common application modes include: 1) high frequency or conventional TENS (40 to150 Hz, 50 to 100 millisecond pulse width, low intensity), and 2) low frequency or so called acupuncture-like TENS (1 to 4 Hz, 100 to 400 uses pulse width, high intensity) (17). Conventional TENS is associated with a faster onset and shorter duration of analgesia compared to acupuncture-like TENS (18). However, whether there is a significant difference in clinical effectiveness between high frequency and low frequency modes is unclear and not well defined (19). Indeed, patient preference for, and response to, different stimulation settings may be highly individualized (20). Three other standard modes of TENS include: 1) Brief-Intense TENS (greater than 80Hz, greater than 150 millisecond pulse width, comfortable-tolerable intensity), 2) Burst TENS (bursts of pulses delivered at a low frequency of less than 10 Hz and at a comfortable intensity) and 3)Modulation TENS (one or more stimulation parameters are randomly modulated during therapy). Adverse reactions reported with TENS include skin irritation at the site of electrode placement. TENS is contraindicated in patients with cardiac pacemakers due to the potential of interfering with pacemaker activity (21).

The clinical benefit provided by TENS remains controversial. In a systematic review, Flowerdew and co-workers, found limited evidence for the usefulness of TENS in individuals with chronic LBP, citing the need for more definitive, high quality randomized-controlled studies (22).

The results of trial of Cheing and colleagues showed a significant decrease in subjective pain intensity with active TENS treatment compared to placebo. Pain reduction was progressive over the course of the 60-minute treatment session and then quickly reached a plateau once stimulation ended. The pain reduction seen at the end of stimulation was maintained for the entire 60-minute post-treatment time interval assessed (23).

In comparison, the results of the second trial by Deyo demonstrated no significant differences between active TENS and placebo for any of the outcomes measured, including pain, functional status, range of motion, and use of medical services. In a third of the participants, minor skin irritation occurred at the site of electrode placement. These adverse effects were observed equally in the active TENS and placebo groups. One participant

randomized to placebo TENS developed severe dermatitis four days after beginning therapy and was required to withdraw (24).

In our study we had the similar complication presented as mild redness in one of our cases.

5. Conclusions

Pain is a multidimensional experience that has both peripheral and central substrates (25). Peripheral nociceptor sensitization, dorsal receptor field expansion, and altered central neuromodulation of pain may all play a role in the transition from acute to chronic LBP. It is thought that the neuroregulatory peripheral and central effects of TENS may be more effective with higher intensity applications such as acupuncture-like TENS. The possibility exists that individualized benefits from TENS cannot be precisely captured with small randomized controlled trials. Indeed, individual response to different stimulation settings (frequency, amplitude, pulse width, waveform) may be quite variable (13, 20). Furthermore, particular subgroups with chronic LBP may respond to TENS better than others. LBP has multiple etiologies (26). Refining the definition and classification of chronic LBP and clarifying its underlying pathophysiological mechanisms will help to promote more uniform study populations. While studying the effects of short term TENS therapy is important, understanding the risks and benefits of long-term use is probably more relevant in the management of post laminectomy syndrome.

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Impact of Hiv/Aids Morbidity on Households Economy in Malaysia

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Abstract

Costs to mitigate HIV/AIDS outcomes and information on household socioeconomic impact in Malaysia are very limited, despite their importance to guide key policy decisions. The aim of this study is to identify the economic impact of chronic adult HIV morbidity, specifically to estimate the cost of care from households' perspective. Median out of pocket health expenditure per patient per year is RM1 080 representing 14.7% of patient's median income. (Note 1) Productivity loss due to absenteeism and inability to work were RM 900 and RM10 800 respectively. The overall HIV/AIDS related cost from a household economic perspective proved substantial in this analysis. It reached RM359 million representing 0.06% of Malaysian GDP in 2007. An important policy implication is to ensure proper resource allocation to manage and control HIV/AIDS, more investment on training and to ensure that households can support themselves without jeopardizing the wellbeing and future of other family members.

Keywords: Household socioeconomic impact, HIV/AIDS cost, Productivity loss

1. Introduction

Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) is a major public-health problem worldwide. It affects mostly young people who are at the most productive part of life. Over half of the world's population, 3.2 billion of a total of 6.1 billion, live in the low and middle income countries of the Asia Pacific region. About 8 million adults and children are living with HIV/AIDS and more than a million have died. An estimated US$ 5.1 billion was required to combat this disease in 2007 and that will rise at a cumulative annual rate of 40%. This is substantial and must be faced seriously. (ADB/UNAIDS 2004) [a] Rapid growth has been recorded in special populations such as injecting drug users (IDUs), commercial sex workers (CSWs) and mobile populations. The epidemic could be many times worse if a noticeable transition to the general population was established. (ADB/UNAIDS 2004) [b]

The deterioration of the most productive segment of the population in society has remarkable implications for the economy and social structure of any nation, particularly those countries with single dominant formal industries such as tourism or agriculture. This threat negatively impacts the GNP, export-earning and public-revenue generation, and investment, especially in education. The most immediate effect is the depletion of government resources as substantial funds are diverted to the health sector. Literally it is a global economic challenge and like other South East Asian countries, Malaysia is not beyond the dispute. (UNDP 2005)

The most important component to be examined, in terms of societal economic impact, is HIV/AIDS related out-of- pocket expenditures and productivity loss for patients and households. The WHO reports that in middle-income and low-income economies out-of-pocket spending is often second only to government expenditures in terms of size and share of total health care costs. In the absence of social health insurance, out-of pocket spending varies from one-third and two-thirds of the total health expenditure. Inequalities in financial burdens of the health care system are most likely to appear in out-of-pocket spending (Shengelia 2003). Ronald Horstman. (2007) has shown that from the Latin American and Caribbean Region tried to predict out-of-pocket expenditures on HIV/AIDS on the basis of macro indicators. (Ronald 2007)

These out-of-pocket expenditures can be highly erratic as demand for health care is unpredictable and any significant share of out-of-pocket expenditure can have a disruptive effect on household consumption and ultimately an impoverishing factor. (ADB/UNAIDS 2005)

Productivity loss is a significant component of the societal costs of a disease, beyond that of health care resources. The term productivity costs has been defined as **"**the costs associated with lost or impaired ability to work or engage in leisure activities due to morbidity**"** by the US Panel on Cost-Effectiveness in Health and Medicine. (Pedram 2004)

To assess economic impact of disease, the human capital approach has been widely used. This method estimates productivity losses from illness or injury as measured by income forgone due to morbidity, disability and mortality. (Olufunke 2009)

The importance of productivity loss estimation can be shown in an example of cost-effectiveness analysis of HAART in HIV-infected patients. It has been shown that the inclusion of productivity gains due to improved health status of the patients would substantially increase the economic attractiveness of HAART. (Sendi 1999) When productivity gains were included in a broader societal perspective, HAART was a cost saving strategy; when the analysis was limited to health care costs, the cost-effectiveness ratio was not so high. However, in the South East Asian region, including Malaysia, few data are available about the ability of HIV-infected patients to work, which determines their potential level of productivity and possible associated factors.

Lubeck and Fries, estimated a mean of 25.4 disability days per year for asymptomatic individuals and 123.55disability days per year for people who are symptomatic patients. This study considered reduced productivity due to disability results both from short-term absenteeism and from below-average or suboptimal performance. (Lubeck 1992)

Around the corner in Thailand, a household impact survey involving 116 households with recent experience of an HIV/AIDS-related death in 5 high prevalence districts within Chiangmai province in northern Thailand. Key findings included: "The loss of income from the diseased family member was found to be largest part of the economic costs of an HIV/AIDs related death and HIV/AIDS medical costs were approximately six months of average total household income. Direct and indirect costs associated with HIV/ AIDS deaths were more substantial than non HIV/AIDS deaths within the groups surveyed". (Sukhontha 2001)

Patients who were once considered permanently disabled or in a terminal phase of AIDS are now experiencing remarkable improvements in health and may be able to remain at work or return to work after periods of illness. Although the inclusion of lost productivity will remain an important factor in assessing the impact of HIV infection, it may become less dominant. (C. Daniel 2000)

Malaysia is home to one of the fastest growing AIDS epidemics in the East Asia and Pacific region. Between the first detected case in 1986 and 2008, 84,630 infected cases were registered, with 0.5% prevalence among the age-group 15-49 years. Some women and children have been notified that they are infected with HIV; while 11,234 have died of AIDS. (MOH 2009)

In most of the countries of the region, the epidemic has not entered the broader community, so its effects are unlikely to be evident in many national indicators such as macro-economic growth, or in the business and education sectors. However, social and economic impact of the disease starts from the individual level, then through household into the country's economy.

Evidence based on research in the area of HIV/AIDS socio economic impact is desperately needed for better resource mobilization, advocating acting partners, as well as for enforcing policies and implementing care and support programs.

This study aimed to estimate the economic impact of chronic adult HIV morbidity on households and examine how they cope with the situation by measuring patients spending on HIV/AIDS care, along with productivity losses. It tries to identify characteristics that may influence patient productivity changes and explore the implications of the findings for policies to mitigate the impact of HIV/AIDS on households and communities.

A household is defined as person or persons who have made arrangements, individually or in groups, for providing themselves with food and other essentials within the same living quarters for more than 16 days. (Department of statistics Malaysia 2007)

2. Methodology

This study is cross-sectional in nature, and included 300 patients between 18 to 56 years of age. The country was stratified into four zones, namely the North Coast, South Coast, East Coast and West Malaysia, represented by the states of Kedah, Johor, Kelantan, and Selangor respectively. Figure (1) The selection of states and number of participants from each state was according to the geographical distribution of infection, the density of infected population, and forms of economic activities in the area, as per HIV/AIDS surveillance data up to the year 2007. Figure (1)

It is claimed by HIV/AIDS specialists that more than 90% of the states' HIV/AIDS cases are channeled to referral hospitals because of free treatment availability, counseling and HIV /AIDS specialist's follow-up services. Respondents have been selected from outpatient HIV/AIDS clinics.

According to latest statistics of reported HIV infections and AIDS 2001-2007 in the selected states, the required sample of patients was apportioned based on the density of cases in each zone. 40 patients were selected from Hospital Sultanah Bahiyah- Kedah, 100 patients form Hospital Sultanah Aminah- Johor, 60 patients from Hospital Raja Perempuan Zainab II- Kelantan, and 100 patients from Sungai Buloh Hospitals-Selangor, using a systematic random sampling method. About 3 - 8 patients a week were studied for a period of 5 months because HIV/AIDS patients should follow up with the clinic every 3 to 4 months. The selection of respondents was adjusted by gender and ethnicity. Excluded were those who had the disease less than one year, those below 18 and above 56 years old, and non Malaysians.

Respondents have gone through detailed interviews using a structured questionnaire designed for this study. Out of pocket expenditure was quantified by finding patients' spending on transportation, fees for services, medication, traditional medicine and other expenses.

Measuring productivity loss in this population was based on patients' inability to work and days of absenteeism for those still working. Median monthly income before contracting the infection was used as a benchmark.

Although we conducted the interview with patients but, we consider this study is household perspective study because our objective was centralized around patient him/her self, assuming patient is fully aware of the economic changes in the household. Nevertheless, the findings from this study should be considered with some limitations; such as the cost of careers who provide home based care was not estimated.

This study was started in August 2007, collecting retrospectively six months data only from the respondents in order to minimize possible recall bias.

Data is descriptively presented by using spss statistical program. Factors associated with ability to work were analyzed in a multivariate ordinary logistic regression (proportional odds) model.

Training for the interviewers, single administration of data and involving counselors from each state were strictly adhered to in order to insure reliability of our tool.

3. Results

3.1 Socio demographic impact

The respondents were selected to reflect the main Ethnic groups (Malay, Chinese and Indian) as well as male to female ratio, with slightly more female respondents in order to better reflect the socioeconomic impact on females' life in this country. Table (1)

Household headed by fathers were about 56.9 %, the rest were headed by mothers, elder brothers or sisters or grandparents. More patients were from households headed by non fathers than those from traditional families. When infected fathers were excluded, Fisher's Exact Test showed the difference was statistically significant ($P< 0.001$ df (1) for n=297). Table (2)

Comparing the marital status before and after the detection of disease showed over 13% of married couples got divorced. When patients CD4 count fell below200 cells/mm^3 and some of them developed AIDS, the divorce rate increased to one third of all married patients.

The mean number of children for married, widowed or divorced patients (**61.7%** of the total number of respondents) is 2.09 children ± 1.57 ranged between 1to8 children per patient. The 2.09 children per patient are vulnerable to becoming orphans. Figure (2)

It is very obvious that HIV is hitting almost every single possible occupation and no career is isolated. Table (3) The disease is seriously threatening the transition from risk groups such as unemployed people and sex workers into normal population. The percentage of infected salesmen, laborers, managers, unemployed as well as mobile workers is alarming. (Note 2)

This study showed that the Median No. of infected patient in one household is 1patient, with the range the of between 1 to 5 patients under the same roof. This profoundly affected household income and expenditure which resulted in not having enough money for necessities. To mitigate the high expenditure of the affected household income; food, quality of accommodation, qualifying plans and entertainment are respectively affected.

Rural/urban distribution and internal migration such as moving from urban to rural, or the other way around, because of the disease was also investigated as a potential source of economic loss. However it was not noticeable and the ratio remains similar 52:43 Urban to Rural before and after detection. It was observed though that some ran away from their families to stay alone or with friends.

3.2 Cost of HIV/AIDS from household perspective

3.2.1 Direct cost (out of pocket expenditure)

The total estimated median of "out of pocket expenditure" per year is RM **1 080** (500 – 16480) which is almost 14.7% of patient's median income, without considering the income change due to productivity loss. The above mentioned out of pocket expenditure for HIV/AIDS would seem vividly higher if we compare it with RM 192 that the average household spends on health according to Malaysian national statistics for 2007. (Department of statistics Malaysia 2007) Patients were asked to list down their out of pocket expenditures related to HIV/AID in the past six months. In addition to cost of transportation and hospital charges the major cost components in out of pocket expenditure were on health food supplements and traditional medicine which reflects clearly that there is a lack of knowledge in this particular area and therefore needs the counselors to pay more attention.

The difference in terms of out of pocket expenditure between working status groups was only in the range of ± RM 40 and ANOVA showed that the difference between groups (currently working, currently not working, not working before and after) Figure (4) was not statically significant, which means even those non working groups are also maintaining the average expenditure from various sources.

The most influential factors associated with increasing out of pocket expenditure were; gender, age, working status, income per month, and latest CD4 count. Interestingly, only CD4 appears to be statistically significant associated. ANCOVA has been used to control other factors while examining the association between out of pocket expenditure and CD4 count as shown in the following table. Table (3) (Note 3)

3.2.2 Second: Indirect cost (Productivity Loss)

In Malaysia majority of the cases contracted the disease through IVDU, the misperception among the public that HIV/AIDS affected community is not economically productive, therefore the economic impact of HIV/AIDS should not be a countable matter.

This study demonstrated that 41.1 % of the patients were heading their households. The overall working status for all the participants are presented in Figure No.5 that implies, only 15.5% were economically non-active as they were not working before and after the infection was detected. Whereas 46.5% are still working and 35.7% have (or has been) stopped working due to HIV/AIDS. Figure (4)

It is clearly shown that health related reasons for stopping work is 73% for those patients who stop working due to the infection, whereas it represent only 41% in the non economically productive group (not working before and after the detection). Figure (5)

It is featured that the respondent's median income per month was around RM 900 in healthy-life period. Therefore HIV/AIDS was negatively impact on their productivity and then household income due to cassation of work or increased median number of days of absenteeism to 20 days a year due to attending clinic, admitted to ward and staying home because of illness. Table (4) The estimated median annual productivity loss per patient was RM 10800 for those who have totally stopped working and RM 900 the cost of absenteeism for those who are still working. This would correspond to a total productivity loss calculated on national level from the following formula:

Total estimated productivity loss in RM = N×46.5/100×900 + N×35.7/100×10800

= RM 287,364,839.4 per year

N: = 67,234 The number of registered HIV/AIDS Patients, excluding deaths up to 2006 and new cases in 2007. (80,938 – (10,334 -1,179) – 4,549 = **67,234**)

46.5/100: The percentage of working patients

900 RM: The Median cost of absenteeism a year (Note 4)

35.7/100: The percentage of patients who stop working

10800 RM: The Median cost of stop working a year

Sources: AIDS/STI Unit, Ministry of Health & Resource Center. Malaysian AIDS Council end of 2007.

It estimated that HIV/AIDS households in the country are losing **46.8 %** of the total income due to HIV/AIDS morbidity and the related inability to work or absenteeism from work. The total estimated income a year for all HIV/AIDS patients (excluding those non productive patients (15.5%) is **RM 613,577,484** while total estimated loss of productivity is **RM 287,364,839.4.** The percentage of unemployment among PLWHA before HIV detection was **15.5%**; after detection it rose to **51.2%**.

Factors such as knowledge about HIV/AIDS and being forced to quit a job showed no statistical significant association when tested against the ability to work. On the other hand, statistical significant associations were found between the mode of transmission, latest CD4 count and HIV treatment status, according to the model presented in Table (5). Model fitting test LR showed sig. < 0.001 at df =30 which means that the variables in the model contribute considerably.

The national estimated cost of HIV/AIDS from a household perspective is:

OOP_{exp} + PL = 72,612,720.00 + 287,364,839.40 = **359,977,559.4**

OOP is: Out of Pocket expenditure per patient estimation for the year 2007

PL is: Productivity loss due to absenteeism and stopping work due to HIV/AIDS related reason

4. Discussion

Out of pocket health expenditure is found to be relatively high, although it is known to us that health care services in Malaysia are heavily subsidized by the government. Unfortunately it was shown that much is spent on health food supplements and traditional medicine which reflects a clear lack of knowledge concerning treatment and the need to focus on counseling, not only to avoid cost escalation, but also to prevent its possible side effects and interference with their ARV regimen.

HIV/AIDS related debt was hard to assess. Our respondents were sensitive in sharing the details of their personal finance, although it was very clear in many individual cases as well as the overall average, expenditures related to HIV/AIDS were exceeding their income. Household members might have borrowed money for daily necessities and health care, others tended to consume their savings or sell assets. In a study conducted by Sukhontha in Thailand, she found that for the household to cope with HIV illness, it used whatever savings available, sold their assets, cut their consumption and obtained support from extended family members. Various strategies were used to maintain family productivity including increasing family members' workload, hiring laborers and withdrawal of children (especially girls) from school. (Sukhontha 2006)

Productivity loss was the main influence on household income through PLWHA job losses or absence from work. The number of children who are vulnerable to becoming orphans are also apt to quit education system and enter early child hood employment. Therefore the free medical and financial support for the needy should use multi dimensional selection criteria to reach the poorest section of households with PLWH. It is important also to identify methods to increase coverage for these vulnerable groups.

Our findings suggest that resource-allocation decision makers would benefit from improved understanding of the full economic impact of chronic disease. This highlights the fact that in medical decision-making, whenever possible, both direct and indirect costs should be considered to visualize the economic consequences for specific intervention.

Analyzing the key components of high out of pocket expenditure is proposing more investment in training for health care counselors should be given priority on the other hand we should think seriously of better risk pooling mechanisms as financial systems to bring down the share of out of pocket expenditures and to prevent catastrophic impact of increased costs; higher public contribution should be maintained.

5. Conclusions

This paper highlighted how chronic HIV morbidity impacts household income. It has illustrated substantial consequences on household labor supply and family income. It shows a 0.06 % loss of Malaysian GDP as a direct and indirect outcome of HIV/AIDS. Other family member's productivity loss was not included in this analysis.

This study has important policy implications concerning households with PLWH and the need to support themselves and meet their medical care expenses without jeopardizing the wellbeing and future of other family members.

6. Recommendations

A form for socioeconomic impact monitoring needs to be used for HIV/AIDS patients while they are having their regular follow up visits to health care facilities. It will help:

To monitor changes accurately

To enhance the relationship with health care service providers and increase treatment adherence

To facilitate social support services to be directed to the needy.

To possibly help in protecting patients from serious psychological disorders.

This study could help risk groups as well as the young adults in general to be more aware of disease consequences. Families and communities should understand their social responsibility as HIV impacts negatively on the whole community rather than the individual punishment. This understanding will help community members to modify their behavior toward HIV patients and their families as a part of a commitment to create a safer community. It could be the first step to minimize stigma attached to HIV/AIDS and to reduce anxiety and fear.

Proper counseling for partners and household members is equally as important as patients' counseling. It should be regular and ongoing in order to avoid multiple psycho-socio-economic complications.

Further research is needed to estimate the cost of productivity loss to employers, including diminished quality of work, sick leave, health insurance premiums, and other frictional costs incurred by employers (e.g., hiring and training temporary employees).

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Source of Maps:

FULL GOSPEL BUSINESS MEN'S FELLOWSHIP, MALAYSIA 2009. Type: 220KB JPG, Size: 460 × 272, Source: www.fgb.com.my/History.html, sited in 6-2009

Notes

Note 1. 1 RM = 0.291 USD (Bank Negara 2010)

Note 2. Mobile workers include (drivers, fisherman, reporters, tour guides and ethnic dancer.

Note 3. Based on Table 2

a. Adjusted mean using ANCOVA controlling for age, gender, monthly income and working statues (Sig. difference between group (1) & (3) P value <0.023 (71.9 – 1570.9))

b. Bonferroni adjustment for 95% confidence interval for difference (pair wise comparisons)

d. Assumptions: form leven's test and plotting residuals vs predicted; Overall model fitness and groups equal variance was checked. Plotting Residual vs each covariate showed non linearity with covariates. Finally normality was clearly shown by drawing the histogram although in this scenario while sample size is more than 30, normality tend to be not an issue. Patients representing various severity stages of the disease based on CD4 count were normally distributed.

Note 4. Cost per day for those working patients in RM has been calculated by dividing total income a month by 20 working days a month (excluding weekends and public holidays) to estimate the cost of each day of absenteeism.

Table 1. Describing the socio demographic characteristics of our respondents

Demographic feacher **(N= 297)***	Sample charactristics						
Age	≤24	25 – 45	46≥	Total			
	2.0 %	79.1%	18.9%	100.0%			
Religion	Muslims	Buddhists	Christians	Hindus	others	Total	
	71.0	18.2	4.7	5.4	0.7	100%	
Position in the household	Alone	Brother/ Sister	son/daughter	Father	Mother	Others	Total
	4.0%	9.8%	29.0 %	24.9%	24.2 %	8.1 %	100%
House hold head	Father	Others					
	56.9 %	43.1 %					
Marital status	Married	Never Married	Un married couples	Divorced	Widowed		
	35.4%	38.4%	1.0%	6.4%	17.2%		
Sexual orientation	Heterosexual	Homosexual	Bisexual				
	72.1	12.8	6.7				
Education level	Higher Edu.	Secondary school level	Primary school level	no formal Edu.			
	7.7	67.0	17.5	7.7			
Mode of transmission	Needle sh.	Needle sh. & Sexual act.	Sexual act.	Others			
	34%	7.4	52.9	5.4			
Urban/Rural	Urban	Rural					
	52%	43%					

*(N= 300, 3are missing cases, the total cases including in the analysis = 297)

Table 2. Of patients from households headed by father vs. headed by others

Household headship	**Infected father**	**others infected**	**Total**
Headed by father	60	**109 (42%)**	169
Headed by others	3	**125 (37%)**	128
Total	63	234	297

χ^2(1, n =297) = 47.9, p <0.0001

Table 3. Out of pocket expenditure vs. severity level using CD4 count indicator

CD4 count	n	Adjusted Mean (95% CI)a	Adjusted mean diff.(95 CI)b	F test a (df)	P value a
< 200 (1)	90	2100	P value <0.023 (71.9 – 1570.9)	4.6 (3, 283)	0.003
201-500 (2)	121	1455			
500 < (3)	86	1279			

Table 4. Estimated cost of absenteeism and stopping work per year

Description	Mean	Median	Minimum	Maximum
Income/Month before (RM)	1079	900	200	4400
No. of Days of absenteeism/ 6 months	11	10	2	60
*Cost per Day (RM)	56.61	45	10	220
Total productivity loss a year due to absenteeism per patient	1245.42	900	90	14700
Total productivity loss a year due to stopping work per patient	12155.84	10800	2400	44400

Table 5. Factors Associated with Ability to work after HIV/AIDS detection

Variable (n=297)	Adj. O R	(95% CI OR)a	χ^2 stat (df)	P value a
Mode of transmission			17.076 (6)	0.009
- needle sharing	3.569	(1.750-7.280)		< 0.001
- needle sharing& Sexual	3.431	(1.105-10.649)		< 0.001
- others	.580	(.112-3.012)		< 0.517
- sexual	0	-		-
CD4 count			24.820 (6)	< 0.001
<200	5.604	(2.149-14.618)		< 0.001
201-500	1.29	(0.536-3.128)		< 0.565
500>	-	-		
HIV treatment			7.464 (2)	0.024
No	2.6285	(1.303-5.300)		0.007
Yes	-	-		
Gender			21.827 (4)	< 0.001
0 Female	1.928	(0.850-4.374)		
1 Male	.982	(.982-.982)		

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Figure 1. Map of Malaysia

Source: FGBMF Malaysia 2009

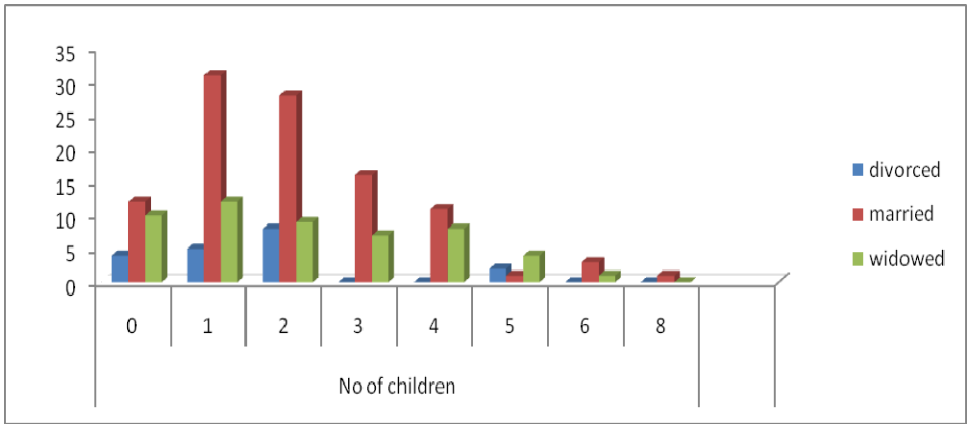

Figure 2. No. of children per married HIV/AIDS patient

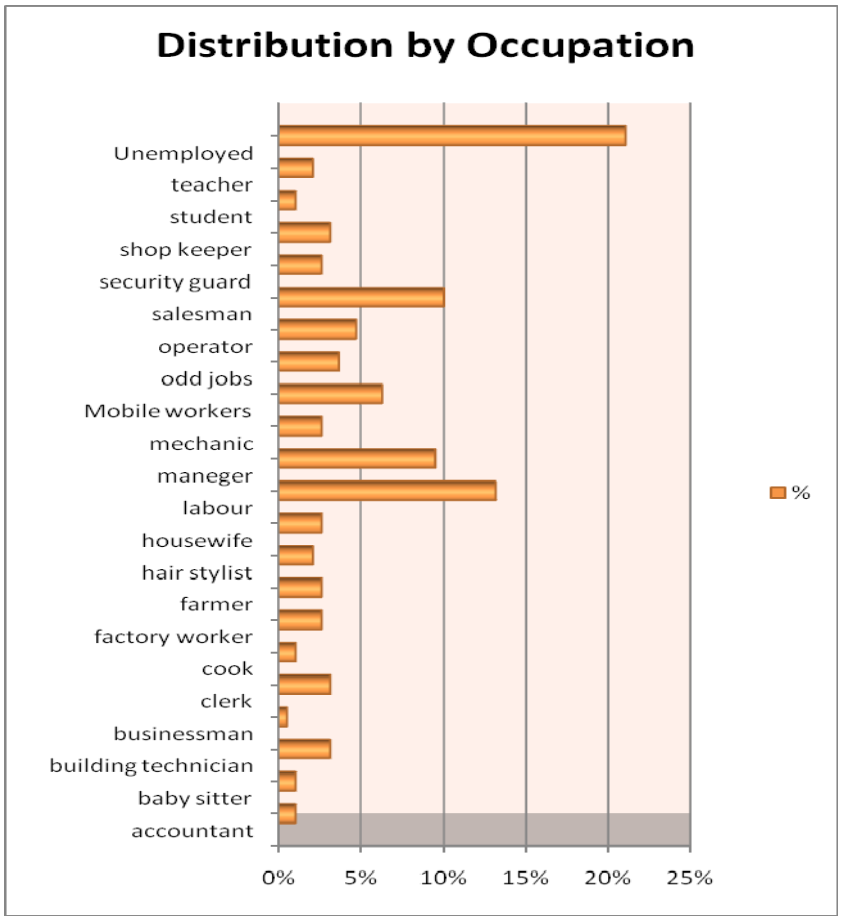

Figure 3. Respondents distribution by occupations

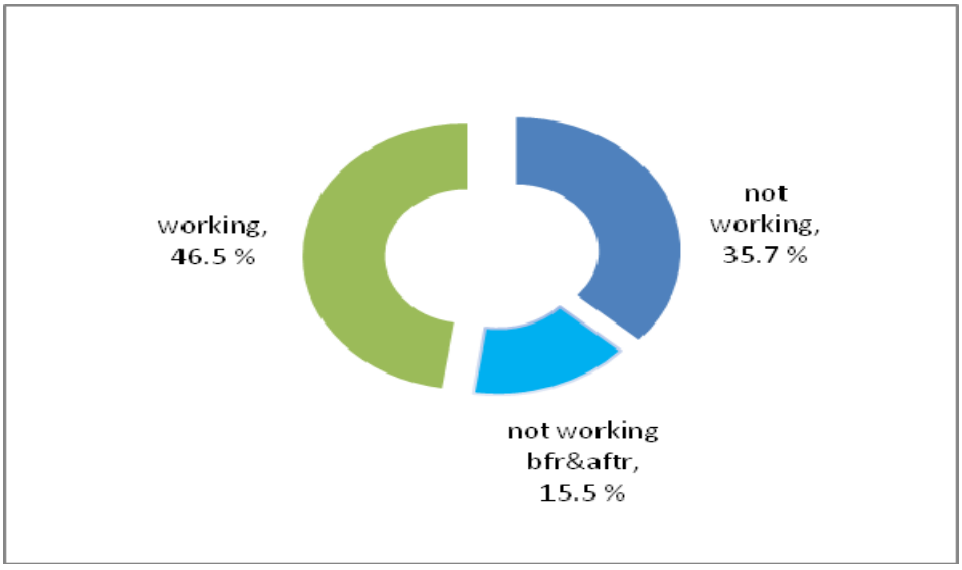

Figure 4. Distribution of patient's as per current working statues

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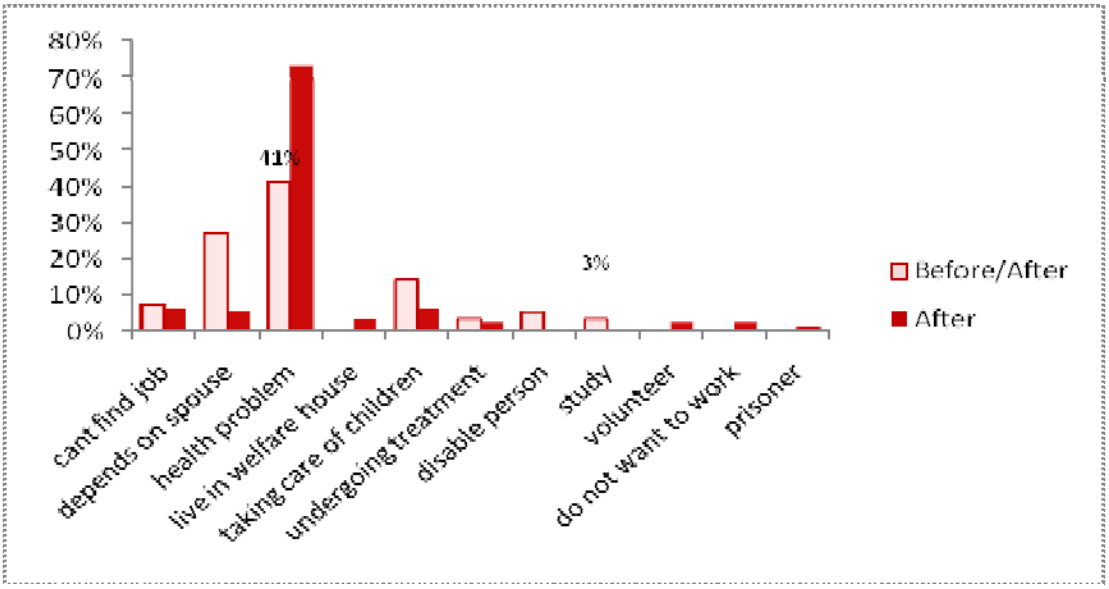

Figure 5. Comparing reasons of not working between the two categories; those not working before and after vs. not working after the detection

Sex Differences in the Impact of Body Mass Index (BMI) and Waist /Hip (W/H) Ratio on Patients with Metabolic Risk Factors in Baghdad

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Abstract

The aim of the study: is to evaluate the impact of sex as variable in measuring waist / hip ratio as risk factor predictor in patients with metabolic disease. ***Methodology:*** A longitudinal cross sectional study conducted on 234 patients with metabolic syndrome during 6 months duration, demographic data like Age and gender were recorded for each patient, other measures like waist circumference, hip circumference, height, weight, according to standards, & body mass index & waist/ hip ratio also calculated, blood tests including fasting blood sugar, lipid profile were also measured to the sample.

Statistical analysis: Data were analyzed using descriptive statistics (frequencies and percentages) and analytic statistics (person correlation two ways (ANOVA) by SPSS, version 11. $P < 0.05$ was considered statistically significant***. Results:*** the mean age for male was 45.73(±7.83) years, while for female was 46.92(±7.83) years, There was significant difference with W/H ratio 0.007 (-0.05 to -0.008) for both sexes. (91.03%) of the total sample were having Diabetes mellitus&, (63.25%) of the sample were having hypertension Most of the participants (85.74%) had no physical activity. A positive correlation was obtained between W/H ratio & BMI, FBS, TG &HDL in male participants. the mean of W/H ratio in both gender as cross classified with Physical Exercise, were the difference in mean is significantly associated ***Conclusion:*** WHR was significantly associated with the risk of incident CVD events. These simple measures of abdominal obesity should be incorporated into CVD risk assessments

Keywords: BMI (body mass index), W/H ratio (waist/ hip ratio), WC (waist circumference), HC (hip circumference) Metabolic syndrome

1. Introduction

Metabolic syndrome is a combination of medical disorders that increase the risk of developing cardiovascular disease and diabetes.[Medline Plus] It affects one in five people, and prevalence increases with age. The exact mechanisms of the complex pathways of metabolic syndrome are not yet completely known. The pathophysiology is extremely complex and has been only partially elucidated. Most patients are older, obese, sedentary, and have a degree of insulin resistance. The most important factors in order are; weight, genetics[Pollex, 2006][Poulsen, P., 2001][Leif, 2000][Bouchard, 1995], aging, and Sedentary lifestyle, i.e., low physical activity and excess caloric intake[Katzmaryk, 2003].

Central adiposity is a key feature of the syndrome, reflecting the fact that the syndrome's prevalence is driven by the strong relationship between waist circumference and increasing adiposity. However, despite the importance of obesity, patients that are of normal weight may also be insulin-resistant and have the syndrome.[Fauci, 2008]

The metabolic syndrome has been associated with several obesity-related disorders including fatty liver disease, chronic renal disease, polycystic ovarian syndrome, obstructive sleep apnea, and increase risk of cognitive decline and dementia.[Grundy SM, 2004]

Physical inactivity is a predictor of CVD events and related mortality. Many components of the metabolic syndrome are associated with a sedentary lifestyle, including increased adipose tissue (predominantly central); reduced HDL cholesterol; and a trend toward increased triglycerides, blood pressure, and glucose in the genetically susceptible. Compared with individuals who watched television or videos or used their computer for more less one hour daily, those that carried out these behaviors for greater than four hours daily have a twofold increased risk of the metabolic syndrome.[Fauci, 2008]

The metabolic syndrome affects 44% of the U.S. population older than age 50. A greater percentage of women older than age 50 have the syndrome than men. The age dependency of the syndrome's prevalence is seen in most populations around the world.[Lara-Castro C, 2007]

It is estimated that the large majority (~75%) of patients with type 2 diabetes or impaired glucose tolerance (IGT) have the metabolic syndrome. The presence of the metabolic syndrome in these populations is associated with a higher prevalence of CVD than found in patients with type 2 diabetes or IGT without the syndrome[Fauci, 2008] Hypoadiponectinemia has been shown to increase insulin resistance[Fauci, 2008], and is considered to be a risk factor for developing metabolic syndrome.[Renaldi O, 2009]

The approximate prevalence of the metabolic syndrome in patients with coronary heart disease (CHD) is 50%, with a prevalence of 37% in patients with premature coronary artery disease (age 45), particularly in women. With appropriate cardiac rehabilitation and changes in lifestyle (e.g., nutrition, physical activity, weight reduction, and, in some cases, Drugs), the prevalence of the syndrome can be reduced.[Fauci, 2008]

Lipo dystrophic disorders in general are associated with the metabolic syndrome. Both genetic (e.g., Berardinelli-Seip congenital lip dystrophy, Dunnigan familial partial lipodystrophy) and acquired (e.g., HIV-related lipodystrophy in patients treated with highly active antiretroviral therapy) forms of lipodystrophy may give rise to severe insulin resistance and many of the metabolic syndrome's components.[Fauci, 2008]

Body mass index (BMI) is an index widely used to define obesity. The World Health Organization (WHO) sets a BMI range of 18.5–24.99 kg/m2 as normal [Renaldi O, 2009]. Although Asians constitute a large proportion of the world's population, the majority of Asians, including the Japanese, are not clearly obese according to the WHO classification, [WHO., 2000; Yoshiike Y, 1990-1994]despite rapid westernization of lifestyles and a corresponding increase in metabolic risks.

BMI does not always accurately indicate the degree of fatness. [de Onis M, 1996] An increasing number of papers indicate that the degree of central fat distribution may be more closely tied to metabolic risks than BMI [Smalley KJ, 1990; Blair D, 1984; Kaplan NM., 1989] Measurement of the degree of central fat distribution thus appears to be important for the early detection of subsequent health risks, even among those of normal weight. [Deprés JP, 1991; Hsieh SD, 1995; Ruderman N, 1998]

The criteria for waist circumference proposed by WHO (midpoint between the lower border of the rib cage and the iliac crest) were based on studies of Caucasians, who generally have a higher BMI than many other ethnic groups. [Renaldi O, 2009] Also stating that obese individuals whose waist circumference (umbilical level) was 85 cm (men) or 90 cm (women) faced a higher risk of visceral fat accumulation. [Hsieh SD, 2000]

Several reports from Asia indicate that waist-to-height ratio (W/Ht) corresponds better to metabolic risk than BMI, waist circumference, waist-to-hip ratio, or skin fold measures[Japan Society for the Study of Obesity, 2000] There are also reports that the cutoff value for W/Ht (0.5) appears to offer a simple but effective index for identifying overweight individuals and those of normal weight who face higher risks,[Hsieh SD, 1995; Lee JS, 1995; Hsieh SD, 1996; Hsia HH, 2001]

2. Patients & Methods

This is a longitudinal cross sectional study conducted on 234 patients with metabolic syndrome, for the period from the 15 of November to 30 of April, 2010. Participants for the study group were recruited from The Specialized Center for Endocrinology & Diabetes(at Al-Rusafa sector) and The National Center for Treatment & Research of Diabetes in Al-Mustanseria College of Medicine (at Al-Karkh sector)- Baghdad. These two centers are the referral points for diabetic patients in Baghdad.

Patients included were diagnosed to have metabolic syndrome by specialists in both centers. Age and gender were recorded for each patient; height was calculated from the anthropometric measurements standing height measurement (CMS weighing equipment LTD, England).The patient stood shoeless with the heels and back in contact with the vertical column of the scale. Weight measurement was done by digitalweightscale(Seca, Australia).Before each measurement the digital scale was adjusted to zero, the patient was asked to take-off his or her shoes and jackets before weighing, and the weight was taken to the nearest fraction of Kg (to the closest 0.1 Kg).

Body mass index (BMI) was calculated as weight (kg) divided by height squared (meter2) and was used as the criteria for diagnosis of overweight and obesity. Participants were divided into 3 groups: normal weight (BMI < 25 kg/m2), overweight (25 kg/m2 ≤ BMI < 30 kg/m2) and obese (BMI ≥ 30 kg/m2) (27).

2.1 Standards used to collect patients indices

Waist circumference: measured on a horizontal plane 1cm above the iliac crest. The cutoff point is: > 94 cm (male), 80 cm (female). [Victor RG, 2004]

Hip circumference: measure the widest circumference of the buttocks at the area of the greater trochanters. The cutoff point of W / H ratio: > 0.9 (male), > 0.85 (female).The cutoff point of W / Ht ratio is: 0.5. [Hsieh SD, 1995; Hsieh SD, 2000; Hsia HH, 2001]

The cutoff point of BMI is 25 to 34.9.

2.2 Diabetes mellitus definition

Raised fasting plasma glucose :(FPG)>100 mg/dL (5.6 mmol/L).Or previously diagnosed type 2 diabetes. If FPG >5.6 mmol/L or 100 mg/dL, OGTT Glucose tolerance test is strongly recommended but is not necessary to define presence of the Syndrome. [IDF, 2006]

2.3 Dyslipedemia

Raised triglycerides: > 150 mg/dL (1.7 mmol/L), or specific treatment for this lipid abnormality. Reduced HDL cholesterol: < 40 mg/dL (1.03 mmol/L) in males, < 50 mg/dL (1.29 mmol/L) in females, or specific treatment for this lipid abnormality.[32]

2.4 Blood pressure:

Was measured and evaluated using a mercury sphygmomanometer and a standard clinical protocol according to the Joint National Committee (JNC-VII) report. After 10 minutes of resting, two readings of the systolic and diastolic BP separated by 5 minutes were averaged to the nearest 2 mmHg from the top of the mercury meniscus. Systolic BP was recorded at the first appearance of sounds, and diastolic BP at phase V at the disappearance of sounds. Hypertension was defined as systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg. The validity of the weight scales and sphygmomanometers was censured by calibration prior to their use [Chobanian AV, 2003].

3. Statistical Analysis

Data were analyzed using descriptive statistics (frequencies and percentages) and analytic statistics (person correlation two ways ANOVA) by SPSS, version 11.P < 0.05 was considered statistically significant [Girerd X, 2008], [Chronic Non, 2006].

4. Results

1- The studied sample consist of 234, with 125 male participants and 109 female, the mean age for male was 45.73(±7.83) years, while for female was 46.92(±7.83) years. The BMI mean was nearly the same for both sexes and showed no significant difference, but this difference was significant with W/H ratio 0.007 (-0.05 to -0.008).this is clearly shown in table 1.

2- About(91.03%)of the total sample were having Diabetes mellitus(DM) with nearly similar percentage of male & female,(63.25%)of the sample were having hypertension, (66.40%)were male &(59.63%)were female, as for hyperlipedemia nearly(83%)of the sample were suffuring from elevated serum cholesterol level, 2/3 (74.36%)were having elevated triglycerides(table 2).Most of the participants (85.74%) have no physical activity, while (49.15%) of them had family history of hypertension &diabetes mellitus.

3-There was a positive correlation between BMI &age, WC, HC, W/H ratio, FBS, TG, and HDL, while there was a negative correlation between BMI & cholesterol, diastolic &systolic blood pressure in male participants. Similar result was obtained with female participants in except for negative correlation of BMI with TG.(Table 3)

4- A positive correlation was obtained between W/H ratio & BMI, FBS, TG &HDL, while negative correlation was found with age, cholesterol, systolic& diastolic blood presser in male participants. Similar result was obtained for female participants except for the negative correlation of W/H ratio with FBS. (Table 5)

5-Regarding the mean of BMI in both gender as cross classified DM,HT, Cholestrol, TG, HDL, PE, FH(HT/DM)

Two way ANOVA only, reviled no statistical association (table 4).

Similar result was obtained regarding the mean of W/H ratio in both gender as cross classified with, Cholesterol, Triglicerides, High Density Lipoprotein, Family History Hypertension/Diabetes Millitus) except for Physical activity, were the difference in mean is significantly associated. (table 6)

5. Discussion

5.1 Associated conditions (determinant) by sex

Most of our studied sample had Diabetes mellitus(DM) with nearly similar percentage of male & female, in addition to hypertension & hyperlipedemia, this is because the sample was chosen from Specialized Centers for Endocrinology & Diabetes(at Al-Rusafa sector) and (at Al-Karkh sector)- Baghdad. These two centers are the referral points for diabetic patients in Baghdad.

5.2 Relation of W/Hip ratio and mean age

The BMI mean was nearly the same for both sexes and showed no significant difference, but this difference was significant with W/H ratio.

In a sample of Dutch women, a lower WHR was associated with high fecundity and was a better predictor than other variables such as body mass index (Zaadstra, 1993). In a second study, without the weight categories and with frontal WHR ranging from 0.4 to 1.0, Hadza men preferred the highest ratios of 0.9 and 1.0 (Marlowe, 2001). This may be because women with a larger waist appear heavier.

5.3 BMI & W/Hip ratio Correlation

A positive correlation was obtained between W/H ratio & BMI, FBS, TG &HDL. Compared with body mass index (BMI), anthropometric measures of abdominal obesity [e.g. waist circumference (WC), waist-to-hip ratio (WHR), sagittal abdominal diameter] appear to be more strongly associated with metabolic risk factors(Wang Y, 2005) incident CVD events, and death. The cardio-metabolic risk associated with abdominal obesity is attributed to the presence of visceral adipose tissue (VAT), which promotes insulin resistance, dyslipidaemia, and hypertension (Despres JP, 2006).

5.4 Physical Activity

With Physical activity, the difference in mean was significantly associated. Two recent reviews have evaluated the relation between physical activity and CVD/cancer incidence and mortality.(BlairSN,2001, Wannamethee SG, 2001) They conclude that individuals who report regular physical activity are less likely than sedentary individuals to die from coronary heart disease, stroke, CVD, certain cancers and all causes. Several studies have assessed the independent and combined effects of fattiness and physical fitness on mortality.(Wannamethee SG, 2001; Haapanen-NiemiN, 2000; StevensJ, 2002) Moderate or high level of cardio respiratory fitness may be protective against the excess mortality among overweight and obese individuals.

6. Conclusion

WHR was significantly associated with the risk of incident CVD events. These simple measures of abdominal obesity should be incorporated into CVD risk assessments in metabolic syndrome.

Physical activity, showed significant difference. Both regular physical activity and normal weight can reduce the risk of CVD. Physical inactivity seems to have an independent effect on CVD risk, whereas obesity increases the risk partly through the modification of other risk factors.

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Table 1. Characteristics of the studied sample by sex and age

	Male (n=125) Mean	SD	Female (n=109) Mean	SD	Total (N=234) Mean	SD	P value (95% CI)
Age (years)	45.73	7.83	48.29	8.59	46.92	8.28	0.02 (-4.67 to -0.44)
BMI(KG/m^2)	29.45	4.55	30.17	4.97	29.78	4.75	0.25 (-1.95 to 0.51)
WC(CM) HC (CM) W/H ratio (%)	110.63 101.50 1.09	11.75 9.12 0.08	117.32 104.75 1.12	12.70 9.02 0.09	114.02 103.09 1.11	12.20 9.07 0.08	0.0001 (-9.84 to -3.54) 0.006 (-5.59 to -0.91) 0.007 (-0.05 to -0.008)
FBS	10.08	5.04	10.74	5.36	10.39	5.19	0.333 (-0.00-0.68)
TG	3.59	3.75	4.42	8.10	3.98	6.17	0.305 (-2.42-0.76)
Chole	3.86	1.57	3.78	1.48	3.86	1.57	0.69 (-0.31-0.47)
HDL	1.41	1.10	1.40	1.13	1.41	1.11	0.95 (-0.28-0.30)
SBP(mmHg) DBP(mmHg)	140.58 91.64	17.73 12.01	139.03 90.54	17.80 11.34	139.85 90.66	17.74 11.72	0.50 (-3.03-6.15) 0.47 (-1.92-4.12)

BMI Body mass index, WC waist circumference, HC hip circumference, W/H waist hip ratio, FBS fasting blood sugar, TG triglycerides, Chol. Cholesterol, HDL high density lipoprotein, SBP systolic blood pressure, DBP diastolic blood pressure

Table 2. Associated conditions (determinants) by sex

	Male (n=125)		Female (n=109)		Total (N=234)		P value
	No	%	No	%	No	%	
DM yes	114	90.20	99	90.83	213	91.03	0.92
No	11	8.20	10	9.17	21	8.97	
HT yes	83	66.40	65	59.63	148	63.25	0.284
No	42	33.60	44	40.37	86	36.75	
↑Chol yes	100	80.00	94	86.24	194	82.91	0.219
No	25	20.00	15	13.76	40	17.09	
↑TG yes	90	72	84	77.06	174	74.36	0.207
No	35	28	25	22.94	60	25.64	
↑HDL yes	69	55.20	64	58.72	133	56.84	0.588
No	56	44.80	45	41.28	101	43.16	
Phy Ex yes	17	13.60	17	15.60	34	14.53	0.666
No	108	86.40	92	84.40	200	85.74	
FH(HT/DM)							
Yes	62	49.60	53	48.62	115	49.15	0.882
No	63	50.40	56	51.38	119	50.85	

DM. Diabetes mellitus, HT Hypertension, Chol. Cholesterol, TG triglycerides HDL high density lipoprotein, Phy. A. Physical activity, FH Family history

Table 3. Correlation of BMI with the studied variables

	BMI					
	Male		Female		Total	
	r	p	r	p	r	p
Age (years)	0.118	0.19	0.114	0.239	0.126	0.091
WC	0.707	0.00	0.653	0.00	0.681	0.000
HC	0.740	0.00	0.708	0.00	0.725	0.000
W/H ratio (%)	0.438	0.002	0.473	0.002	0.495	0.000
FBS	0.264	0.003	0.195	0.004	0.224	0.001
TG	0.146	0.104	-0.002	0.982	0.049	0.456
Chole	-0.14	0.119	-0.75	0.439	-0.102	0.119
HDL	0.106	0.238	0.052	0.588	0.079	0.228
SBP(mmHg)	-0.056	0.538	-0.021	0.827	-0.042	0.523
DBP(mmHg	-0.040	0.654	-0.056	0.565	-0.054	0.411

WC waist circumference, HC hip circumference, W/H waist hip ratio, FBS fasting blood sugar, TG triglycerides, Chol. Cholesterol, HDL high density lipoprotein, SBP systolic blood pressure, DBP diastolic blood pressure, r = correlation coefficient, P= p value

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Table 4. Association of BMI with the studied variables (2 ways ANOVA)

	W/H R					
	Male		Female		Total	
	r	p	r	r	p	r
Age (yr)	-0.090	0.318	-0.003	0.976	-0024	0.520
BMI	0.438	0.002	0.473	0.002	0.495	0.000
FBS	0.115	0.203	-0.112	0.246	0.001	0.983
TG	0.045	0.616	0.061	0.530	0.054	0.410
Chole	-0.089	0.321	-0.062	0.525	-0.074	0.260
HDL	0.113	0.208	0.120	0.214	0.117	0.075
SBP	-0.071	0.432	-0.015	0.876	-0.044	0.501
DBP	-0.093	0.310	-0.051	0.597	-0.074	0.258

DM. Diabetes mellitus, HT Hypertension, Chol. Cholesterol, TG triglycerides HDL high density lipoprotein, PAPhysical activity, FH Family history

Table 5. Correlation of W/H R with the studied variables

		BMI					
		Male (n=125)		Female (n=109)		Total (N=234)	P value
		No	Mean (SD)	No	Mean (SD)	No Mean	
DM	Yes	114	30.48 (4.65)	99	30.27(4.98)	213 30.44 (4.81)	0.678
	No	11	28.42 (3.53)	10	29.15 (5.03)	21 28.72 (4.19)	
HT	Yes	83	29.38 (4.40)	65	30.43 (4.57)	148 29.90 (4.52)	0.687
	No	42	29.58 (4.89)	44	29.77 (5.55)	86 29.67 (4.82)	
↑Chol	Yes	100	31.98 (4.72)	94	31.34 (4.89)	194 31.66 (4.84)	0.724
	No	25	28.28 (4.31)	15	29.98 (4.98)	40 29.13 (4.74)	
TG	Yes	90	29.62 (4.59)	84	30.54 (4.68)	174 30.08 (4.60)	0.168
	No	35	29.00 (4.48)	25	29.46 (4.72)	60 29.24 (4.58)	
HDL	Yes	69	29.60 (4.19)	64	30.64 (4.62)	133 30.12 (4.48)	0.214
	No	56	29.35 (5.16)	45	29.38 (4.34)	101 29.36 (4.86)	
PE	Yes	17	27.89 (5.14)	17	29.93 (4.90)	34 28.91 (5.02)	0.189
	No	108	30.54 (4.28)	92	31.34 (5.30)	200 30.94 (5.70)	
FH(HT/DM)							
	Yes	62	29.78 (4.96)	53	30.21 (4.88)	115 29.99 (4.90)	0.386
	No	63	29.12 (4.13)	56	30.09 (4.72)	119 29.60 (4.58)	

BMI Body mass index, FBS fasting blood sugar, TG triglycerides, Chol. Cholesterol, HDL high density lipoprotein, SBP systolic blood pressure, DBP diastolic blood pressure, r =correlation coefficient,

P= p value

Table 6. Association of W/HR with the studied variables (2 ways ANOVA)

		BMI						P value
		Male (n=125)		Female (n=109)		Total (N=234)		
		No	Mean (SD)	No	Mean (SD)	No	Mean	
DM	Yes	114	1.13 (0.07)	99	1.14 (0.08)	213	1.13 (0.08)	0.205
	No	11	1.05 (0.12)	10	1.10 (0.07)	21	1.08 (0.09)	
HT	Yes	83	1.10 (0.07)	65	1.12 (0.08)	148	1.11 (0.07)	0.312
	No	42	1.09 (0.08)	44	1.11 (0.08)	86	1.10 (0.08)	
↑Chol	Yes	100	1.14 (0.07)	94	1.16 (0.07)	194	1.15 (0.07)	0.07
	No	25	1.04 (0.09)	15	1.08 (0.08)	40	1.07 (0.08)	
TG	Yes	90	1.11 (0.07)	84	1.13 (0.07)	174	1.12 (0.07)	0.205
	No	35	1.07 (0.08)	25	1.11 (0.08)	60	1.09 (0.08)	
HDL	Yes	69	1.09 (0.08)	64	1.11 (0.08)	133	1.10 (0.08)	0.204
	No	56	1.10 (0.07)	45	1.13 (0.07)	101	1.11 (0.07)	
PE	Yes	17	0.98 (0.09)	17	1.02 (0.07)	34	1.01 (0.08)	**0.030**
	No	108	1.20 (0.07)	92	1.22 (0.08)	200	1.21 (0.07)	
FH(HT/DM)								
	Yes	62	1.11 (0.08)	53	1.13 (0.08)	115	1.12 (0.08)	0.126
	No	63	1.08 (0.06)	56	1.11 (0.07)	119	1.10 (0.07)	

DM. Diabetes mellitus, HT Hypertension, Chol. Cholesterol, TG triglycerides HDL high density lipoprotein, Physical activity, FH Family history

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Assessment of Stress and Its Risk Factors among Primary School Teachers in the Klang Valley, Malaysia

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Abstract

Introduction: This cross-sectional study determined the workplace stressors, stress levels, mental health status and their influencing factors, among primary school teachers in the Klang Valley, Malaysia. **Methodology**: Nine primary schools in Klang Valley which fulfil the inclusive criteria were randomly selected from a list obtained from the Ministry of Education website. Two hundred and seventy two teachers from the selected school, volunteered to participate in the study. A questionnaire was used to determine socio-demographic background, working information and medical history. Teacher Stress Inventory was used to measure the stressor and stress levels; while General Health Questionnaire was used to measure the mental health status. **Result**: Results showed that most of the teachers experience moderate stress level (71.7%) and only 12.1% had low mental health status. Student misbehaviour was the main stressor in the school environment (mean= 2.62). Gender (p=0.001) and workload (p=0.002) showed a significant contributing factors towards mental health status. **Conclusion**: These primary school teachers experience stress mainly due to the student misbehaviour and the mental well-being were influenced by the workload and gender. Women teachers with heavy workload had lower mental health status.

Keyword: Primary school teachers, Stress, Teacher stress inventory, Mental health status

1. Introduction

Teaching profession comes with other roles and commitments to be made towards students, the community and the profession itself. Teachers are responsible to guide students to learn by providing clear directions and explanations in order to educate the future generation. Teachers must be role models and realize that each action taken will reflect upon his/her professional status as teachers (Connecticut Code of Professional Responsibility for Teachers).

Teaching has been proven as a stressful job based on previous studies (Shirley & Kathy, 2002; Kyriacou, 1989). Sveinsdottir, Gunarsdottir, and Fridriksdottir (2007) reported that the working environment for teachers is highly stress-provoking. Teacher stress is defined as an uncomfortable feeling, negative emotion such as anger, anxiety and pressure which originated from their work (Maslach & Jackson, 1984). Teachers have to cope with their task to give knowledge; as well as to educate students to be good citizens. With the increasing demand from students and parents, as well as the job requirement made by Malaysia's Ministry of Education, the stress levels are steadily increasing. Teachers in Selangor and Kuala Lumpur areas have been categorized as 'stressful teachers' since they have to spend 74 hours per week in teaching, as well as involved in curriculum activities (Abdul, 2005).

Mental illness among teachers has become an increasing problem in many countries (Bauer *et al*., 2005; Bauer *et al*., 2007; Weber, Weltle & Lederel., 2006). According to a study (Sveinsdottir *et al*, 2007), psychiatric and/ or psychosomatic disorders are the leading causes of premature retirement among teachers. Stressors such as disruptive student, heavy workload and lack of support put teachers' mental health in danger (National Union of Teachers, 2009). Occupational stress has two conceptual definitions (David, 1984). The first one refers to physiological responses of the individuals such as increased heart rate, blood pressure, as well as the release of cortisol hormone into the blood stream that result from an individual's frustrations of the interaction with the environment. The second one refers to the negative appraisal from the environment itself such as workload and inadequate resources and time that are associated with the current job that lead to anxiety and chronic pressure in meeting the job demand. Another scholar defined stress as the physical, emotional and mental strain resulting from the mismatch between an individual and the environment (Bynoe, 1994). Stress is most likely to occur in situations where; demands are high, the amount of control in an individual is low, and there is limited support or help available for the individual. When a body receives stressor, it can increase the stress level. Proposed model of teacher stress by Richard and Christine (1989) included teaching history and personal factors as the stressor for job stress among the teachers. The positive and negative reactions may in turn influence the risk of developing psychosomatic symptoms. Model of teacher stress by Kyriacou and Sutcliffe (1978) defined potential stressors as physical (such as large number of pupil in classes) and psychological (such as poor relationship with colleagues). The model also contained additional variables such as recognition and inadequate resources and time as potential non-occupational stressor.

This objective of this study was to determine the workplace stressors, stress levels, mental health status and their influencing factors, among primary school teachers in the Klang Valley, Malaysia

2. Methodology

2.1 Study background and design

This cross-sectional study was conducted in 9 primary schools, located in the Klang Valley. The selection criteria for the school selection were: Grade A national primary school which have more than 1000 students. The schools are located in the districts of Petaling Jaya, Kuala Lumpur, Klang, Hulu Langat, and Kuala Langat. Teacher's name lists were obtained from school administrator and they were selected based on voluntary basis. About 272 primary school teachers agreed to participate in the study. However, they have to fulfil the criteria such as having a minimum of one-year teaching experience, and not diagnosed with any chronic medical problem or take any medication and alcohol. Written consents were obtained from the respondents.

2.2 Instrumentation

Questionnaires were distributed to determine respondents' demographic and background status, occupational information, medical history and health complaints. The questions included age, gender, marital status, level of education and the employment year as teacher. Teacher Stress Inventory questionnaire was used for the assessment of individuals' perception on the potential stressors in the school environment (Boyle, Borg, Fazlon, & Baglioni, 1995). This questionnaire developed by Boyle *et al*. (1995) was validated and translated into Malay Language and was used to measure the stress levels and the stressors. This questionnaire consists of 5 sections; A) workload B) student behaviour C) interpersonal factors D) time and resources E) recognition. This questionnaire uses Likert Scale in the evaluation of responses whereby 1 mark were given for "No or less stress", 2 for "Medium stress", 3 for "High stress" and 4 for "Extreme stress". Total scores were categorized into low, medium and high stress.

The General Health Questionnaire (GHQ) used to determine the mental health status was developed by Goldberg and Hilier (1979). The GHQ was developed as a screening tool to detect those likely to have or be at risk of developing psychiatric disorders. It measures the common mental health problems/domains of depression, anxiety, somatic symptoms and social withdrawal. The items include 'have you lost much sleep?', 'have you felt

capable of making decisions about things?' and 'have you felt constantly under strain?'. The score was based on Likert Scale with 0 for "Not at all", 1 for "Sometimes", 2 for "More than sometimes" and 3 for "Often". The questionnaire was self-administered, after a short briefing and consent letter was given to each respondent before the data collection.

3. Results

3.1 Demographic information

The main objective of the study was to identify the prevalence of stress and the influencing factors of stress among primary school teachers in Klang Valley, Malaysia. According to the Malaysian Ministry of Education, in 2009, there were approximately 219,766 primary school teachers and 69.1% of them were female (Ministry of Education). The ratio of respondents for this study was consistent with the statistics produced by the ministry. The average age was 34 years as the academic qualification requirements have to be fulfilled before being teachers (Table 1). About 66.5% of the respondents were female, while 81.3% were married and 56.3% had a certificate of education. Their employment years range from 1 to 35 years, with a mean of 10 (S.D= 4.73) years. The average salary was RM2495.59. Respondents spent 7 hours on the average, teaching or being in the school. About 57.4% of the respondents were classroom teachers, followed by 37.5% were subject teachers.

3.2 Stress and Mental Health Status

Table 2 showed the prevalence of stress and mental health status among the respondents. Questionnaire of Teacher Stress Inventory was used to determine the prevalence of stress among the respondents. Result showed that 71.7% of respondents experienced medium stress and 87.9% has high mental health status. There was an association between stress levels and mental health status ($p< 0.05$) (Table 3). Table 4 showed the mean score and standard deviations of the 5 stressors in school environment. The top stressor was "student misbehaviour "with a mean of 2.62. This was followed by "time and resource scarcity" (mean= 2.37), "workload" (mean= 2.32), "interpersonal relationship" (mean= 2.28) and "recognition" (mean= 2.26).

3.3 Stress and Selected Variables

Table 5 shows that there was no significant association between stress and selected factors, such as work experience, job responsibility, marital status and education level ($p> 0.05$). Teachers' job responsibility was based on their task such as subject teacher, classroom teacher and school administrator. With reference to Table 6, no significant association between stress with gender, job responsibility and school locations were found ($p> 0.05$).

3.4 Factors that Influence Mental Health Status

Table 7 shows the factors that influenced mental health status. The results from covariate analysis showed that there were 2 factors affecting mental health status when combined, namely gender ($p=0.001$) and teachers' workload ($p=0.002$).

4. Discussion

4.1 Stress and Mental Health Status

The results showed that majority of the respondents experienced medium level of stress (71.7%) with most of them reported to have low complaints on health (87.9%). The study done by Milaat (1997) indicated the prevalence of stress was 38.2%, for school teachers in Jeddah. A study on teachers in Kinta District, Perak also showed that 43.2% reported their job to be very or extremely stressful (Amarnathan, 2000); whilst 62% of school teachers in Muar, Johor experienced medium stress (Shahrina & Jamaludin, 2005). From the result of the study, only 12.1% of the respondents reported to have complaints for the mental health status. The result proved that implication from the stress level will reflect the mental status face by the teachers, which in this study showed that moderate stress level will induce low complaint on mental health status.

This study showed that student misbehaviour was the leading stressor that caused stress to the respondents. It was followed by time and resource scarcity, workload, interpersonal relationship and recognition. Similar results by previous studies (Azizi, Shahrin, & Tee, 2007; Abdul, 2002; Zakiah, 2003) found that student misbehaviour was the main cause of teacher stress. Student misbehaviour among primary school children were increasing from 0.78 % in 2008 to 0.79 % in 2009 (Ministry of Education). Among the main issues related to children misbehaviour were bullying, absenteeism and disrespectfulness. According to Malaysian Education Ministry, student misbehaviour can be divided into 3 categories, namely heavy offense, moderate offense and light offense. Bringing drugs to school and rude against teachers were categorised as heavy offense while inappropriate attire falls under moderate offense. Teaching and Learning International Survey (TALIS) developed by Organization

For Economic Cooperation and Development (OECD) reported on the average, classroom disciplinary climate is viewed rather negatively by teachers in Malaysia and the percentage of lesson time due to disruptive student behaviour or administrative issues is relatively high compared to other countries under studied (Organization for Economic Cooperation and Development). Findings by Armanathan (2000) also revealed that student misbehaviour and recognition were the stressors significantly contributed to the teachers' stress levels.

4.2 Stress and Selected Variables

The results showed that there were no significant associations between the stress level with work experience, job responsibility, marital status and educational level. A study by Gold and Roth (1993) stated that unmarried teachers had a higher stress level than married teachers. Previous studies (Azizi *et al*., 2007; Zakiah, 2003) showed that stress level did not differ significantly with education level. However, Kyriacou and Sutcliffe (1978) have proven that teachers with degree or higher academic qualifications were less stressed than their colleagues with lower academic qualification. The stress levels between respondents who were subject teachers, classroom teachers and school administrators also showed no significant difference, as well as the work experience. Job responsibility consists of subject teachers, classroom teachers and administrators. Subject teachers teach more than 1 specific subject, in many classes, while for the classroom teachers, even though they have the priority to teach their core subject, they have to handle and manage a class. They also have to handle any complaints from other students and parents on issues related to their class students. Teachers may also ask to substitute for another teacher and they viewed this situation as a stirring issue. As for the administrators, they have to manage the school and keep the school environment in order. Visitors from the district education office as well as instruction or any education development plan from the Ministry of Education are under their responsibilities (Education Development Plan for Malaysia 2001-2010). However, the result from this study did not showed any significant differences between those job responsibilities. Eventually, a study by David (1984), showed that least experienced class teachers and deputies were the most likely to report stress, while the heads of departments and school principals were the least likely. Beside this, the results of this study also showed there was no association between stress level and gender. Therefore, both male and female teachers showed the similar attitudes towards stress caused by the potential stressors in the school environment. Borg and Riding (1991) found that male reported greater stress than female teachers, however, Payne and Funham (1987) found that female teachers reported greater stress than their counterparts.

Viviane, Christine, S. D., Carmen, Elena, and Christine, C. C. (2006) using multiple analyses, after adjusted for all confounding variables, showed a higher risk of lifetime anxiety disorders in male teachers. On the contrary, the study discussed that teachers did not seem to suffer from psychological distress as compared to non-teacher. However, their level of psychological distress grew with age. Compared to non-teachers, the teachers seemed to be more satisfied with their living condition in term of housing, environment or free time. Older teachers tend to complaint on noise and musculoskeletal symptoms while younger teachers were more likely to report on symptoms of common cold, stress and exhaustion (Viviane *et al*., 2006). According to Fujino *et al*. (2001), workers with longer employment period, had the lowest quantitative workload and the skilled employee could easily finish a task. Doing repetitive, monotonous and under stimulating jobs by themselves were known to induce stress (Zakiah, 2003).

These schools which are located in 3 areas (urban, industry and rural) showed no correlation with the teachers' stress levels. Schools in the urban and industrial areas that were categorized into Grade A have more than 1000 students, whereas for Grade A rural schools, there were only 200 students. The number of teachers also varied within the area, in which there are more than 50 teachers in urban and industrial schools, with less in the rural schools (Ministry of Education). The workload is more with fewer workforces and therefore, work can be stressful. However, in the urban and industrial schools have different problems; with more teachers, they have to cope with more students and heavy demands from the school administrator as well as parents.

4.3 Factors that Influence the Mental Health Status

The factors that influenced the teachers' mental health status were workload. According to Rusli, Edimansyah, and Naing (2006), high job demand, increased environmental exposures and overtime work has increased the stress level. This result was consistent with Shankar and Famuyiwa (1991) stating that high workload increased the stress level. In urbanised and modern societies, high demands by parents and community that are constantly increasing is becoming unrealistic with the resources that are given to teachers (Sveinsdottir *et al*., 2007). An Icelandic study indicated that sources of burnout and stress in the working environment are related to role conflicts, professional isolation, lack of support, ineffective teaching aids, student disciplinary and behavioural problems, inadequate working conditions and general lack of respect for the teacher's role (Travers & Copper,

1996). According to Dunham (1992), ineffective communication, tense interpersonal relationship between staff, heavy workload and unsuitable management style can be declared as the environmental stressors. Miller, Brown-Anderson, Willie, Peele, and Chen (1991) suggested if teachers were to work with an environment where supports such as good relationship with colleagues, enough resources and facilities were provided; the stress level could be minimized.

Results also showed there was a relationship between gender and mental health status. Female teachers tend to have poorer mental health status and higher stress level compared to male teachers (Yang, Ge, Hu, Chi, & Wang, 2009). The ratio of male: female teachers in Malaysia showed unbalanced number, leading us to conclude female teachers usually hold more responsibility in teaching than male teachers. They have to carry out various working load and moreover, female teachers have to perform domestic duties which may result in poor health status. Differences in psychological characteristic in male and female supported the reason. Females are more emotional and heavily affected by negative emotions, while male generally more independent and have rugged feelings. This will result in females are more susceptible to the impact of environmental stressors.

Findings also showed no relationship between mental health status with other variables such as school location, recognition, student misbehaviour and working experience. This finding was consistent with another study (Azizi *et al*., 2007) that showed no significant difference with age; however inconsistent with Kyriacou and Sutcliffe (1978) which concluded that age and duration of teaching experience were associated with stress level. Faber (1991) implied that even though teachers may sustain working under high pressure workload, they might leave the profession when due recognition and appreciation were not given or when there is insufficient reward. Previous study (Tan, 1996) showed that the recognition had a significant relationship with stress.

5. Conclusion

The results of this study showed that the prevalence of stress was at medium level (71.7%), while the 87.9% of the respondents had good mental health status. The main cause of stress among primary school teachers were students' misbehaviour. There was no significant association between stress levels with gender, marital status, educational level, work experience, job responsibility and school locations. This study also found that factors that influenced mental health status were gender and teachers' workload. Therefore, this study concluded that in the primary school environment, the main stressor to teachers' stress levels were mainly the students' misbehaviour. Female teachers with heavy workload in school or home were most likely to have poor mental health status.

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Table 1. Respondents Background

Variables		n (%)
Gender	Male	81 (33.5)
	Female	191 (66.5)
Marital Status	Married	221 (81.3)
	Single	42 (15.4)
	Divorced	9 (3.3)
Education Level	Certificate	153 (56.3)
	Diploma	26 (9.6)
	Bachelor	93 (34.2)
Job Responsibility	Subject teacher	102 (37.5)
	Classroom teacher	156 (57.4)
	Administrator	14 (5.1)
Variable	**Mean (S.D)**	
Age (year)	34.74 (7.7)	
Total Salary (RM)	2495.59 (594.62)	
Work Experience (year)	10 (4.73)	
Work Duration (hour)	7 (1.45)	

n= 272

Table 2. Prevalence of Stress Levels and Mental Health Status

Main Variable	Variables	Frequency (%)
Stress Levels	Low	56 (20.6)
	Medium	195 (71.7)
	High	21 (7.7)
Mental Health Status	Good	239 (87.9)
	Poor	33 (12.1)

n= 272

Table 3. Association between Stress Levels and mental Health Status

Variable	Health Status		χ^2 value	p value
	Good	Poor		
Stress Level				
Low	52	4	8.059	0.018*
Medium	173	22		
High	14	7		

n= 272

* significant at $p< 0.05$

Table 4. Stress Scores According to the Stressors from the School Environment

Stressors	Stress Scores
	Mean (±S.D)
Student misbehaviour	2.62 (0.78)
Time and source scarcity	2.37 (0.84)
Workload	2.32 (0.98)
Interpersonal relationship	2.28 (0.84)
Recognition	2.26 (0.83)

n= 272

Table 5. Association between Stress Levels with Work Experience, Job responsibility, Marital Status, and Education Level

Variable	Mean Square	df	F	p value
Work Experience	0.291	2	1.095	0.352
Job responsibility	0.780	2	2.936	0.055
Marital status	0.054	2	0.205	0.815
Educational level	0.120	2	0.453	0.636

n= 272

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Table 6. Association between Stress Levels with Gender, School Area and Job Responsibility

Variable	Stress level			χ^2 value	p value
	Low	Medium	High		
Gender					
Male	22	63	6	1.195	0.550
Female	34	132	15		
School Area					
Urban	26	88	7	3.417	0.491
Rural	17	44	6		
Industry	13	63	8		
Job responsibility					
Subject teacher	27	71	4	6.441	0.169
Classroom teacher	26	114	16		
Administrator	3	10	1		

n= 272

Table 7. Variables Influencing Mental Health Status

Variable	Mean Square	df	F	p
School location	36.938	2	0.623	0.537
Gender	630.776	1	10.635	0.001***
Smoking status	84.508	1	1.425	0.234
Educational level	44.564	2	0.751	0.473
Marital status	50.094	2	0.845	0.431
Student misbehaviour	21.575	1	0.364	0.547
Time and resource scarcity	61.936	1	1.044	0.308
Interpersonal relationship	7.965	1	0.134	0.714
Workload	587.928	1	9.913	0.002**
Recognition	3.371	1	0.057	0.812
Age	221.216	1	3.730	0.055
Work experience	133.626	1	2.253	0.135
Working duration	72.764	1	1.227	0.269
Body mass index	191.260	1	3.225	0.074

R^2= 0.240

** Significant at p< 0.01

*** Significant at p< 0.001

n=272

The Status of a Trainee Teacher with Mental-Health Problems: Dilemmas on Inclusion and Exclusion in Higher Education

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Abstract

The case study reports on a 22-year old female pre-service student teacher pseudo-named P who dropped out of her training program at one of the universities in Brunei due to psychological problems. All the three universities in Brunei with both local and foreign students train teachers. For ethical reasons and information protection laws, the nationality, ethnicity and other identifying information of the student together with the institutional affiliation of the researcher are withheld throughout this study. An informal interview and the MMPI-2 evaluation confirmed that P had many severe mental-health problems that required a wide range of therapeutic interventions to address. Overall, the study illustrated how gender, interpersonal relationships, and culture interacted to cause distress for P. In addition the results demonstrated the plight of a tertiary student with mental-health problems in a developing country who seemed to be accorded low priority in comparison to peers with other severe disabilities. Moreover, the study also highlighted the importance of psychological assessment in educational counseling and the lack of adequate psychotherapy resources for students with high support-needs in mental-health. Appropriate intervention measures are recommended to reduce the wastage rate among vulnerable students with challenging behaviors in Brunei.

Keywords: Psychological assessment, Mental-health, Counseling, Psychotherapy, Trainee teacher

1. Introduction

In developed countries, research indicates that there is now an increase in the enrolment of students with severe disabilities in institutions of higher learning due to the sensitization and awareness campaign carried out the last two decades by various forces such as the inclusive education movement and changes to educational policies and legislation (Shute, 2007). Ironically, research also indicates that there is now an increase in mental health problems such as depression among college and university students including all categories of trainee teachers (Benton *et al*., 2003; Shute, 2007). Previous research on students' mental health problems has focused mainly on depression (Gavin, 2004; Bouteyre *et al*., 2007); anxiety (Head & Lindsey, 1983; Eller *et al*., 2006); and stress (McKean & Misra, 2000; Burnard *et al*., 2007a; b). The amount and frequency of anxiety and stress were higher than those for depression (Vaidya & Mulgaonkar, 2007). In addition depression, anxiety and stress were more prevalent in female students than males (McKean & Misra, 2000; Eller *et al*., 2006; Dyrbye *et al*., 2006). Also, more freshmen were afflicted by these three disorders than sophomores (Capeding, 2002; Pabiton, 2007; Bouteyre *et al*., 2007). Depression, anxiety and stress appear to be linked to each other but the connections have only been determined by correlation and not experimentally (Andrews & Wilding, 2004; Edward, 2006). In view of this, it is difficult to establish with certainty if (and how) they cause each other. One possible reason why depression, anxiety and stress and other mental health problems might co-exist may be due to the fact that they share a few common symptoms, causes, and effects (e.g. faulty cognitions or having cognitive distortions). Apart from depression, anxiety, and stress, there are many other mental health problems such as psychoticism and schizophrenia that affect tertiary students. In developing countries these student mental health problems are caused by a host of lifelong factors such as pressure of academic work, poverty, diseases, natural disasters, environmental hazards, war, and unrealistic expectations from parents and teachers (Ovunga *et al*., 2006). In their recent study, Yates *et al*. (2008) found that some mental-health problems occur before students enter a college or university. Literature is also abundant on many other mental-health problems (Jenkins *et al*., 1990; Taylor, 1990; Amchin, 1991; APA, 2000; & WHO, 2007). In institutions of learning, the mental-health problems are often neglected until the student becomes a danger to the self or others. At that point, the student's undesirable mental-health behaviors begin to indirectly manifest themselves in a number of ways such as the small but steadily growing attrition rates and bizarre dysfunctional behaviors like suicide, stalking, gun-shooting,

assaulting professors, rape, arson, and gang-behavior. These problems are usually identified with certainty when concerned students are comprehensively assessed using diagnostic observations, clinical interviews, the mental status examination, and psychometric tests. In Brunei Darussalam, the scant research conducted on students' mental- health problems is mainly on stress (Burnard *et al*., 2007a; b). Much effort and resources in most developing countries, like Brunei, are directed towards helping students with traditional types of disabilities through policies such as inclusive education, special education, and curriculum reforms. Despite these efforts, students in developing countries still largely depend on various alternative sources of help such as parents, friends, and religion to solve their personal problems (Pabiton, 2004; 2007). However, there are signs that the situation is changing slowly in Brunei Darussalam with the increased recognition of psychology, psychiatry, counseling and social work as important mental-health professions. These professions have potential to make meaningful contributions to improving the quality of life for Brunei people.

1.1 Attitudes to severely disabled learners

In Brunei, the attitudes of educators towards students with mental health problems in institutions of higher leaning are not yet known due to lack of research. In addition, the number of students with severe challenging behaviors (e.g. behavioral disorders, BD or emotional and behavioral disorders, EBD) and mental-health problems in Brunei tertiary institutions is still small because of the small population and rigorous selection procedures. According to Zarean *et al*., (2008) emotional disturbance contributes to the onset and persistence of schizophrenia, organic mental disorders, psychosomatic disorders, and personality disorders. Due mainly to the social stigma attached to negative labels pertaining to psychiatric conditions, the few students admitted into Brunei tertiary institutions with BD, EBD or mental-health problems tend to mask their behaviors and are thus invisible. There is also stigma associated with seeking professional psychiatric help (Shute, 2007). In view of these and other reasons, research on students with mental-health problems is still scant in Brunei and the present study was an attempt to narrow this knowledge gap. At the secondary school level, previous research from elsewhere showed that regular school teachers were in general opposed to having disabled learners in their classrooms (Jones *et al*., 1978; Jamieson, 1984; Knoff, 1985). The more severe or profound the learner's disability, the higher the chance such a learner was likely to be rejected by regular school teachers, non-disabled peers in an inclusive setting, and parents of non-disabled students (Heward, 1996). Among students with partial or mild disabilities who were includable in ordinary schools, regular teachers preferred most those who had learning difficulties and liked least learners with mental and behavioral disorders (William & Algozzine, 1979; Vandivier & Vandivier, 1981). This might be partly due to the fact that students with mental and behavioral disorders pose the biggest challenge to teaching and assessment. In addition many teachers may not know how to handle learners with mental-health problems. A major concern that is often raised when a student with high support needs is included in a mainstream classroom is the fear that his or her presence and participation might detract and retard the academic progress of the non-disabled peers (Hunt & Goetz, 1997). Moreover, regular teachers often think that the placement of disabled learners in ordinary classrooms might influence teaching effectiveness (Myles & Simpson, 1989). These negative attitudes are gradually becoming positive with the wide availability of sensitization programs as well as preserve and in-service courses in special education. Hunt and Goetz (1997) reviewed 19 studies of inclusive educational programs, practices, and outcomes for students with severe disabilities. Their meta-analysis revealed that learners with severe disabilities were includable in ordinary schools, and that they could achieve positive academic and learning outcomes, contrary to the unfounded fears or concerns held by many stakeholders. The two researchers found that inclusion of severely disabled learners into regular schools was more effective and beneficial where and when:

- " parental involvement was made an essential component of inclusion;
- the school / classroom environment fostered acceptance, social interactions, and friendships;
- teaching and learning were a collaborative effort involving the major stakeholders; and
- appropriate curricula adaptations and accommodations were made" (Hunt & Goetz, 1997: 25-26).

Universities in Brunei Darussalam admit into their academic programs students with different categories of disability. One student with profound visual impairment (total blindness) graduated a few years ago at P's institution. Another student with severe physical disabilities was due to graduate at the same institution P was attending. Students with disabilities rarely drop out at P's university because of the support they receive from and accommodations made to them by the University. However, the student with mental-health problems discussed in this Study broke the trend and challenged the University when she dropped out of her degree training program. The present Study seeks to answer the question: what was the difference between this mentally disturbed student and the other students with similarly severe disabilities who never dropped out? Surely there

were factors that forced this unique student to discontinue her training and such self-exclusion was in itself educational wastage that needs to be probed, prevented, or addressed. Since the inclusion and later exclusion of the student in the present study involved only one person, critics and skeptics may say that they see no links or connections between the plight or fate of one student and the broader issues of teacher education and regular education in tertiary institutions. The truth is that the philosophies of the Education for All (EFA) and inclusive education movements require that problems of all learners be addressed. This includes addressing the problems of single students with rare or unique behaviors on college and university campuses.

1.2 Psychology and psychologists in Brunei Darussalam

Psychology in Brunei has not yet reached the level of Japan (see Sato, 2005), India (Jain, 2005), and Pakistan (Suhail, 2004) whose universities offer masters and doctoral degrees in this discipline. Psychology is also less used as a mental-health profession in Brunei than in other Asia-Pacific countries, such as Australia and New Zealand with well developed counseling and psychotherapy infrastructure and resources as part of their overall health-care facilities. However, mental-health well-being in Brunei is far ahead than in other small countries in the Pacific-Southeast Asia region, such as Vanuatu (see Forster, 2005), Samoa, Kilibati, Tuvalu, and Nauru. Most psychological services in Brunei are dispensed in the field of education. Since 1998, the Country has had special schools called Centers that serve learners with high support-needs and an inclusive education system that integrates students with mild and moderate disabilities into mainstream schools (Ministry of Education, 1997; 1998). Implementation of the education program for gifted and talented students started in 2008 (Ministry of Education, 2008). In addition, the Ministry of Education also has a Special Education Unit (Wong, 2005) and a Counseling and Career Guidance Section (Yahya, 2005). The Government has, through the Ministry of Education and the University of Brunei Darussalam (UBD), sponsored two international conferences on special education in 1997 and 2005, and one international conference on counseling in 1998. Recently, the Government launched a Counseling Unit on 14 April 2005 within the Institute for Public Administration (IPA) for use by civil servants and also created the "Brunei Darussalam Journal of Special Education" on 6 June 2005 for researchers to publish the outcome of their investigations. The Counseling Unit at IPA deals mainly with occupational, financial, and family-related problems while the Bureau for Narcotics deals with drug and forensic problems. The University of Brunei Darussalam (UBD) offers an MEd in Special Education. According to the policy of the Ministry of Education, all trainee-teachers (pre-service and in-service) are required to take courses in inclusive education, educational psychology as well as guidance and counseling. Upon the completion of their training, some teachers in secondary schools are appointed as guidance counselors. The Institute of Medicine at UBD also offers courses in applied psychology (clinical and counseling) to medical students. In addition, each university has a Counseling Unit used mainly by students. Furthermore, the major hospitals in the country have Psychiatric Units that attend to patients with mental-health problems. These developments suggest that the value of Psychology as a human health-care profession in Brunei is increasing, and that it might grow bigger in future. Overall, Brunei still lacks adequate counseling and psychotherapy resources in private-practice, hospitals, and industry at present. More attention, effort, and resources need to be directed to these areas of health-psychology in this country. Psychological assessment or testing is considered a dilemmatic issue in counseling and psychotherapy because there are many arguments both for and against it. According to Corey (1991) counselors who favor the use of diagnosis in therapy generally argue that it enables the practitioner to acquire enough knowledge about the client's past and current behavior to develop an appropriate plan of treatment. On the other hand critics and skeptics of psychological testing such as Yalom (2001) see diagnosis as unnecessary or harmful because of the negative labels used.

1.3 Objectives of the study

Using the mental-health problems a student had at one university in Brunei, the Study probed the three broad research questions listed below. Through these questions, the Study addressed the problems surrounding the inclusion and exclusion of students with mental-health problems in tertiary institutions of learning within a developing country context.

- What was the problem?
- Why did the problem persist? and
- How could the problem be resolved?

2. Investigative method

The Case-study research method was adopted in investigating and probing the problem. The rationale and justification for using this approach was based on three reasons. First, the Study was exploratory and intended to

find out the possible presenting problems of the student in the Case-study. Second, only one student was involved in the Case study. Third, the overall goal of the research was to sensitize the public (to the likelihood) that there could be many other students in Brunei institutions of higher learning with similar mental-health problems. Such students need the help of mental-health professionals to prevent them from dropping-out and contributing to wastage statistics in education.

2.1 The participant

The person discussed in this case-study is pseudo-named P throughout the text. P was a 22-year old female pre-service student-teacher at one of the three universities in Brunei Darussalam who had intense personal problems. Despite her problems, P was an above-average student in academic work. She was a polite, well-behaved, and a pleasant student to work with. During the second year of her 4-year program, P confidentially and voluntarily reported to the Researcher (who was one of her lecturers) that she felt overly-nervous whenever she was required to participate in course tutorial discussions and teaching-practice (peer-teaching and micro-teaching). Most courses at her institution required students to participate actively during the tutorials. She requested to talk about the issue with the Researcher. The Researcher immediately arranged (within the same week) a one 30-minute informal interview to privately discuss her problems in a safe office environment. P cooperated and attended the interview. During the interview, P verbally indicated that she was always afraid of talking when in a group of people including the peers. The University administration was aware of P's problems and referred P to the University's Counseling Unit for help. After a while, the Counseling Unit, in turn, referred P to the Psychiatric Unit at one of the hospitals in the country. P was not admitted in the hospital, and as an out-patient she continued attending her classes at the University. Being a sponsored student, her scholarship did not permit her to change to a study program that was less threatening to social interaction. As the severity of her problems increased, the situation became unbearable and P eventually dropped out of the program in the middle of the second year.

2.3 Data collection instrument

Prior to quitting the University, P voluntarily agreed to participate in a study along with other trainee-teachers in which the current Researcher was investigating the social desirability orientations of the student-teachers. Participants in this Study were requested to complete the entire MMPI-2 scale. In addition, the participants also agreed (as part of the informed consent) that the Researcher could use the obtained data for other psychological inquiries. On the basis of this understanding, data were obtained indirectly on P for this Study and her whole protocol was analyzed further to shed light on her presenting problems. The MMPI-2 (Hathaway & McKinley, 1989) is a 567-item psychometric personality-test consisting of 3 validity scales, 10 clinical scales, and several supplemental scales. The Test is normally administered individually on referred cases in clinical settings. At the time of conducting and writing this Study, there were no studies on Brunei tertiary students based on the MMPI-2. In view of this, the Test's reliability and validity with Brunei student populations were unknown. However, the Instrument is well-researched and well-established with good reliability and validity in many clinical contexts. In addition to completing the MMPI-2, P also had a 30-minute informal interview with the Researcher in which she discussed her problems. P voluntarily requested for this interview with the Researcher.

2.4 Instrument administration procedures

Before administering the Instrument, the participants were told verbally about the ethical conditions and requirements for their involvement in the Study. This discussion focused on seven ethical issues (voluntary participation, privacy, anonymity, confidentiality, protection from physical and psychological harm, debriefing, and informed consent). In addition, the participants also agreed (as part of verbal informed consent) that the Researcher could use the obtained data for other psychological inquiries. On the basis of this understanding, data were obtained indirectly on P for the present Study. The meanings of difficult words (sentences or phrases) involving six items (Items 17, 65, 116, 388, 426, and 444) were verbally explained to the participants before the Instrument was administered. However, the Instrument is written in basic English and Brunei University students completed it without any major problems. In view of this, it was deemed not necessary (by the Researcher) to translate the Instrument into Bahasa Melayu (Brunei's natural and official language). Furthermore, students at UBD take courses in English language and have participated in numerous research-studies that required them to complete self-report scales or questionnaires in English. Although the Instrument may be completed in about 30 minutes by people who speak English as a native or first language, the Brunei student sample took more than one hour to have it done. A few students needed an hour and half to complete it. As usual and as expected, some questions were not answered by a small number of participants, and this resulted in few protocols not being usable due to many missing values. Fortunately, P responded appropriately to all the items in the scale. The

data-collection procedure complied with the ethical requirements of the University and the Government of Brunei on the use human participants in research. The Study also met the requirements of the Helsinki Declaration on the use of human subjects in research.

2.5 Data analysis

P answered all the items appropriately on the MMPI-2. A battery of validity and clinical scales plus selected supplemental scales were scored (according to instructions in the technical manual) on P's protocol. Both raw and standardized T scores (with K-correction where necessary) were obtained. Data from the interview was analyzed qualitatively using content-analysis and constant-comparison procedures (Lincoln & Guba, 1985; Patton, 1990).

3. Results

The findings of the Study are presented below under four separate sections / subheadings (informal interview; validity scales; clinical scales; and supplemental scales). These findings address the first research question: what was the problem? It turned out that P had numerous severe and multifaceted problems. It should be noted at the outset that the obtained data were interpreted cautiously due to the limitations of the Study (collecting data using only one interview and one inventory) noted below. A complex case like P, needed to be comprehensively evaluated using a variety of procedures in order to get a clearer and better picture of her problems. However, prior to this small-scale assessment, the Researcher had practically no idea about the sort of problems P had and how they could be tackled.

3.1 Findings from the informal interview

Throughout the interview, the Researcher observed that P was calm and remained in a stable mental-state. This might be due to the fact P used to come to the Researcher's office occasionally to get course hand-outs. The interview environment was therefore familiar and friendly and may have had good ecological validity. During the interview, P made several references to her father, who she claimed was too domineering and whose personality she described as narcissist. P further alleged that she was over-protected by her father who never allowed her to socialize with peers. She accused her father of being unfair to her by allowing her brothers freedom to interact with peers. From what transpired in the interview probes and the father's assumed gender-bias, it seemed that P did not have a cordial relationship with her father. Because P's parents were not living in Brunei at the time of collecting the data, a joint-interview with the parents could not be conducted to obtain further information on this case. One initial interview was therefore not enough to have a prolonged engagement with P and observe her adequately. Rather than deal with P's complex problems, the University found it easier to let her drop out.

3.2 Findings from the validity scales

It can be noted from Table 1 that P's standard scores on the L and K validity scales were within the normal range. However, her score on the F scale was elevated far above the average (T = 50) and this raises concerns about interpreting her profile correctly. A high score on F may be interpreted in many ways. People who score high on the F scale tend to endorse 'true' and 'false' responses, generally marked by less than 5% normal adults (hence the name infrequency scale). This might be due to random-marking of responses which may invalidate the profile. Alternatively, a high F-score may be an indication of a high degree of mental-confusion or psychopathology in the respondent. The test-administrator has to observe the client carefully. An inflated F score might also mean that the respondent made a deliberate attempt to fake bad, magnify, or exaggerate psychological symptoms. Of these three competing interpretations, a high F score in this Study probably provided hints for greater psychiatric disturbance in the student. This is because of the high trust P had in the Researcher and the good professional / helping relationship that existed between P and the Researcher.

<Insert Table 1 Here>

3.3 Findings from the clinical scales

On the clinical scales, Table 1 shows that 8 of P's 10 scores fell in the clinical range (T > 65). P obtained a personality profile code of 64/23 on the basic (clinical) scales. Her first and second highest scores were on scales 6 and 4 respectively. The third and fourth highest scores were obtained on scales 2 and 3 respectively. P's profile-pattern provided several clues regarding her presenting problems. The profile suggested that she had severe mental-health problems in the areas assessed by scales 6, 4, 2, and 3. Her psychological problems in areas measured by scales 8, 1, and 10 appear to have been moderate. In addition, P also had two other mild psychological problems, illustrated by above-average scores on scales 7 and 9.

<Insert Table 2 Here>

3.4 Findings from the supplemental scales

P's T scores were also in the clinical range on 8 of the 10 supplemental scales presented below in Table 2. Evidence from this table indicates that P had severe family problems and familial discord. This was supported earlier by her revelation above during the informal interview. It can also be observed from Table 2 that P was highly anxious and scored high on related attributes such as social avoidance, social discomfort, alienation, and self-esteem. In Table 1 she scored high (T = 70) on the social introversion scale. These additional scales provide ample hints as to why P was possibly nervous to speak to her peers in formal learning settings at the University. Not surprisingly, P scored high on the post-traumatic stress disorder scale (PK). This was probably due to the fact that she was besieged by too many different severe problems that eventually forced her to leave the Program. The combined effect of all the many and diverse presenting problems might have been catastrophic and traumatic.

4. Discussion

This section of the Study addresses the second and third research questions of the investigation, namely: why did the problem persist? and how could the problem be resolved? The implications of the findings of the Study to the local Brunei and international community on the well-being of students with mental-health problems in high institutions of learning, are described in the relevant sections below. Educators, mental-health practitioners, and parents in other developing-nations may be interested to know that cases of university students like P also exist in other developing-countries. Finding durable and meaningful solutions to complex problems of this nature often requires international cooperation.

4.1 Why did the problem persist?

There are probably many reasons and theories to explain why P's problems recurred. Only four of these plausible contributing factors are discussed here. First, the results of the study presented above indicated that P had numerous and different psychological problems. The process of identifying all these problems properly using a variety of suitable methods required considerable time and effort. Second, most of P's problems were severe. In view of this, it may be assumed that effective treatment of the problems needed both a long-term intervention plan and a number of mental-health specialists experienced in treating various concerns. Long treatments offered by teams often have many complications. Third, although P was (as explained above) referred to a Counseling Unit (CU) at her University, the effect of the CU on P's problems is unknown because of the privacy and confidentiality laws and other ethical considerations. Whatever happened at this stage, P's problems appear not to have been resolved satisfactorily by the CU. This observation seems to be supported by the fact that the CU, in turn, also ended up referring P to a Psychiatric Unit (PU) at one of the hospitals. Again, the type and effect of the intervention and interaction between P and the PU cannot be known because of the information protection laws. Fourth, despite visiting the PU as an outpatient, P's problems at that time were on the increase rather than decreasing, and eventually she left the University. Her exit gave rise to speculation that the intervention she received from the PU might not have been adequate.

4.2 How could the problem be resolved?

From the Researcher's understanding of the case under study, it seems there were three actions that needed to be undertaken to help resolve P's problems. To identify and confirm her major concerns, P needed to be comprehensively assessed in a variety of ways including obtaining her personal history, family background, and medical records as well as using diagnostic observations, clinical interviews, objective tests, and a mental status examination in ecologically ideal environments. The Diagnostic and Statistical Manual, DSM-IV (APA, 2000) and the International Classification of Diseases, ICD-10 (WHO, 2007) may have been used to help classify P's problems. Some of P's scores on the MMPI-2 clinical scales, such as paranoia, psychopathy, hysteria, schizophrenia, hypochondrias, psychasthenia, and hypomania, needed further psychiatric evaluations. The basic descriptions for the high and low scorers on the MMPI-2 scales would be familiar to most readers from the literature (Jenkins *et al*., 1990) and the technical manual (Hathaway & McKinley, 1989). These assessments might have assisted in developing and guiding informed therapeutic decisions and choices. The next stage would have involved the construction of a long-term treatment plan based largely on the assessment outcomes. Such a plan needed to carefully take into account the nature and extent of P's multifaceted problems. Some examples of the issues that needed to be included in the intervention regime are presented in Table 3. Once a realistic intervention plan was in place, the final logical action would have required its implementation.

<Insert Table 3 Here>

With so many different problems, treating P would have been a daunting and challenging task. No single mental health professional could treat all of P's problems. Similarly, no single therapy could address all of P's concerns. As suggested in Table 3, P's problems needed to be grouped into categories of related difficulties. The integrated treatment could then be conducted in phases (each stage targeting one cluster of inter-related behaviors). For instance, the first phase might have addressed the family-based problems using the professionals and techniques outlined in Table 3. One of the most useful techniques in family counseling is rational emotive therapy, RET (Jones, 1969; Ellis, 1973). This strategy examines peoples' dysfunctional thoughts, feelings and beliefs (TFBs) that are irrational and unrealistic in a given context, such as the family, school, or work place. Phase two may have dealt with issues of depression, anxiety and stress that mainly resulted from P's interactions with people in the home and school environments. These problems may be relieved by the use of relaxation as a coping-strategy. They also seem to respond well to cognitive-behavioral therapies, CBT (Beck, 1967) that look into people's faulty thinking such as having cognitive distortions and dissonance; absolutistic or perfectionist thinking; and automatic thoughts. The social phobias that appear to have occurred mostly in the school and work contexts might have been the focus of the third phase of the intervention plan. Literature suggests that systematic desensitization (SD) and social skills training (SST) may be effective in treating most social phobias (Fogiel, 1989; Leary, 1981). The psychiatric conditions such as schizophrenia and hypomania could have been addressed in a hospital setting by psychotherapy or drug therapy (DT) or a combination of these two depending on the nature and severity of the problem (see Jenkins *et al*., 1990). Based on the outcomes from diagnostic observations, clinical interviews, and psychometric tests, additional groups of related problems could be included in the treatment plan. In this way, P was going to have many referrals (an experience that would be potentially confusing and frustrating if not planned and executed well). The whole treatment plan would have required a lot of cooperation from all those involved in its implementation. Furthermore, all of P's session therapeutic strategies, phase terminations, phase referrals, and phase follow-ups to prevent any relapse, needed long and careful consideration during planning. Her progress also required constant monitoring and evaluation. On the basis of the present limited available information, it appears that P needed a long-term intervention rather than brief therapy.

4.3 Implications of findings on students' welfare

The case of P brings to the forefront the need to attend to the problems of tertiary students with mental-health problems. At the moment, the needs of such students appear to be accorded a low status and priority compared to the needs of students with traditional disabilities. At primary and secondary school levels, literature on special education indicates that students with mental retardation or mental health problems are thought by regular teachers to be the most difficult to teach (Heward, 1996) and the least preferred (William & Algozzine, 1979; Vandivier & Vandivier, 1981). In general, most students may not know that they have or are living with a mental-health problem that needs to be addressed. To bring awareness to such issues, sensitization-workshops could be conducted by psychologists and counselors within each University for students. Students who suspect that they might have a psychological or psychiatric problem should be encouraged by the University to undergo voluntary comprehensive assessment by specialists in mental-health. Sometimes, lay-observations by lecturers, parents, and peers may initially be helpful in identifying students at-risk of developing psychological / psychiatric problems. In some cases, mental-health professionals would have an ethical and legal obligation to warn if the behavior of the person concerned is harmful or injurious to the self and others. In the case of P, her situation was dilemmatic in that her behavior was not dangerous to other people, and yet it was destructive enough to the self to the extent it hindered and prevented her from continuing with her studies (self-actualizing). P's problem appeared to have posed a choice-dilemma to the University: to help her or to let her go. Eventually, P left the University. Morally and ethically, it would have been in the best interests of P if the University had, in consultation with the parents, continued looking for alternative ways to help her. The University is supposed to assist and support students in all possible ways to promote good mental-health. For instance, P needed to be encouraged to seek further professional help within and outside Brunei, if necessary. Such advice was not going to be an infringement of P's rights to decision-and-choice making but rather seen to be in her best interests (as ignoring her difficulties would be a form of negligence and uncaring attitude). Once the condition is confirmed, the concerned student(s) should be encouraged by parents and University authorities to consider going into voluntary counseling or psychotherapy to address the problem. If the problem is severe, then the student(s) should be given enough information about the possible advantages of seeing a psychiatrist to benefit from both psychotherapy and drug therapy. P's main and immediate problem as a student-teacher was anxiety which disabled her from performing peer-teaching, micro-teaching and teaching-practice (all essential aspects of teacher-training). Anxiety could be treated as indicated in the suggested intervention schedule, presented in Table 3 above. However, for the intervention to be successful the University needed to have well-trained and

experienced mental-health practitioners (counselors and psychotherapists). These ideas could be incorporated into the University-wide drop-out prevention policy. In terms of the current data-protection laws, information on P accumulated by the University and the Hospital could technically only be released to a third party under three circumstances: (1) when the client or patient is referred to another mental-health specialist or facility; (2) when subpoenaed by a court of law; and (3) when the client is dangerous to the self and others and the duty to warn becomes apparent. The present study proposes that custodians of the data on P should also (in strict confidence) make available the information to counselors and psychotherapists for research purposes to further help unlock P's problems and the possible solutions. Research-based solutions would help the educational institutions to deal more effectively with cases of this nature in future. Unless something is done along these suggestions, students with mental-health problems may continue to drop out of the schools thereby contributing to wastage statistics in Brunei tertiary education system. The wastage problem might grow bigger with the increase in population and student numbers. Brunei Darussalam cannot afford to do away with such essential human resources. Early identification of problems and early intervention are the key to prevention of major psychological and psychiatric conditions. In their study, Yates *et al*. (2008) recommended that pastoral care mechanisms in higher education institutions need to be enhanced to identify and support potentially vulnerable students.

4.4 Overall implications from the findings

The findings from this Study demonstrated the need for parents, institutions of higher-learning, and mental-health specialists to work collaboratively in assisting students with mental-health problems, such as P. The results also illustrated the lack of adequate counseling and psychotherapy resources at the University and possibly other tertiary institutions of learning in Brunei for students with mental-health problems. The required programs and resources may include sensitization programs, voluntary assessment or screening, self-referral, and appropriate therapists. The students' mental-health problems need to be addressed to prevent wastage. The fact that students with high support-needs in other disability areas have not dropped out from P's University, suggests that learners with mental-health problems might be accorded a low status or priority, and that they may not be receiving adequate attention and support accorded to their counterparts. In addition, the extent to which factors such as gender, inter-personal relationships, and culture contributed to the exclusion of P from training also needs to be carefully examined. For example, findings from the informal interview indicated that P's home environment was more favorable to male, than female, children in the family.

5. Conclusion

The Study discussed the mental-health problems student P had while at the University. Although the Study used one case for illustrative purposes, it was argued that there might be many other tertiary students with such problems in Brunei and elsewhere. The best way these students could be identified, is through voluntary psychological assessment and self-referral for counseling and psychotherapy. The plight of students with mental-health problems was high-lighted. Overall, the findings (of the Study) have important educational implications to the local and international community regarding the inclusion and exclusion of students with mental-health problems in tertiary institutions of learning. Further research (both qualitative and quantitative) on students with mental-health problems is needed in Brunei, to gain more understanding of the problem. The present Study is a contribution to the generation of such information.

6. Limitations of the Study

This Study was informed by a few limitations. Quantitative evidence for the reliability and validity of the MMPI-2 subscales used in data-collection was not obtained prior to conducting the Study. In practice however, the MMPI-2 is normally administered to individual clients in counseling or psychotherapy settings. In the present Study, the criterion-related validity was particularly needed to demonstrate the MMPI-2's theoretical relationship with similar scales such as the Symptoms Checklist, SCL-90-R (Derogatis, 1977) in the Brunei context. As a case- study, the results of the research did not show cause-and-effect relationships of the variables investigated. In addition, the findings had low external validity and could not be generalized to other students at UBD. Furthermore, the concerned student was not interviewed after administering a psychological instrument/test. A post-administration briefing meeting with the student was needed to provide feed-back information to the Participant and probe her performance on the instrument/test. Qualitative information would have helped reveal the extent to which the Student's responses in the interview matched, differed from, or added to the data gathered by the MMPI-2 survey instrument. In this way, the second qualitative component would have enhanced the findings of the Study. These and other limitations did not, however, adversely affect the results of the Study.

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Table 1. Assessment Outcomes from MMPI-2 Validity and Clinical Scales

Scale Name	Scale Abbreviation	Scale No.	Raw Score with K*	T-score with K*
Lie	L	Validity	4	52
Infrequency	F	Validity	20	106
Defensive	K	Validity	13	46
Hypochondrias	Hs	1	23	71
Depression	D	2	42	96
Hysteria+ (Conversion)	Hy	3	39	89
Psychopathy+ (Rebelliousness)	Pd	4	41	97
Masculinity-Feminity	Mf	5	36	50
Paranoia	Pa	6	26	107
Psychasthenia+ (Obsessive-compulsive)	Pt	7	37	68
Schizophrenia	Sc	8	43	76
Hypomania	Ma	9	24	62
Social Introversion	Si	0	46	70

* K is added to five clinical scales (Hs, Pd, Pt, Sc, Ma)

+ Note new name in brackets

Table 2. Assessment Outcomes from MMPI-2 Supplemental Scales

Scale name	Scale Abbreviation	Raw Score	T-score
Anxiety	ANX	21	84
Fears	FRS	8	53
Family problems	FAM	17	> 99
Low Self-Esteem	LSE	12	65
Social Discomfort	SOD	18	72
Shyness	Si1	8	57
Social Avoidance	Si2	8	74
Alienation (self & others)	Si3	12	69
Post-Traumatic Stress Disorder	PK	39	96
Familial Discord	Pd1	9	92

Table 3. Suggested Intervention Plan for P

	Type 1	Type 2	Type 3	Type 4
Problems	Depression Anxiety Stress (PTSD) Fears	Family problems Familial discord	Social avoidance Social discomfort Alienation Shyness Social introversion Low self-esteem	Paranoia Psychopathy Hysteria Schizophrenia Hypochondrias Psycasthenia Hypomania
Therapies	Cognitive-Behavioral Therapy (CBT) Relaxation	Family counseling Rational Emotive Therapy (RET)	Systematic desensitization (SD) Social skills training (SST)	Bibliotherapy Psychotherapy Drug therapy (DT)
Sessions	Individual	Group	Individual	Individual
Helpers	Multiteam (psychologist, counsellor, social worker)	Psychologist Counsellor Social worker (one)	Psychologist Counsellor (one)	Psychiatrist Clinical psychologist (one)

Self-Reported Oral Hygiene Practices and Periodontal Status of Visually Impaired Adults

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Abstract

This study investigated self-reported oral hygiene practices and periodontal status of visually impaired adults. A convenient sample of visually impaired adults who were trainees at the Malaysian Association for the Blind (MAB) participated in the study. Data were collected through a face-to-face interview and clinical dental examination. An assessment of visual acuity determined types of visual impairment. Thirty-nine adults were examined (response rate=65.0%). Most were females (56.4%) and aged between 21-30 years (66.7%). About half were blind, 20.5% had low vision and the rest had at least one eye with normal vision. Many reported to brush teeth at least twice a day (82.1%), used toothbrush and toothpaste (97.4%) but hardly used dental floss. Almost all had experienced symptoms like tooth sensitivity (53.8%) and inflamed and painful gums (43.6%). Average percentage of sites with plaque and bleeding were 81.7%, and 35.1 respectively. Although good oral hygiene practices were reported, periodontal status was poor and periodontal treatment needs were high.

Keywords: Oral hygiene, Dental awareness, Visually impaired

1. Introduction

"Just because a man lacks the use of his eyes doesn't mean he lacks vision."

-Stevie Wonder-

Visual impairment is a problem with one's ability to see and can range from low vision to total blindness. In Malaysia, the prevalence of people with visual impairment has been estimated to be about 2.42% for low vision and 0.28% for total blindness (Zainal *et al* 2002). Of people with all types of disabilities, this group account for about 9.5% (Welfare Department of Malaysia 2005). Although the prevalence is not so high, oral diseases can greatly affect their quality of life and would in turn worsen their capability to access oral health care. These

visually impaired patients present a unique population that challenges the dentist's skills and knowledge. They differ from normal patients with regard to the professional relationship between patient and the dentist. In addition, the true ability and talents of the blind are often underestimated. Providing comprehensive dental care for the visually impaired is not only rewarding but is also a community service that health care providers should fulfill. These patients may be managed well when the oral health care provider undertakes adequate training and understanding of the needs of individuals with low visions.

People with visual impairment are at an increased risk of developing oral diseases, namely periodontal disease because of greater difficulty in attaining good oral hygiene. This may be due to the lack of ability to visually assess whether dental plaque has been effectively removed or if their gums bleed during tooth brushing. Often, dental plaque is an important prerequisite for the development of dental caries and periodontal diseases. People with low vision cannot detect and recognize early signs of oral disease and because of this they may not be able to take the necessary action to prevent or treat a particular oral tcondition. A study among visually impaired adolescents (Azrina *et al* 2007) observed that difficulties faced during tooth brushing include putting toothpaste on brush and using brushing techniques that could be detrimental to oral structures; such as brushing using hard bristles and using strokes that damage the periodontal ligaments. Other than skills in plaque control, factors that have been suggested to affect oral health of the general population include lack of dental knowledge and regular visits to the dentist. The same could be said for the visually impaired population.

There is some evidence in the published literature which highlighted the need to provide more oral health education for people with visual impairment (Azrina *et al* 2007, O`Donnell & Crosswaite 1990, Yalcinkaya & Atalay 2006). This recommendation appeared to have been based on the notion that knowledge of dental health is important to promote the maintenance of oral health. A Taiwan study, had established that knowledge of dental health among visually impaired students were poor compared to their sighted peers (Chang & Shih 2004). The same study also found that visually impaired students were less likely to practice good oral health habits.

In Malaysia, although there is huge success with regard to the school dental service, there has not been much information on its impact on the visually impaired school children. Furthermore, not much is known about this group after they have left school. Even among the general population, it is known (Ministry of Health, 2006) that oral health does deteriorate once people leave school and reach adulthood. The same or worse could be expected within these populations with visual impairment.

This study aims to provide an insight into self-reported oral hygiene practices, oral health knowledge and periodontal status of adults who are visually impaired. If any oral health intervention were to be carried out, the need for baseline data is crucial to provide the input on which aspects of oral health promotion and services that need to be improved.

2. Methodology

2.1 Sample

The participants were trainees at the Malaysian Association for the Blind (MAB), a premier voluntary organization in Malaysia that looks after the general well-being of blind persons in the country. All participants had some form of visual impairment and did not have any other disabilities or impairments such as loss of limbs, impaired speech or hearing. All 60 trainees were included in the sampling frame and were invited to participate in this cross-sectional study involving a face-to-face interview, an oral examination and assessment of visual impairment. They were scheduled for the data collection session after formal classes ended for the day.

2.2 Face-to-face interview

The interview was conducted by interviewers who had been briefed prior to the data collection. It was done using a pre-tested, structured questionnaire form to collect the following: personal information, oral hygiene habits, dental service utilization and dental knowledge. The section on dental knowledge included eight close-ended questions knowledge related to causes, prevention, signs and treatment of dental caries and knowledge related to causes, prevention, signs and treatment of periodontal disease.

2.3 Dental examination

The status of periodontal health provides an indication of oral hygiene status when assessed using Modified Visible Plaque Index (VPI) and modified Gingival Bleeding Index (GBI). The data for VPI were obtained by visual detection while for GBI, it was obtained by running the periodontal probe along the gingival margin and the presence of bleeding was observed. Buccal and lingual surfaces of all teeth were examined for plaque and bleeding sites using both indices. Sites with plaque or bleeding were recorded as “1” while those without were recorded as “0”. All teeth were charted except for retained root or missing teeth which were charted as “X” -

meaning not applicable.

To estimate the needs for periodontal treatment, the Community Periodontal Index for Treatment Needs (CPITN) - with some modifications in relation to treatment needs - was used. This index was introduced by the World Health Organisation (WHO 1997) and recommended to be used as a screening tool so that countries can plan effective intervention programmes for the prevention and control of periodontal disease. This involved charting of six index teeth, each representing a sextant of the dentition. The standard parameters for the presentation of data are percentage of persons by their highest CPI score (prevalence rate) and the mean number of sextants (severity) with certain CPI scores: score 0= healthy periodontal conditions, score 1= gingival bleeding, score 2= gingival bleeding and dental calculus, score 3= shallow periodontal pockets (4-5mm), score 4= deep periodontal pockets (6mm or more), score 9= excluded, and score X= not recorded or not visible. Presence of plaque, gingival bleeding and dental calculus are also indications of oral hygiene status.

The dental examination was carried out in a hall setting by three examiners who took turns to examine. Prior to the data collection period, these examiners underwent a standardization session for all three indices and were calibrated with a periodontist who acted as the gold standard. However, during the actual data collection, it was not possible to carry out a duplicate examination on the study respondents due to time constraint.

2.3 Assessment of visual acuity

Visual impairment was assessed by the optometry team using distant visual acuity (VA) measurement. VA is an indication of the clarity or clearness of one's vision and often measured according to the size of letters viewed on a chart. VA is expressed relative to 20/20 if using "foot" as a unit of measurement, or 6/6 if using the metre. In this study LogMAR or Minimal Angle of Resolution charts are used to measure distant VA. Subjects were asked to stand 3m away from the charts to measure habitual VA. To obtain distant VA for the right eye, the left eye was covered, and vice versa. For participants who had difficulty seeing the topmost line, (1.0LogMAR) charts, they were asked to move forward for a specified distance of 2m and 1m. If they were still not able to see the line, they were then assessed whether they were able to count number of fingers shown from a distance of 50m (CF), able to distinguish whether a hand is moving or not (HM) or able to perceive presence of light. Not being able to perceive light will be interpreted as total blindness.

2.4 Data processing and analysis

The data collected were entered and analysed using SPSS version 15. Responses to most of the questionnaire items were reported as percentages. The VPI and GBI scores were calculated as the percentage of sites with plaque or bleeding over the total number of sites charted. Mean percentages for different regions – anterior/posterior, upper/lower, buccal/lingual - were reported separately. CPITN scores were reported as the worst score among all six scores from the sextants. As for visual acuity assessment, the vision is determined using the reading from the better eye and reported as percentages of participants at a particular level of visual impairment.

3. Results

A total of 39 adults took part in the study (response rate=65.0%). Majority of subjects were females (n=22, 56.4%) and aged between 21-30 years (n=19, 66.7%). About half (n=20, 51.3%) of the trainees were blind, 20.5% (n=8) had low vision and the rest (n=11, 28.2%) had at least one eye with normal vision.

3.1 Oral hygiene practices

17.9% reported to brush only once a day, yet up to 43.6% claimed to brush more than twice a day. Use of toothbrush and toothpaste was high (97.4%), while dental floss use was low (10.3%). Other oral health aids used are mouthrinses (17.9%) and toothpicks (15.4%). Majority reported dental attendance only when there is need for treatment (69.2%), while some (20.5%) cited no experience of dental treatment. About half (53.8%) reported a dental visit in more than twelve months before. Reasons for last dental treatment were for dental check-up /scaling (35.9%), restorative (12.8%), emergency (23.1%) and other reasons (15.4%).

3.2 Knowledge on dental caries

Most respondents knew that bacteria in the mouth (92.3%) and sugary food (94.9%) were factors that can cause dental caries. Most (97.4%) perceived that good oral hygiene care can prevent dental caries and this was consistent with 84.6% agreeing that brushing teeth after meals and reducing sugary food (92.3%) can prevent the dental caries. A similar percentage which is 82.1% of the subjects, agree that gargling after meal and usage of fluoridated toothpaste can prevent the dental caries. Many (79.5%) of them agreed that regular dental check-up can also lead to caries prevention. Majority of the trainees identified cavities (92.3%), toothache (82.1%), oral

malodour (74.4%) and loose teeth (74.4%) as symptoms of dental caries. Many knew that restoration (84.6%) is treatment for dental caries, followed by 79.5% for extraction. Some (38.5%) agreed that taking painkiller can treat dental caries, whereas few (5.1%) perceived that if you ignore it, dental caries can be treated on its own.

3.3 Knowledge on periodontal disease

Similar response (87.2%) was cited for two factors causing periodontal disease - which are bacteria in the mouth and poor oral hygiene. This is followed by injury while brushing (76.9%), while calculus and sugary food was agreed by 71.8% of the participants, followed by smoking (59.0%) and systemic diseases (48.7%). All patients recognised "inflamed and pain gingival" as symptoms of periodontal disease. Other symptoms identified were "gingival bleeding while tooth brushing" (92.3%), tooth sensitivity (79.5%), loose tooth (74.4%) and oral maolodour (69.2%). Good oral hygiene care and regular check-up were cited by almost all respondents (97.4%) as factors that can prevent periodontal disease. This was followed by reduction of sugary food (84.6%) and brushing teeth after meal (74.4%). Almost half of the participants (48.7%) perceived that antibiotic / medication could treat periodontal disease followed by cleaning and removing all plaque and calculus (38.5%). 12.8% of the subjects admitted that they did not know the treatment for periodontal disease.

3.4 Previous experience of oral symptoms

More than half of the respondents (58.3%) disclosed that they had experienced tooth sensitivity, followed by inflamed and pain gingival experience (43.6%) and oral malodour (30.8%). About one-quarter (28.2%) of the respondents reported having loose teeth and gingival bleeding while tooth brushing. Needs for scaling (35.9%) were the most perceived, followed by periodontal treatment (23.1%), restoration (17.9%), extraction (10.3%) and other types of treatment (12.8%).

3.5 Periodontal status

The average percentage of sites with dental plaque was 81.7% (Table 1), with anterior segments scoring better than the posterior ones. Posterior lower lingual segment appears to have the highest mean percentage of sites with plaque (90.1%). The average percentage of bleeding sites was 35.1% (Table 2) with similar distribution as plaque – anterior segments were healthier and the highest mean percentage was also on the posterior lingual teeth (49.5%). As high as 69.2% of participants scored 2 (dental calculus) as the highest CPI score (Table 3). This corresponded with the proportion for highest treatment need for simple scaling (Table 4).

3.6 Relationship between periodontal disease and vision

Plaque levels were seen to be highest among the normal-vision group and lowest among the blind (Table 5). These differences were not found to be statistically significant. On the other hand, scores for gingival bleeding were found to be highest among the blind, followed by the normal-vision group (Table 6). These differences were demonstrated to be statistically significant (Kruskall-Wallis Test, $p<0.01$).

4. Discussion

This study is limited by the moderate response rate, small sample size, and timing of the data collection which was late in the day and did not permit duplicate of the clinical examination. Furthermore, the questionnaire used had been developed for sighted populations and may have validity and reliability issues. However, its findings can be seen to confirm that in this particular target group, poor oral hygiene, high levels of periodontal disease and unmet treatment need was evident (Azrina *et al* 2007, Anaise 1979, Mahoney *et al* 2008, Chang & Shih 2004).

Basic oral health knowledge was moderate as evidenced by many respondents getting the answers right for etiology, prevention, symptoms and treatment for both caries and periodontal disease. However, there were some concerns over misconceptions (for example: sugary food can cause periodontal disease; which is not true) and lack of exposure in certain areas (for example: the role of smoking in periodontal disease.)

Reported oral hygiene behavior was acceptable for frequency of brushing although, the percentage reporting brushing once a day was higher than the normal population as opposed to the recommended at least twice a day (Ministry of Health, 2006). Low use of dental floss was similar to that of the general population, while use of mouthrinses was higher in this study (Ministry of Health 2006) Utilization behavior appeared to be inadequate, with high reports of symptomatic attendance, and even evidence of non-attendance. Another interesting finding is that more than half of the respondents admitted having experienced a dental symptom – namely; tooth sensitivity, gingivitis and oral malodour. It is unfortunate that in spite of having these symptoms, most of them have not visited the dentist for a long time.

The question of access needs to be explored to identify barriers to care so that an effective oral health

intervention may be planned and executed (Nandini 2003, Yalcinkaya & Atalay 2006). There is a possibility that most of the people would only seek dental treatment if they were in great pain, otherwise they would think that their oral condition was good even it was not; especially because they lack the capacity to detect signs of abnormalities within the oral cavity in a visual manner. Moreover, some would just bear the pain hoping that it would resolve.

Two of the most common oral diseases affecting mankind are dental caries and periodontal disease. Although the disease mechanisms are different both diseases are initiated by the presence of microbial dental plaque. Dental plaque that is present on tooth surfaces will affect the oral hygiene status of an individual. If it is not removed from the tooth surface through effective oral hygiene measures, it will lead to inflammation of the gingival tissues, also known as gingivitis which is characterized among others as bleeding of the gingival tissues upon probing. Gingivitis is also considered as the mildest form of periodontal disease and one that is reversible. Subsequently dental plaque will undergo calcification, harden and form dental calculus. So in other words, presence of dental plaque, gingival bleeding and dental calculus are indications of oral hygiene status and this directly affects periodontal status. At a more advanced level of periodontal disease, chronic periodontitis can develop; and this is defined as an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment, and bone loss (American Academy of Periodontology 2001).

In this study, the overall percentage of sites with plaque for all the subjects was a mean of 81.7%. This can be considered as poor oral hygiene due to ineffective plaque control or oral hygiene measures. However, the absence of a control group measuring plaque levels makes it difficult to conclude that plaque levels among the low vision group is worse off compared to a sighted population. What may be concluded is that plaque level for this group was high and it should be of concern as this may lead to dental caries or periodontal disease. The percentage of sites that had gingival bleeding was low to moderate and this implies that the extent of active periodontal disease was not severe in this study.

In the most recent nationwide survey in Malaysia, which was the National Oral Health Survey of Adults (NOHSA) conducted in 2000 (Oral Health Division 2004), it was found that for the 15-19 years age group, 25.8% had healthy periodontium. The remaining had varying degrees of periodontal disease including gingivitis (11.2%), dental calculus (60%), shallow periodontal pockets of 4-5mm depths (2.9%) and deep pockets of 6mm and more (0.1%). In this study, only 2.6% had healthy periodontium, 10.3% with gingivitis, 69.2% with calculus, 10.3% with shallow pockets and 7.7% with deep pockets. In comparison with the general population, there was a smaller proportion of individuals in this study who have healthy periodontium yet a much higher proportion with the most advanced periodontal condition. This indicates that many had poor oral hygiene which would require dental scaling procedures to clean the affected tooth surfaces and some actually need complex specialist care.

Among the three groups of vision classification: normal (one eye normal), low vision and the blind, plaque levels were highest for the normal vision group, but this difference was not found to be statistically significant. On the other hand, scores for gingival bleeding were found to be highest among the blind (Kruskall-Wallis Test, $p<0.01$). Gingivitis is an inflammatory process affecting the soft tissues surrounding the teeth, the most common type is one where bacteria is its primary cause (plaque-related) which colonises the gingival sulcus and adjacent tooth surfaces. This relationship between plaque deposits as one that is of cause-and-effect has long been established (Anerud *et al* 1979, Loe *et al* 1986) and thus demonstrates that bleeding of the gingiva is a sequelae of prolonged plaque accumulation and retention on tooth surfaces. So although, plaque levels appear to be the same among the three types of vision classification, active disease is highest among the blind.

Recommendations for future research include ensuring a larger sample size to allow for a better representation of the target population and to improve external validity of results in future study. It is highly desirable that questionnaires are developed specifically for the blind and translated into Braille to improve internal validity of the study. Qualitative research methods to be employed for interviews and various observation methods can provide an insight into more in-depth information and greater wealth of data. The understanding of the capabilities and limitations of those impaired with visual-related conditions will help the dental care providers to facilitate quality care. Moreover, only with keen collaborations with other members of healthcare team can comprehensive health care be achieved.

5. Conclusions

Oral hygiene practice; which was self-reported was generally acceptable except that the proportion of brushing once a day was higher than the general population. Use of dental floss was low, similar to the general population. Most were symptomatic attendees while some reported that they never had any form of dental treatment. Oral health knowledge was moderate with some questions answered correctly but with some evidence of

misconceptions and lack of exposure. Periodontal status was poorer than the general population with many requiring treatment as assessed normatively as well as reported by the respondents. Sites with bleeding on probing were found to be significantly highest among the blind group ($p<0.05$), while those with plaque show no significant differences between different visual groups.

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Table 1. Average percentage of sites with plaque

Site	Mean percentage (S.D)
Full mouth	81.7 (23.6)
Anterior upper buccal	78.7 (36.8)
Anterior upper palatal	75.1 (37.0)
Posterior upper buccal	82.9 (26.3)
Posterior upper palatal	84.4 (26.3)
Anterior lower buccal	80.9 (36.1)
Anterior lower lingual	78.8 (35.7)
Posterior lower buccal	81.2 (30.7)
Posterior lower lingual	90.1 (20.4)

Table 2. Average percentage of sites with bleeding on probing

Site	Mean percentage (S.D)
Full mouth	35.1 (33.6)
Anterior upper buccal	33.3 (40.4)
Anterior upper palatal	27.1 (36.8)
Posterior upper buccal	41.5 (37.2)
Posterior upper palatal	34.2 (39.6)
Anterior lower buccal	31.4 (41.1)
Anterior lower lingual	33.3 (40.5)
Posterior lower buccal	28.7 (38.5)
Posterior lower lingual	49.5 (36.7)

Table 3. Distribution of subjects according to the highest CPI score

Score	Number (%)
Healthy	1 (2.6)
Bleeding	4 (10.3)
Calculus	27 (69.2)
Pocket 4-5 mm	4 (10.3)
Pocket 6 mm or more	3 (7.7)

Table 4. Distribution of subjects according to the highest score for periodontal treatment need

Score	Number (%)
No treatment	0 (0.0)
Oral hygiene instruction	5 (12.8)
Simple scaling	27 (69.2)
Deep scaling	4 (10.3)
Complex treatment	3 (7.7)

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Table 5. Distribution of sites with plaque by classification of vision

Classification of vision	Mean percentage of sites with plaque (S.D)	Mean rank of percentages (*)
Normal	48.1 (10.4)	23.7
Low	44. 8 (16.6)	22.5
Blind	40.5 (13.3)	17.0

*Kruskall Wallis Test, $p>0.05$

Table 6. Distribution of sites with gingival bleeding by classification of vision

Classification of vision	Mean percentage of sites with bleeding (S.D)	Mean rank of percentages (*)
Normal	15.0 (16.2)	18.0
Low	4.0 (5.2)	8.4
Blind	26.2 (17.9)	25.8

*Kruskall Wallis Test, $p<0.05$

Applying Balanced Scorecard to Hellenic Navy's Education and Training: An Initial Approach

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Abstract

Like organizations striving for growth, Hellenic Navy is facing rising pressure to increase the value added by its services. To meet this challenge in an era of scarcity of resources Hellenic Navy's education and training will need to undergo fundamental changes in the way they operate and continuously seek ways to create future value. This paper explores and discusses the potential applicability of Balanced Scorecard in Hellenic Navy's education and training in order to stimulate and sustain continuous improvement. Favorable results were reported in the for-profit and government organizations supporting the aforementioned applicability.

Keywords: Hellenic Navy's Education and Training, Scorecard to Hellenic Navy's Education and Training, Balanced Scorecard

1. Introduction

Nowadays there is an increased trend for government departments and public entities for reform especially in the area of management and budgeting. This reform along with the decreased government funding have resulted the need for delivering agreed outputs as efficiently as possible. In turn, this need has as an effect the adoption of private sector management practices one of which is performance measurement (Niven 2008; Holmes *et al* 2006; Pallot 1991; Supppanz 1996).

Traditionally, performance measurement systems have been based on financial results which have a limited effect on the criteria used to measure, to assess or even more to drive performance. In the past, various systems for performance measurement that overcome this limitation have been suggested. One of these, the Balanced Scorecard (BSC) has met worldwide acceptance as a management tool that measures and drive performance based on financial and non-financial indicators.

2. Background

The concept of the balanced scorecard was first introduced by Robert S. Kaplan and David P. Norton (1992) in their now well known *Harvard Business Review* article "The Balanced Scorecard – Measures That Drive Performance". The idea of BSC has met enormous success worldwide especially in private sector organizations. For instance, Kaplan and Norton (2001) reported that by 2001 about 50% of the *Fortune* 1000 companies in North America and 40% to 45% of companies in Europe were using the BSC.

The core argument of BSC is that financial results alone cannot capture value-creating activities (Kaplan & Norton, 2001a). That means that financial measures are lagging indicators and, as such are not effective in identifying the drivers or activities that affect financial results. Also, Kaplan and Norton (1992) suggested that organizations, while using financial measures, should develop a comprehensive set of additional measures to use as leading indicators of financial performance.

The BSC is based on balanced set of measures covering financial, customer, innovation and learning process areas to manage effectively. In addition, the BSC is used to translate an organization's mission and strategy into a comprehensive set of performance measures that enables organizations to track short-term financial results while simultaneously monitoring their progress in building the capabilities that generate future growth. In contrast to financial performance measurement systems, the BSC "puts strategy and vision, not control at the center. It establishes goals but assumes people will adopt whatever behaviors and take whatever actions are necessary to arrive at the goals" (Kaplan & Norton, 1992).

Kaplan and Norton divide the BSC into four quadrants of measures: financial, customer, internal business process and learning and growth. The adoption of these measures is not mandatory; instead a BSC is needed to be built in order to link measures with organization's strategy. Actually, an organization's BSC is imperative to reflect unique characteristics of the organization, for instance, cultural aspects, strategic planning horizon and the nature of operations (Hoffecker & Goldenberg 1994; Chesley & Wenger 1999).

However, after the initial introduction and the following evolution of BSC Kaplan and Norton (1996a) figured out that manager were using the BSC as a central organizing framework based around four key management processes:

- Clarifying and Translating Strategy
- Communicating and Linking Strategic Objectives and Measures
- Planning, Setting Targets and Aligning Strategic Initiatives
- Enhancing Strategic Feedback and Learning

Supportive to the use of BSC as a strategic management system are Birchard (1996), Booth (1996), Chow *et al* (1998) and Huckestein & Duboff (1999).

In addition to that, BSC has been found to be used as a tool to communicate information to external stakeholders. According to the United States Conference Board (1997), the disclosure of strategic performance information is a delicate balancing act. Whereas better company valuation and improved conditions for institutions to discuss strategy with management are recognized as benefits, in that case the costs of disclosure include the following:

- Exposure to the company to litigation
- Revealing competitive information
- Comparability of data

An example of this use of BSC is the OCIMF (Oil Companies International Marine Forum) Guide, which is an initiative from the tanker industry, by promoting TMSA (Tanker Management Self Assessment) as a tool that can help the ship's operators/managers to measure and to improve their management systems. The TMSA is based on the belief that it encourages ship operators to achieve high standards of ship management and of continuous improvement, and it provides direction towards the proposal of current best practice for the industry via the forum. The sequence of action, based on the TMSA, is plan – act – measure – improve. Furthermore TMSA provides feedback of information to the charterer about the effectiveness of Total Safety Management of the ship manager (Goulielmos M *et al*, 2008).

The BSC is considered to have an increasing applicability to government organizations that often operate in the absence of a competitive market and it seems to have the potential to improve transparency and accountability for these organizations. The BSC provides government organizations an opportunity to demonstrate value for money and recognizes the multiple dimensions of value (Gambles 1999; Griffiths 2003).

Nevertheless the concept of BSC has been widely adopted and used in the business sector, followed by the public sector; the education sector has not embraced the BSC widely. A thorough review of the literature yielded few significant publications, as pointed out by Karathanos D & Karathanos P (2005). While, Cullen *et al*. (2003) proposed that a balanced scorecard be used in educational institutions for reinforcement of the importance of managing rather than just monitoring performance. Sutherland (2000) reported that the Rossier School of Education at the University of Southern California adopted the Balanced Scorecard approach to assess its academic program and planning process. Also, Chang & Chow (1999) reported that responses in a survey of 69 accounting department heads were generally supportive of the balanced scorecard's applicability and benefits to accounting programs.

BSC applicability seems to be expanded in the area of defense agencies, where a GAO report (2004) depicts that the Department of Defense in the USA (DoD) "took steps to strengthen performance plans and scorecards by revising and review process, requiring performance measures to align with agency and departmentwide goals, and requiring measures to provide a more comprehensive view of agency performance". However, despite the BSC applicability on defense agencies the literature on the issue is extremely limited.

Accordingly, there is a need for research that examines the range of BSC applications in Hellenic Armed Forces services and organizations. The present paper is examining an initial approach for BSC application in Hellenic Navy's (HN) education and training systems. The work presented is a part of the HN committee's task to prepare and propose evaluating and measuring performance tools for HN's education and training systems. The proposed plan of action is based on data collected through a in-depth structured survey with some of the stakeholders of HN's education and training systems (students and trainers), a SWOT analysis (Strengths – Weaknesses – Opportunities – Threats) for the above systems and an thorough research on HN strategic management practices for education and training.

3. The Hellenic Navy BSC initial approach

From the findings of the up to date research, the BSC application for HN's education and training systems might have a multiple use as following:

- BSC to assist the development and management of the organization's strategy and strategic objectives and ensure that internal work programs and resource allocation priorities are aligned to the mission.
- BSC to clarify, translate, communicate and measure the organization's strategy.
- BSC to be a strategic management tool to clarify the vision and strategy and communicate and link strategic objectives and measures.

Supportive to our research is the BSC literature (Birchard 1996; Kaplan & Norton 1996a, 1996b; Epstein & Manzoni1997) reports that organizations initially use the scorecards as a performance measurement tool and evolve to using BSC as strategic management tool. It is well documented the transformation power of the balanced scorecard to move an organization from the measurement system to a management system. The foundation for such a system is the alignment of area and individual goals to HN education and training systems. Thus the first step in BSC is to examine the purpose of the organization from which all other initiatives flow. A broad expression of this purpose is expressed in its vision and mission statements:

Vision statement: The vision of HN education and training systems is the provision of the optimum and cost effective education and training to HN human resources based on operational and non operational needs of HN.

Mission statement: The mission of HN education and training systems is to prepare students to be both managers and leaders who add significant value to HN and communities

From the vision and mission flows the HN education and training systems' value proposition, based on the distinctive characteristics that give HN a competitive advantage in the marketplace – overwhelmingly deterrent sea power.

The core values held at the HN education and training systems come from the long tradition and history of HN and the Greeks as a maritime nation and these are derived through the dominant organizational culture of HN. Our initial research has identified the following core values:

- Sense of being member of an expanded team (HN)
- Innovation
- Adaptability
- Mutual trust and appreciation

- Sense of duty and task accomplishment
- Quest for optimum solutions
- Experiential learning
- Use of technology
- HR management emphasis
- Personal development
- Leadership

It is evident that the BSC model outlined by Kaplan & Norton (1992) has to be extensively modified by the HN education and training systems BSC designing process. Financial and Customer quadrants must be replaced by Shareholder and Stakeholders & Leadership quadrants to reflect a wider accountability and a non profit focus in public sector organizations.

4. Future work

From the initial findings and as the our research is expanding along with our deepening understanding in the issue of BSC our intention is to draw guidelines for further action in building our BSC. However, before trying to map variables that drive the organization and selecting measures encouraging staff, faculty and students to act in alignment of HN strategy, we believe that our committee must define strategy, which in turn depends on a well defined value proposition. Thus the following goals are set as prerequisite for strategy definition:

1) Clarify mission and strategic performance aims

As the principal guiding statement, the mission is most critical in establishing strategic priorities. Also, mission statement should be reexamined periodically to ensure consistency with other organizational HN units and changing environment conditions

2) Identify and prioritize core values

While organizations might differ in core values, the process in our committee is instructive in finding and evaluating value congruence among all stakeholders of HN education and training systems. So, our research should be expanded to include all stakeholders (students, faculty, staff and external stakeholders) in order to find the full spectrum of core values and to distinguish core value ordering. General agreement about core values should lead to a natural and pre-existing determination of HN education and training systems' value proposition. It is believed that this a necessary condition for developing a uniform strategy upon which a BSC strategic approach can be built.

The value proposition is the basis for defining how HN education and training systems will accomplish its statement of vision and mission. The ordering of values taken from our expanding research will guide the choice of activities composing the "internal operations" perspective of the balance scorecard. The list and sequence of core values will provide the required action plan for implementing strategy. For instance, if personal development is chosen as a core value, then it should also appear in internal operations. Measures can then be constructed to track activities in that direction. Thereby, focusing in enhancement of personal development. By comparing measures of actual performance with established targets, performance gaps can be identified, and initiatives can then be taken to align measures and action in align with core values.

3) Survey key stakeholders

Up to date our survey has been limited to faculty and students. In addition, our survey will include a follow up of our students surveying them in a later time in their working environment. However, there is the identified need to determine who the key constituents are. In a large organization such as HN, the stakeholders of HN education and training systems consist probably a wide group. It is part of our research to identify them and prioritize their impact and importance in order to make the appropriate expansion of our survey to the key stakeholders. Besides to this, given the dynamic nature of BSC, this has the capacity to strengthen relationships with the key stakeholders. This potential benefit is an element that must also be examined during the mentioned survey.

4) Strategy and Annual Work Plan

Kaplan & Norton (1996a) suggest that the scorecard can provide a bridge between an organization's strategy and the annual work plan. Based on this, it is assumed that when focusing in the initiatives that contribute to strategy, then initiatives can be prioritized. Also, Kaplan & Norton (2001b:352) note that this is a particular challenge for non-profit organizations as the decision-making and planning process generate more initiatives than can be met

within funding levels. Therefore, the BSC, that is to be built, should used as a framework to prioritize to what must be achieved in any one year. Once the annual initiatives have been established these can be translated into accountability documents. It is believed that as the initiatives are linked to the strategy of the organizations, the impact that specific initiatives will have on the mission is transparent.

*5) **Individual and Organizational Goals Linkage***

It stands to reason that the linkage between individual and organizational goals with BSC is essential. Poor designed BSCs have found to have none linkage with these goals. By reviewing literature (McKenzie & Shilling 1998; McWilliams 1996) it depicted the necessity of establishing reliable linkages between scorecard measures is essential if the scorecard is to be accepted in an organization. If the linkages are not robust, then it is likely that the credibility that the compensation mechanism and the scorecard will be undermined. Also, Kaplan & Norton (1996b) note that the organizations may not have appropriate and reliable data for the many of the measures in the early stages of the BSC. Until these linkages had been embedded and measures established, the linkage to individual managers and performance assessments will not be made.

5. Conclusion

The present paper has sought to illuminate the processes, purposes, and limitations for designing and developing a BSC for HN education and training systems as part of its self-assessment by developing and reporting a comprehensive set of measures that comprise both leading and lagging indicators. A critical requirement is that measures be aligned with the organization's strategic objectives.

While there is no reported BSC implementation in a similar or equivelant unit of organization as HN education and training systems, the experiences from the for-profit sector indicate that developing and implementing the BSC can be a complex and lengthy process. Apart from that, the present paper illustrates clearly that the preparatory work that is needed might turn out to be heavy load to carry. In addition, it is obvious that the time span between the start of process of BSC and harvesting of initial results can be considerable.

Given the mounting challenges to HN along with the unprecedented levels of change in the environment that HN operates, meeting these challenges in an era of shrinking resources will require HN education and training to undergo fundamental changes and to continuously seek ways to create future value. So it is imperative that there is no time for HN to lose in implementing BSC or similar approaches to promote and support change.

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Health Status and Personal Hygiene among Food Handlers Working at Food Establishment around a Rural Teaching Hospital in Wardha District of Maharashtra, India

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Abstract

Introduction: The chances of food contamination largely depend on the health status of food handlers & their hygiene behaviors and practices. Often these food handlers are appointed without proper health examination. The present study was conducted to assess health status of food handlers working in food establishment nearby a medical institute. **Material & methods:** A cross-sectional study was conducted on randomly selected 160 food handlers of both sexes. Stool examination and nail culture was also done. **Result:** There was no registration of these food establishments. Most of the food handlers were young in age, mostly cooks (35.62 %) and literate (63.13 %). Point prevalence of morbidity was 54 (33.75%) and period prevalence 26.25 %. 21.87 % were anemic.

Microbial positivity rate for their stool & nail culture was 97 percent. **Conclusion:** Registration of all food establishments should be mandatory. Pre-placement and periodical medical checkup is the key to improving health status of food handlers for better food safety.

Keywords: Food handler, Food handling, Hygiene, Health status, Bacterial infections

1. Introduction

Industrialization, urbanization and population growth have promoted people to migrate from rural to urban areas, forcing them to have their meals at any place at an affordable price. In urban areas, there is mushrooming of eating establishments due to increased demand.

The term *food safety* is increasingly being used in place of *food hygiene* and encompasses a whole range of issues that must be addressed for ensuring the safety of prepared food. Food hygiene probably put too much emphasis on cleanliness but food safety requires much more than a clean premises (Food Hygiene Safety). The high incidence of food borne illnesses has led to an increase in global concern about food safety (Van Tonder, 2007). Several food-borne disease outbreaks have been reported to be associated with poor personal hygiene of people handling foodstuffs.

Food borne diseases are increasing in both developed and developing countries. Diarrhoeal diseases, mostly caused by food borne microbial pathogens, are leading causes of illness and deaths in the developing countries, killing an estimated 1.9 million people annually at the global level (Schlundt J, 2004).

An estimated 76 million food borne illnesses occur annually in the United States. These food-borne illnesses result in an estimated 325,000 hospitalizations and 5000 deaths every year in the United States. The cost of the most common food borne illnesses in the United States is estimated at $6.5–$34.9 billion annually (Mead PS, 1999). In the past few decades, the epidemiology of food borne diseases has changed with several emerging and reemerging pathogens. Some of them may pose a low risk to most individuals, but may be life-threatening to others (Maizun Mohd Zain, 2002).

Between 1998 and 2002, an average of 1329 food borne disease outbreaks were reported to the Center for Disease Control and Prevention (CDC) each year. Approximately 52% of these were attributed to food service establishments (Jones TF, 2006; Lynch M, 2006). During the same period, the Oregon Public Health Division reported 62 food borne outbreaks or approximately 5% of the national total (Emilio E. DeBess, 2009). Another study conducted in Malaysia also showed that approximately 10-20% of food-borne disease outbreaks are due to contamination by the food handlers (Zain MM, 2002).

We, as the Public Health Epidemiologists along with Environmental Health Specialists are the first to respond to a food borne outbreak, and to investigate, analyze, and report any food borne disease outbreaks, including restaurant-associated illnesses. Routine surveillance underestimates the incidence of food borne gastrointestinal illness related to food consumption in restaurants by approximately 20–38 times (Evan MR, 2006; Jones TF, 2006).

Food contamination may occur at any point during its journey through production, processing, distribution, and preparation (Green L, 2005; Hennessy TW, 2004). The risk of food getting contaminated depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene (Mead PS, 1999). Infections can also be acquired through contaminated unwashed fingers, insects, and circulation of bank notes and by wind during dry conditions (Isara AR, 2009). Contamination of food with eggs and cysts especially those sold by hawkers may also serve as a source of infection to consumers of such items (Umeche N, 1991). Therefore, food handlers i.e. any person who handles food, regardless whether he actually prepares or serves it, play an important role in the transmission and, ultimately, prevention of food borne disease (Isara AR, 2009). Information regarding food handlers' practices is key to addressing the trend of increasing food borne illnesses.

In recent years, due to changing lifestyle, breakdown of joint family system and increase in number of working women has led to consumption of *ready to eat* foods. The individuals may be able to satisfy their taste and nutrition needs, but pays little attention to hygiene and food safety (Santosh MJ, 2008).

It is necessary to register all types of food establishment so that supervision and monitoring of hygiene of the food as well as the food handlers can be done. There are hardly any registered food establishments existing in rural and peri-urban areas of Wardha district. There are many sporadic cases of food borne diseases reported among the consumers. This study was undertaken with the aim to evaluate the knowledge and practices of food handlers and identify gaps in education & training of food handlers. The objectives of the study were to:

1. Assess health status of food handlers working at food establishments situated in the study area.

2. Assess relationship between food handler's hygiene behavior and practice & their health status.

3. Assess the microbial growth patterns of food handler's stool and hand nail.

4. Know registration status of food establishments present in the study area.

2. Methodology

Study Design: This is a cross-sectional study conducted in a rural area of Wardha district of Central India, situated in close proximity to ***Acharya Vinoba Bhave Rural teaching Hospital.***

Study Sample: The study was carried out between October to December 2009, amongst food handlers working in 15 food establishments located in the study area. A food handler is any person who handles food, regardless of whether he actually prepares or serves it (Isara AR, 2009). Of the 169 total food handlers working in these 15 food establishments, 160 food handlers (94.67%) participated in the study. Those food handlers who could not be contacted even after three visits, were unwilling to give stool/nail specimen, refused to participate were excluded from the study.

Study Method: During first visit, a list of all the food handlers working in 15 establishments was prepared. During the subsequent visits, a pretested questionnaire was used to collect the demographic details of the food handlers; information related to personal hygiene, personal habits, history of illness; and registration of food establishments. The questionnaire also assessed the individual's knowledge about prevention of food borne illnesses, food hygiene and attitude towards measures for control & prevention of food borne illnesses. An observational checklist was used to assess environmental hygiene, cleanliness of food, and food handling practices. General & systemic examination of all of the study participants was carried out. Hand nails were examined & samples of fingernail contents were collected from both the hands of each subject using sterile –moistened swab sticks. The participants were each handed a culture bottle and requested to bring stool sample next morning. The stool & nail sample thus collected were immediately transported to microbiology laboratory. All the samples were cultured on Mac Conkey Agar & Blood Agar and incubated at 37^{o}C for 24 hours and the bacterial species were identified using standard procedures (Mackie, 2007).

Data collection and analysis: Information from food handlers on above mentioned variable were collected using interview technique. Findings of the nail and stool culture after microbiological examination were noted. Data on registration of food establishments were enquired from owner and verified from local health authorities of the district. Data thus collected was analyzed. The health status of the individual was co-related with the economic status. Economic status of the individual is categorized into two groups' ***Below Poverty Line (BPL)' & 'Above Poverty Line (APL)'.*** For urban dwellers, the BPL is defined as living on less than 538.60 rupees (approximately USD $12) per person per month, and for rural dwellers, less than 356.35 rupees per person per month (approximately USD $7.50). Those who have earning above this amount were considered as APL (Tenth five-year plan, 2002-2007).

3. Results

There was no registration of any of these 15 food establishments of the 160 food handlers, 54.37% were below 30 years of age, whereas 3.75% were children less than 10 years of age. Majority of food handlers were males (69.38%) and from rural areas (66.87%). 46.25% were helpers while 35.62% were cooks.

36.87% participants were illiterate while 25.62% were educated up to secondary school. The percentage of participants who were below poverty line was 33.75%.

58(36.25%) of the food handlers were free from any of the common addictions. However the percentage of food handlers with one or more addictions is high. 39(24.37%) were smokers, 44 (27.50%) consumed alcohol daily, 30(18.75%) were in the habit of chewing tobacco and 32(20%) habituated to pan chewing. Some of the food handlers were habituated to more than one habit. (32.50%) was mostly found to be both smokers as well as alcoholics.

As mention in Table 2, majority of the participants (73.74%) were having clean nails and were cutting their nails satisfactorily i.e. at least once a week. 49.38 % were washing hands with soap and water after using the toilet. The kitchen surface area was found to be clean in 73.13% of the food establishments and was being cleaned by soap & detergents (61.87%).

When health status of study group was assessed it was found that 21.87% were suffering from anemia, dental carries (10%), halitosis (10%) and scabies (5.62%). Point prevalence of morbidity was 33.75% and period prevalence in three months period was found to be 26.25%. 42(26.25%) of food handlers, reported some illness in the past three months. (Table No. 3).

Table No. 4 shows that Klebsiella was found in 56(35%) & Pseudomonas in 4 (2.50%) of the stool cultures, and Staphylococcus in 91(56.87%), E-coli in 28(17.5%), and Klebsiella in 35(21.87 %) of the nail cultures.

When association between education and their personal hygiene was assessed, it was found that amongst the illiterate group, only 13.79% were cleaning cloths, 14.28% were using overhead cap, 5.71% kept their hair neat and tidy, 7.14% had clean nails, and 16.66% were using footwear. In comparison the percentage of literates wearing clean clothes was (31.03%), wearing cap (28.57%), neat and tidy hair (25.71%), clean nails (25%) and footwear (50%). This shows that literacy level of food handlers is inversely proportional to their personal hygiene practices. (Figure I)

Food handlers who belongs to Below Poverty Line group were found suffering mainly from morbid conditions like Anaemia (59.25%), halitosis (11.11%), scabies (9.25%), and Phyrnoderma (3.75%). Tuberculosis, leprosy and skin diseases together accounted for 12.96%. Comparatively the Above Poverty Line group suffered mainly from diseases like Hypertension and Diabetes (3.77%) and Dental Carries (11.32%). (Figure II)

4. Discussion

Despite continuing progress made in food quality and safety, food borne disease outbreaks continue to be reported in the literature. The most frequently identified factors contributing to the outbreaks are contaminated raw foods/ ingredients, and poor personal hygiene by persons who handle foods ***(Report of the FDA retail food programs, 2000).***

The study reveals that maximum number (54.37%) of food handlers were below 30 years of age but unfortunately 3.75% were small children below the age of 10 years. In a similar study by ***Udgiri RekhaS, Masali KA (2007)*** they found 73.2% of respondents were below 30 years of age and only 9 (2.72%) respondents were above 50 years whereas ***Gupta and Ketkar (1981*)** from Nagpur in their study on food handlers observed that 22.3% of them were below 25 years of age. It is also seen that a majority (69.38 %) of food handlers were males in the present study. Maximum number (46.25 %) were helpers and majority (66.87 %) of food handlers were from rural areas while 29 (18.13 %) were from the slums. In a study by ***Isara AR and Isah EC*(2009)** they found 65.1% were females while another study by ***Maizun Mohd Zain and Nyi Nyi Naing (2002)*** found 69.5% of the food handlers were females.

59 (36.87 %) food handlers were found illiterate in the present which differed markedly from the study by ***Isara AR and Isah EC*** (2009), wherein they found 98% of the respondents were having formal education. The lower literacy rate in the present study may be due to the fact that majority of food handlers were migrants from states like Madhya Pradesh, Bihar and Uttar Pradesh where the literacy rates are relatively lower.

Gupta and Ketkar (1981) reported that 50% of the food handlers were habituated to chewing pan and 40.1% to chewing tobacco. These findings varied from the present study, where 39(24.37%) were smokers, 44 (27.50%) consumed alcohol daily, 30(18.75%) were in the habit of chewing tobacco and 32(20%) habituated to pan chewing. Some of the food handlers were habituated to more than one habit. (32.50%) was mostly found to be both smokers as well as alcoholics. 58(36.25%) of the food handlers were free from any of the addictions.

Food handlers who belongs to below poverty line group were found suffering from majority of the morbid conditions like anemia, halitosis, scabies & other skin diseases, phyrnoderma, tuberculosis, leprosy as compared to those above poverty line. However Hypertension, Diabetes and Dental Carries were more common amongst the individuals who were above poverty line. (Figure II). For urban dwellers, below poverty line is defined as living on less than 538.60 rupees (approximately USD $12) per person per month, and for rural dwellers, less than 356.35 rupees per person per month (approximately USD $7.50). (Schlundt J, 2004)

42(26.25%) of food handlers, reported some illness in the past three months. The morbidity suffered by the participants is depicted in table no. 3 in order of magnitude. The past history was restricted to 3 months to facilitate better recall. ***Rathore AS (1993)*** observed that 25.33% of food handlers suffered one or the other illness in the past 6 months. Of the total 160 food-handlers, 54(33.75%) were currently suffering from some or the other disease. Anemia was found in 35(21.87%) individuals. The high level of morbidity in food handlers could probably be due to poor environmental conditions, poor personal hygiene and low socio-economic status. ***Chitnis (1986)*** who had reported 74.13% overall morbidity, found that anemia (22.13%) was the most frequently seen morbid conditions.

When stool culture was examined, Klebsiella was found in 56(35%) food handlers, Pseudomonas in 4(2.50%), beta Streptococcus and Proteus (1.87 & 1.25% respectively) and Salmonella in 5(3.12%). We found Staphylococcus in 91(56.87%), E-coli in 28(17.5%) and Klebsiella in 35(21.87 %) in nail cultures. In a study by ***Gashaw Andargie and et al*** they isolated several species of bacteria, including *S. aureus (16.5%)*, and intestinal bacterial species, such as *Klebsiella (5.5%)*, *Enterobacter (0.8%)*, *E. coli (3.1%)* from their fingernail contents (Gashaw Andargie, 2008). ***Mohan V (2001)*** observed the overall prevalence of intestinal parasite infestation to be

14% whereas in a study by ***OA Idowu and SA Rowland (2006)*** 97% of the food vendors were infected with one or more faeco-orally transmissible parasites. Such a high prevalence of intestinal parasites is largely due to poor personal hygiene practices and environmental sanitation, lack of supply of safe water, poverty, ignorance of health-promotion practices, and impoverished health services.

Washing of hand with only water (without using soap) after using the toilet was practiced by 81(50.62%) whereas frequency of cutting nails is less or nil in 26.25% of the food handlers. ***Gashaw Andargie and et al*** reported that 11% of the food-handlers did not practice hand-washing after using the toilet, this shows that there is a need to give more emphasis on personal hygiene, self care & related practices of food handlers.

5. Conclusions

The health status and the level of personal hygiene of the food handlers in the eating establishments were found to be unsatisfactory. The cooks and suppliers who handled food were not maintaining a satisfactory personal hygiene, thereby increasing the risk of food contamination considerably. Good personal hygiene is also expected among the cleaning and dish washing staff. Food hygiene can be best promoted by educating the food handlers about personal hygiene. The findings highlight the importance of food hygiene education among food handlers; to inculcate the practices of good personal hygiene.

Although most of the workers in the organized sectors are covered under the Employee's State Insurance scheme and are entitled to medical and other benefits, it is not the case with the unorganized sectors, and small food establishments. Daily inspections of the workers with regard to their health and hygiene, Periodic medical examination along with necessary treatment such as de-worming should be done. Training in hygiene and sanitation for all employees working in food establishments is an essential step towards ensuring food safety.

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Table 1. Distribution of food handlers as per their socio-economic & demographic characteristic at Wardha 2009

Socio-demographic Characters		**Number**	**%**
Age N=160	< 10 years	06	03.75
	10-29 years	81	50.62
	30-49 years	59	36.87
	>50 years	14	08.76
Sex N=160	Male	111	69.38
	Female	49	30.62
Occupation N=160	Cook	57	35.62
	Helper	74	46.26
	Waiter	29	18.12
Residence N=160	Rural	107	66.87
	Urban	24	15.00
	Slum	29	18.13
Education N=160	Illiterate	59	36.87
	Primary	17	10.62
	Secondary	24	15.00
	High-school	42	26.25
	Above High-school	18	11.26
Income Group N=160	BPL †	54	33.75
	APL ‡	106	66.25

†BPL -Below poverty line, ‡APL- Above poverty line N= Number of respondents

Table 2. Habits & personal hygiene practices of food handlers at working in food establishment, Wardha 2009

Practices of food handlers		Total no.	Percentages
Habits and addictions*	Smokers	39	24.37
	Consuming alcohol	44	27.50
	Chewing tobacco	30	18.75
	Betal chewing	32	20.00
	Mixed/double habits	52	32.50
	No addiction	58	36.25
Frequency of cutting nails	2 times in a week	51	31.87
	1 time in a week	67	41.87
	1 time in 2 week	36	22.51
	Need not cut	06	03.75
Washing of hand after coming from toilet	With water	81	50.62
	With soap	79	49.38
No. of time working area is cleaned	1 time	25	15.62
	2 time	117	73.13
	3 time	18	11.25
Cleansing material	Soap / detergent	99	61.87
	Only water	61	38.13
Personal hygiene of food handlers*	Use of separate cloth	14	08.75
	Tidy cloth	58	36.25
	Use of cap	14	08.75
	Tidy hair	70	43.75
	Clean nails	56	35.00
	Use of footwear	06	03.75

* Multiple response answers

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Table 3. Health status of food handlers

Health Status among food handlers		Number	Percentages
Morbidities*	Anemia	35	21.87
	Dental caries	16	10.00
	Halitosis	16	10.00
	Phrenoderma	03	01.87
	Scabies	09	05.62
	ARI & Diarrhea	04	02.50
	Leprosy	01	00.62
	TB	05	03.12
	HT	04	02.50
	DM	02	01.25
Total morbid subjects	During study	54	33.75
	During last 3 months	42	26.25

* Multiple response answers

Table 4. Stool & nail culture of food handlers (n= 160)

Culture of food handlers		No of food handlers	Percentages
Nail culture	Staphylococcus	91	56.87
	E Coli	28	17.50
	Klebsiella	35	21.87
	No organism	06	03.76
Stool culture	E Coli	92	57.50
	Klebsiella	56	35.00
	Pseudomonas	04	02.50
	Streptococcus	03	01.87
	Proteus	02	01.25
	Salmonella	05	03.12
	Shigella	04	02.50
	No organism	05	03.12

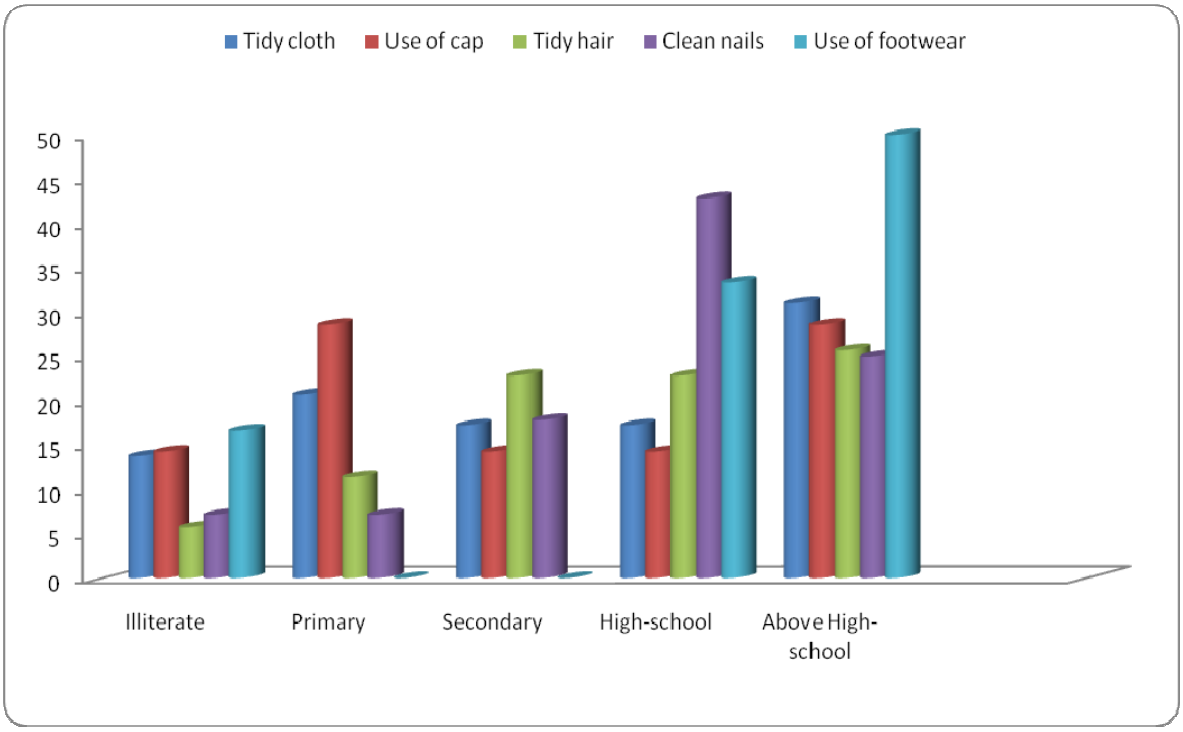

Figure 1. Association between education of food handlers and their personal hygiene

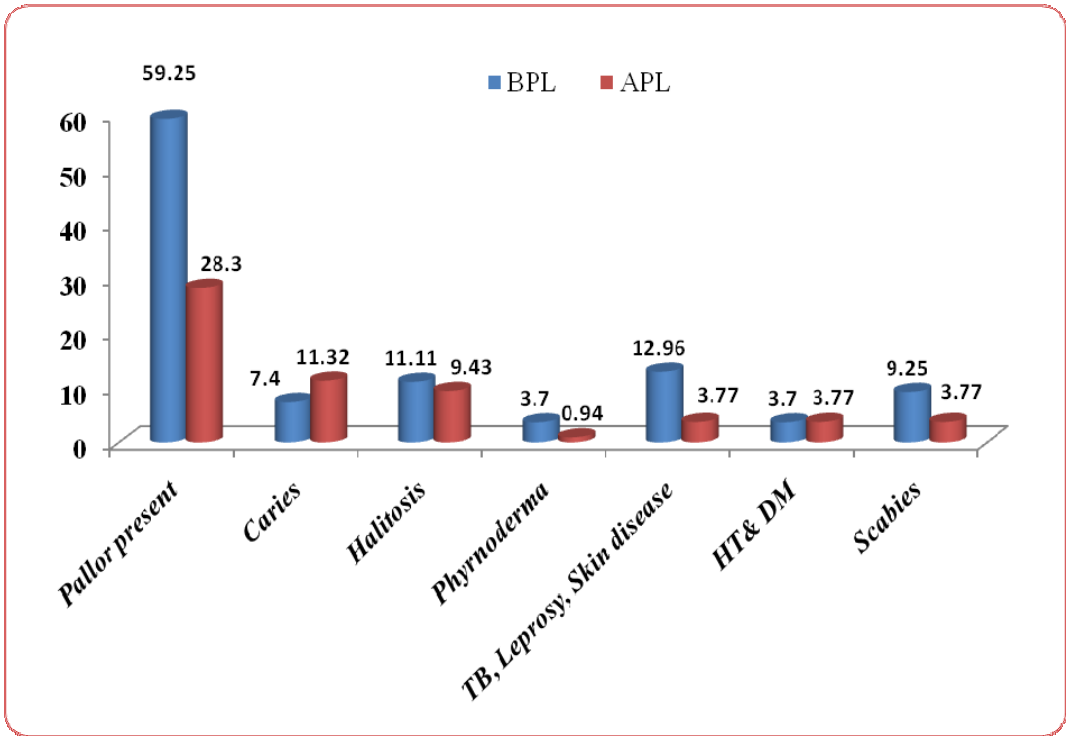

Figure 2. Association between income group and morbid conditions of food handlers

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Gender Identity: Challenges to Accessing Social and Health Care Services for Lesbians in Nepal

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Abstract

Literature about same-sex love and sexuality in Nepal is rare. However, limited anecdotal evidence on these issues signals that the health and social care needs of lesbians in Nepal are high. This qualitative study explores the challenges faced by lesbians in Nepal in accessing health and social services. In-depth interviews carried out with fifteen lesbians found that Nepalese lesbians face many challenges from families and society which result in a stressful life, homelessness and forced and unwanted relationships and marriage, including self-harming behaviours. They often face discrimination and harassment when coming out at public administration and social institutions. Hence, most lesbians of Nepal prefer not to disclose their sexual identity due to the fear of becoming isolated and not getting quality health care services.

Keywords: Gender, Lesbian, Discrimination, Barriers, Nepal

1. Background

Nepal has a patriarchal society where women are always considered to be second to men (Thapa-Oli *et al.* 2009). Women are seldom in a decision-making position in the family (Acharya *et al.* 2010). Life expectancy at birth for a female was always less than her male counterpart; however this has changed only since 2004 (WHO 2005). Nepali people have many strong traditional norms and beliefs on sex and sexuality (Mahat and Scoloveno 2001). Open discussion regarding sexual and reproductive health issues is still a social taboo (Simkhada *et al.* 2010). However, males are sometimes excused when talking about sex (Regmi *et al.* 2010). Sexual minorities i.e. Lesbian Gay Bisexual Transgender – LGBT (Ullerstam 1967) have only very recently been recognized at government level and are yet be socialized in Nepal.

In spite of instances of same-sex love and sexuality within almost all ancient civilizations (Vanggaard 1972) sex and sexuality issues are not widely accepted in Nepal (Dahal 2008). However, public acknowledgement of 'sexual minorities' is very recent in Nepal. Indeed, there are only a few organisations working in the field of sexual minority issues in Nepal and the Blue Diamond Society (BDS), a non-governmental organization, is spearheading this. BDS has already established networks in more than 20 municipalities/districts in Nepal. Actual facts and figures regarding the situation of lesbians in Nepal are rare; however, there are estimated to be 1,200 lesbians in Nepal (BDS 2008).

BDS contributed to the legalization of sexual minority issues by demanding protection of their legal rights in a petition for a verdict of the Supreme Court of Nepal. Their demands were threefold: to recognize the civil rights of transgender people without requiring them to renounce one gender identity for another; to create a new law preventing discrimination and violence against LGBT communities; and to require the state to make reparations to LGBT victims of state violence and/or discrimination. This petition was premised on the unique relationship between Nepal's Supreme Court and its legislature. In response to a request by BDS for legal observers to be present at the hearing, the International Gay and Lesbian Human Rights Commission (IGLHRC) commissioned a team of lawyers from India, to serve as court observers and share legal strategy with BDS legal counsel. Their report outlines the history behind the proactive litigation by LGBT groups in Nepal and provides legal analysis proceedings, which includes some precedent-setting remarks by the Court (Divan 2007). In this way, Nepal's Supreme Court ruled in favour of laws to guarantee full rights to sexual minorities, and all gender minorities have been defined as "natural persons". The Government of Nepal has also given consent to same-sex marriages (Narayanan 2008).

The only organization (non-governmental) in Nepal which works to improve the sexual health, human rights and well-being of lesbians is Mitini Nepal, although only a small number of lesbians have registered with this organization so far. Literature about discrimination, sexual abuse, social harassment and lack of access to public services by lesbians is also rare in the context of Nepal. Given this limited information, the health and social care needs of lesbians in Nepal are relatively still unknown.

It is generally recognized that lesbians suffer from depression, low self-esteem and social ostracism. Biaggio (1997) argued that lesbianism provokes confusion and uncertainty (for the women concerned) about how to address its consequences. Therefore, they are forced to lead a split life or dual existence. There is also evidence that lack of legislation and action by governments of Nepal to protect lesbians have resulted in many instances of abuse and discrimination (Mitini Nepal 2007). For example, if the lesbian woman is from a so-called 'low caste' ethnic group, she has to face triple discrimination - (1) as a woman, (2) as a low caste and (3) as a sexual minority (BDS 2008).

The aim of this qualitative study is to explore the challenges in accessing social and health care services by lesbians in Nepal. It is anticipated that the issues discussed in this paper would be beneficial in designing policies and programmes to address the specific needs of lesbians living in Nepal accordingly.

2. Methods

2.1 Study design and procedure

The study approach was an exploratory qualitative study. It is now widely accepted that qualitative methods are commonly used in health and social sciences (Flick 1998) and recommended for research on sexuality and other sensitive issues (Reid and van Teijlingen 2006, Silverman 2006). Previously this approach has been used to research sexuality and sensitive issues in Nepal (e.g. Puri & Busza 2004, Simkhada *et al*. 2010, Regmi *et al.* 2010).

In the summer of 2008, we carried out fifteen in-depth interviews with lesbians of Mitini Nepal. These participants were purposively selected. Interviews were conducted in an environment in which the respondent felt most comfortable, where they could freely discuss the issue. A semi-structured discussion guide was

developed in the Nepali language and tested with two lesbians. The guide consisted of a number of issues around socio-economic and cultural challenges, health problems, access to public services and places and access to health care. All interviews were conducted by a skilled researcher. They were tape recorded with the permission of the participants and generally lasted one to two hours. The participant was given priority to choose the location for the interview. On all occasions, appointments were made in advance.

2.2 Data management and analysis

We carefully made all transcriptions based on the original tape recordings. The first author translated all transcriptions into English. The translated version was cross-checked to ensure the inter-rater reliability. Any disagreements were discussed in detail between the authors for appropriate translation. Data were cleaned and coded prior to analysis. The first author analysed all transcripts and the other authors acted as second coders. A thematic approach was followed in the analysis and relevant quotes are presented to illustrate the key themes.

2.3 Ethics consideration

Ethics approval was granted from the Nepal Health Research Council (NHRC). Similarly, an official letter was submitted to Mitini Nepal and Blue Diamond Society (BDS) regarding this research work. Before fixing the date for the in-depth interviews, suggestions and permission were sought from the concerned authority so as to avoid any disturbances and to increase participation. Consent was taken from participants prior to the study. Confidentiality was maintained by avoiding using the names of the participants where necessary. The rights of the participants were kept in consideration (to know our objectives, freedom to respond and decline etc).

3. Findings

3.1 Participants

Out of fifteen participants, seven had lived or were living in a rural area and eight lived in Kathmandu (the capital city of Nepal). Most rural participants were of the age group 25-29 years, whereas the majority of the urban participants were between 20-24 years of age. Most respondents are of Newar and Janajati (Rai/ Limbu/ Magar) ethnic background. As lesbian marriage had not been legalized in Nepal prior to this research, most of the participants reported themselves as unmarried although they were currently living with their partners. Only half of those from the rural areas had received some secondary education, whereas most urban participants had received secondary education (Table 1).

The following themes were identified: (1) socio-economic and cultural challenges; (2) health problems; (3) **c**hallenges to access public services and places; (4) access to health care**.**

3.2 Socio-economic and cultural challenges

Most of the rural respondents reported that it is difficult to disclose oneself as a lesbian in the community. Some participants indicated they were unaware about their sexual identity during their childhood and when of school age. Others talked about learning about their identity while they were in school, which included gender issues such as discrimination and injustice although none of them reported it to their family members and teachers. Some also believed that they only shared it with their close friends. They also believed that it has been easier for them to disclose their lesbian identity since the legalisation of lesbians in Nepal in 2007 (AD). However, it was commonly agreed that it is still a matter of concern and risks them being isolated and discriminated against, if their sexual identity is disclosed to their teachers and colleagues. For example:

I always used to dress like a boy, since childhood. I knew that I was a lesbian when I was studying in class eight. I used to love a girl at that time. I always used to think why did I fall in love with a girl. My best friend was also a lesbian. When the teacher found out that she was a lesbian she was thrown out of the school (IIP11, Rural Participant).

My gender is female but I look like a male, having the sexuality of a male. So it's really difficult to come out in the village. I don't have any problems coming out as a lesbian to my village friends but some of them say "why do you get dressed up like this? (IIP9, Rural Participant).

Although some participants argued that it is often difficult to disclose one's identity as a lesbian, they further asserted they don't hesitate to introduce themselves as lesbians in some circumstances. Surprisingly, some explained that they felt it pleasant to be known as lesbians or female homosexuals.

While observing the social relationships in rural settings the lesbians were found to be socially and emotionally distant from their family and relatives. Some lesbians have been in a relationship with their partners lasting for more than ten years, regardless of the social and cultural acceptability of their marriage. This was particularly observed in urban areas. Most of the participants stated that they rarely go to their (parents') home for fear of being

forced to get married, which often results in a dispute among family members. They also revealed that when the parents discover their daughter to be a lesbian, they force her to get married to a man and live in a heterosexual relationship. The participants also shared that parents and family members even attempt to separate them from their partners, causing them further problems. For example, a lesbian explained her long story as:

I had my best friend partner named Sandhaya (name changed). My family found out about our relationship and forcefully married me off. When Sandhya found out that I was married she used to walk the streets of Thamel like a mad woman. I also did not have a good relationship with my husband and after one year I went to Blue Diamond Society [BDS] with my children and my husband. We told BDS everything about our relationship and how we got married. My husband also said that I was not happy with him. BDS suggested that we separate and also mentioned about the legal procedures. After our divorce my husband took my children with him. After a couple of months, I had a heart problem. I tried to tell Sandhaya my problems but it was useless, she was already into drugs. She always injects, two to three times a day. Anyway, I was supported by Mitini Nepal and BDS for my treatment. I recovered and after a couple of months, I went to visit Sandhaya but she had already died due to excessive intravenous drug use (IIP2, Urban participant).

Most of the participants commonly agreed that lesbians are always harassed verbally (using slang words) in public places like parks, social gatherings, hotels, minibuses etc. in the city, which is always embarrassing.

People tease and make fun of us. We have to face unnecessary psychological torture. Seeing the situation, sometimes we make them aware that we are also part of this society. We talk about our rights (IIP8, Urban Participant).

Most of the participants also reported economic problems related to their status. They also revealed that they were expelled from their jobs due to their sexual identity which led them to joblessness. For example:

I joined one of the security forces and was working as an instructor during my work period. I was also given leadership and discipline awards from them. The bad incident happened in my life … I was sacked and kept in custody saying that I was involved in unnatural sexual activities. The crime that I committed was that I was a lesbian in Nepal. I was kept in a dark room where there was no water, no sunlight. I was unconscious for a long time (IIP6, Urban Participant).

The participants stressed that training for jobs such as security guard, driving and handicrafts work for them because they could be self-employed and can make a living.

3.3 Common health problems

Participants recounted that lesbians in Nepal are facing many health-related problems. Rural participants reported that some of them also suffer from Tuberculosis (TB) as they mostly work as manual labourers. Other health and psychological problems such as depression, sleeplessness and loneliness were also frequently reported by urban participants. They claimed that lesbians face such psychological disorders due to discrimination and social harassment from the community.

When we are excluded from our family and society, we get hurt emotionally. Some even take wrong decisions...We feel that our sexuality was a curse. Some even take various hormones without a doctor's prescription; they can have negative consequences (II14, Rural Participant).

Our participants also have a belief that sexually transmitted infections (STIs) are also common among lesbians. Most reported discharge of white liquid from the vagina, itchiness in the genital organs, poor hygiene and lower abdominal pains. In addition to the aforementioned psychological disorders, some of the sexual health related problems were also reported by them.

During sexual contact my partner always has a white liquid vaginal discharge, which has a foul smell. She takes a bath twice a day but my partner feels uncomfortable about going to the health post (IIP13, Rural Participant).

Nevertheless, the lesbians of masculine appearance reported that they face more of such problems than their more feminine-looking counterparts.

3.4 Challenges to access public services and places

Lesbians from rural areas reported that they face difficulties in accessing and getting administrative services from local level public service offices. Participants frequently revealed that the village level authorities were not well organised; therefore problems arise when their identification is required for verification purposes, i.e. matching their photographs against their actual appearance. Participants also mentioned that similar problems exist in banks where they perceived they were asked more questions than others to gain access to banking services. They also

face inconvenience during formal procedures for obtaining a citizenship certificate and similar formalities, illustrated by these quotes:

In public places such as the village development community, health posts, locally generated banks etc, if the offices know our identity they will start hating us and even refuse our requests (IIP15, Rural Participant).

Recently when I went to register my land ownership certificate with my father, the government officials said that I was not the daughter of my father. I really cried a lot (IIP2, Urban Participant).

Similarly, our study also found that lesbians face many problems while travelling. They are questioned, for security reasons, in the airports as their passport photos do not always exactly match their appearance, illustrated here:

I was flying from Kathmandu to Thailand to take part in a HIV/AIDS conference; it was really difficult for me to convince the security guard that I was the right person travelling since my passport photo did not match my appearance (IIP1, Urban Participant).

Some of the participants found using toilet facilities in public places to be problematic and some do not feel comfortable using both male and female toilets in public places, described here:

The most difficult problem that I faced was going to the public toilets. I look like a man but I am biologically a female. If we go to the female toilets the women scold us a lot (IIP4, Urban Participant).

Surprisingly, most lesbians shared that they rarely face any discrimination in religious places like temples, churches and monasteries. None of our participants had problems going to religious places such as temples, monasteries, churches etc in the district; however, some described difficulty in choosing the queue to use to go into the temple, highlighted by this example:

When I go to the temple there are always two different queues to worship - one men's and the other women's; we cannot stay in the ladies' line but we don't want to go to the males' either. It's good if we can have our own line such as a third gender line (IIP9, Rural Participant).

It was also commonly agreed among participants that when their identity is exposed it often brings detrimental outcomes. For example, one participant shared her story as:

I and Laxmi (name changed) were the first exposed lesbian couple in Nepal. We came out from different Medias. The greatest problem that we faced was that we were told to leave the flat where we were staying in the community and we were also denied the opportunity to live in a good apartment. They used to kick us out, accusing us of influencing their daughters and creating social evils. We moved apartment 15 or 16 times due to our sexual identity (IIP2, Urban Participant).

3.5 Access to health care

Study participants described that they never come out as lesbians to the doctors/physicians in health facilities (e.g. health posts and district hospital). They believed that they may not be treated well and that their illnesses will remain unsolved if they are identified as lesbians. Most of them wanted to consult a female doctor/physician even though they really wanted to have access to a sexual minority's specialist doctor/physician. Almost all of the participants perceived that protecting patient confidentiality was poorly practiced in health service centres, illustrated here:

Doctors and nurses don't keep confidentiality... if we say that we are lesbians, I think that they will discriminate against us since they are not emotionally and culturally distanced from the Nepalese culture and society (IIP7, Urban Participant).

Doctors were commonly perceived to regularly discriminate against those who took part in this study on the basis of their sexuality and identity.

Our participants commonly reported that it is difficult to make an appointment with the doctors because the disclosure of male or female identity is required in most cases. In addition, they also argued that they do not find it comfortable to be in a male or female ward. It has often made it difficult for them to decide whether to get admitted or not, exemplified by these quotes:

We feel it's very difficult to access health care facilities. We are biologically female but some look like a male...it becomes more difficult. Some have a generally male outlook but while filling hospital forms they have to write female. This also creates debates. Also we cannot share our problems easily. Either we are compelled to hide our health-related problems or have to solve them by consulting peer groups (IIP5, Urban Participant).

In the district hospitals, the administrative staffs don't know which ward to admit us to. They say how can we love those people who look like hijada [called half-male and half-female] and don't have any identification? They should have married and lived like women (IIP15, Rural Participant).

Surprisingly, it was also found that some participants even use another person's identity asking for medicine so that they will not be identified in the society by the doctor used to prescribe it, for example:

I had rashes on my genital organs…but I told the doctor that one of our relatives has rashes on her genital organs. When the doctor said that it needs to be checked, I was very scared in case the doctor asked my marital status, identity and sexuality. I convinced the doctor that my relative could not come due to her household works, and then the doctor prescribed the medicine (IIP9, Rural Participant).

4. Discussion

This study explored issues around socio-economic and cultural challenges, access to public and health services, health behaviours and challenges. It is unique and the first of its kind in attempting to draw a clearer picture of the perception and experience of lesbians relating to their day-to-day life in Nepalese society.

Most of the study participants reported less discrimination in religious places like temples, churches and monasteries, compared to that in public and administrative places such as airports, government offices and public toilets. These problems usually arise when their appearance does not exactly match their identity documents. They are harassed and teased in places such as parks, cafeterias, hotels and minibuses. Indeed, social exclusion and discrimination may bring many psychological disorders for lesbians. For example, a previous study documented that lesbians suffer from common psychological disorders such as anger, depression, sleeplessness, nightmares, flashbacks, sleeping disorders and uncontrollable crying (Quiery 2002.) However, there is also evidence that sexual-minority people also address these issues such as abuse, harassment and inequalities in four ways; (1) avoiding or ignoring them, (2) tolerating to optimal stage, (3) relying on someone else and (4) rebelling against these activities (Pendragon 2010). However, our study did not collect any information regarding strategies used by lesbians to avoid these situations.

Our study found that most lesbians in Nepal cannot easily disclose their sexual identity as there is a fear of exclusion. Indeed, this has also resulted in lesbians' low participation in education, particularly in most rural areas. Perhaps there is a fear of harassment and isolation from their peers in their schools. A study carried out in New Zealand also found hostile educational environments in school. This study also reported that there is also harassment of students attracted to their own gender (Semlyen *et al.* 2008). Our findings also suggest that there is a possibility of students leaving their parental home in order to avoid these circumstances. They are usually pushed into heterosexual marriage if their family members suspect they are interested in same gender relationships. However, the government of Nepal now has given consent to same-sex marriage. A previous study also showed that forced marriage led lesbians and gays to run away from home and the number of homeless youths (Lesbian and Gays) had reached 3,200,000 from 115,000 (Ray 2006).

Although the relationship between a sexual minority identity and risky sexual relationships with opposite sex partners is yet another issue of research (Herrick 2010), most participants in this study have a belief that lesbians often engage in risky sexual behaviour. They are also reluctant to utilize existing health care information and services. It can be argued that they are not able to disclose their sexual issues to the health services providers. Previously, it has also been reported that discrimination and abuse are the main causes of inhibiting people from accessing health services (Mulligan 2005). This also highlights that health facilities have also failed to provide lesbians with specialised sexual and reproductive health education and services. Perhaps mass media would be a possible means of disseminating sexual health information to these groups. In addition, provision of health care providers from sexual minorities and establishment of friendly service centres in convenient places would encourage them to utilize sexual and reproductive health services.

Although there is a general view that talking about sensitive issues with sexual minorities is difficult, most participants in this study actively discussed them. This highlights the impact of mass media. In addition, provision of skilled researchers and assuring confidentiality to the participants might have contributed to getting a better response from them. This study was carried out in one district of Nepal; hence our findings may not be generalized to the other areas of Nepal. Nevertheless, the most important outcome of this study is the "voice" of Nepalese lesbians which we have attempted to document.

The study highlighted lesbian health and social issues in Nepal. Valuable experience and perception of lesbian day to day living was explored. There was difficulty in projecting the realistic figure of lesbians in Nepal. The lesbians of Nepal had difficulty in coming out (sharing their feelings), which could be due to fear of isolation

from society. Finally, the key strength of this paper is that it reports on research which is the first of its kind in Nepal.

5. Conclusion and recommendations for research and practice

It is imperative from this study that the magnitude of problems faced by Nepalese lesbians need to be quantified alongside the in-depth information provided by this study in order to categorise some of the social, economic and public health aspects. This will give an elucidated situation-analysis for better utilisation of the information in policies and programmes. This recommendation has been put forward because the extent of socio-economic and health-related problems of the sexual minority population is an emergent issue and requires greater efforts to tackle it. Since the non-governmental sector has already been involved in this field, better networking with government bodies could be vital for synergistic results. Further research is required to present the situation of each of the issues such as inequalities in education, employment, mental health, sexual health and other illnesses raised in this study. Following this, strategies must be developed and implemented in order to address each of these issues.

There is an urgent need to accurately determine the number of lesbians in Nepal in order to make plans and policies to address their basic needs. The study brings to light the impact of social exclusion on lesbians in Nepal. It is important to be aware of the major challenges faced while living as a lesbian in Nepal and the aspects of their lives that could be improved.

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Table 1. Characteristics of Participants

Variables	Characteristics	Number
Age	15-19	1
	20-24	6
	25-29	7
	30-34	1
Ethnicity	Chettri	1
	Newar	6
	Gurung	3
	Rai/limbu	3
	Dalit	1
	Tharu	1
Education	No education	2
	Primary	4
	Some secondary	2
	School leaving certificate (SLC) and above	7
Occupation	Professional/Technical/Managerial Clerical	1
	Sales and services	2
	Local business	6
	Skilled manuals	3
	Unskilled manuals	1
	Unemployed	2

Comparison of Proximal Injections of Local Anesthetics with Distal Injections in Intravenous Block

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Abstract

Background: Perfect pain management is one of the most essential problems in anesthesia. Intravenous block is considered a simple anesthetic method to reduce extremity pain. This study is aimed to determine the effect of proximal injection compared with distal injections to avoid the problems related to be in the vicinity of the surgical field and making use of the larger proximal veins instead of the tiny distal vessels.

Methods: In this randomized double blind clinical trial, the patients with traumatic injuries of upper extremities referred to Rajaie Hospital from October 2003 to February 2004 were studied. The cases were divided blindly in to two groups. In one group injections were performed proximally and for the second group distally.

Results: This study was based on the data from 100 serial patients. The average time to achieve analgesia was 4.17 ± 0.57 minutes for the patients who received distal injections and for the cases that had proximal injection the mean time for analgesia was 5.19 ± 0.55. There was no difference in the rate of haematoma formation between the two groups.

Conclusions: In intravenous nerve block, the injection of local anesthetic agents in the proximal parts of the limbs is a safe method and is considered as effective as distal injections.

Keywords: Analgesia, Proximal, Distal, Intravenous, Block

1. Introduction

One of the most important issues in the field of Anesthesiology is to provide proper and effective analgesia with the lowest risk of side effects in each operative procedure (Barash 1996). Sharp injuries of upper extremities constitute a wide majority of operations performed due to traumatic injuries. These procedures can be performed not only under general anesthesia but also with regional analgesia which is obviously less hazardous for the patients especially for the elderly. So the use of local anesthetic methods is more popular (Blyth 1995).

Intravenous nerve block (Bier block) is a very simple method which can be used in every medical center with a high index to achieve analgesia in the desired area. The only requisiteness is to find an appropriate vein to perform the injection. This may be sometimes problematic due to limitations to find the proper vein with suitable diameter. It may also be troublesome to work close to the field of the vascular surgeon and struggle with the scrub nurse or the surgical team about the limitation of the local space to work. So this study is aimed to

determine the effect of proximal injection compared with distal injections to avoid the problems related to being in the vicinity of the surgical field and making use of the larger proximal veins instead of the tiny distal vessels.

2. Methods

In this randomized clinical trial, the patients with traumatic injuries of upper extremities referred to Rajaie Hospital from October 2003 to February 2004 were studied. The exclusion criteria were as follows: Age under 25 and more than 45 years, loss of consciousness, drug abuse, Alcohol consumption, past history of peripheral neuropathy, use of analgesics 12 hours before entrance to the operating room. Informed consents were signed by all the selected patients. The patients were offered to choose between two colors, red and green. Those who selected green were classified as the first group and considered for proximal injection. Those who selected red were considered for distal injection. All of the patients received 0.04 mg Midazolam and 1 mg/kg Fentanyl. After one minute, 50 ml Lidocaine 20% was injected by a 22 gauge needle. In the first group the anesthetic injected in the antecubital fossa veins and in the second group the injections performed from the dorsal veins of the hands. The depth of analgesia was recorded every 20 second for a period of 10 minutes or until the patient reported complete painlessness. The cases that did not achieved painlessness in 10 minutes or needed more analgesics were considered as the failed cases. The time of beginning of analgesia following injection was recorded for every case and compared. For statistical analysis χ^2 was used.

3. Results

This study was based on experimental results of 100 patients with traumatic injuries of upper extremities referred to Rajaie Hospital from October 2003 to February 2004. In the first group who received distal injections 37 cases were male and 13 were female. In the second group who received proximal injections, 32 patients were male and 18 were female. The difference between sex distributions between the two groups was not statistically significant. One case (2%) from the first group and 2 cases (4%) from the second group showed failure of pain control. This difference was not significant statistically. Local haematoma occurred in one case (2%) among the patients who received distal injections and in 2 patients (4%) among the other group. There was no difference in the rate of haematoma formation between the two groups. The average time to achieve analgesia was 4.17 ± 0.57 minutes for the patients who received distal injections and for the cases that had proximal injection the mean time for analgesia was 5.19 ± 0.55.

4. Discussion

Bier block anesthesia is an intravenous regional anesthesia technique in which an extremity (generally an arm) is made numb for surgery by injecting a local anesthetic solution into a vein after the blood has been squeezed out of the extremity and a tourniquet has been placed on it. The tourniquet prevents the local from leaving the extremity and blood from entering it, giving the patient a numb (anesthetic) extremity and the surgeon a bloodless field to work in. The technique is named for August Bier (Miller 2000).The advantages of the technique is that it is simple to perform, and provides a bloodless field that is easy to work in and minimizes blood loss (Numm 1989). Regional analgesia is obviously less hazardous for the patients compared with general anesthesia. So the use of local anesthetic methods is more popular (Brown 1996). Our study showed that in intravenous nerve block, the injection of local anesthetic agents in the proximal parts of the limbs is a safe method and is considered as effective as distal injections (Rogger 1997). Conventional studies suggested the veins of the dorsal hand are better options for injection (Vincent 1993).

Blyth and colleagues suggested that proximal veins can be used effectively for nerve block in Callis fracture (Blyth 1995). Proximal veins are more convenient to use due to larger diameter and appropriate distance from the surgical field. It can produce the desired level of analgesia without a significant harm for the patients.

In our study the beginning of analgesia was a little bit later compared with distal injection but it was not so problematic.

5. Conclusions

In intravenous nerve block, the injection of local anesthetic agents in the proximal parts of the limbs is a safe method and is considered as effective as distal injections.

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HIV/AIDS Spread among Rural Farmers in Nigeria: Implication on Village Agricultural Extension Service Delivery.

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Abstract

There is a great public concern on the prevalence and effects of Human Immunes Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) on the rural farmers and agricultural productivity in Nigeria. This study evaluated the implication of this disease on extension services, using Dekina LGA as its focus. It identified the level of HIV/AIDS prevalence by collecting secondary data on rate of HIV/AIDS infection from year 2000 to 2005 from medical centers in the study area. The study also examined farmers' perception on HIV/AIDS using mean scores from 5 point Likert scale in which, one hundred and sixty contact farmers were interviewed. Farmers had the highest HIV/AIDS infection record with 50.6 percent and 8.19 in year 2001 and 2005 respectively. While estimated farmers HIV/AIDS infection by 2010 would be 1,972. Findings also show that HIV/AIDS has negative effect on farmers health (mean score of 3.88), while 4.13 showed that respondents favoured the statement that "stigmatization and the scaring nature of AIDS prevented them from going for HIV/AIDS test. About 20 percent the extension workers claimed that infected farmers negatively affected their extension work delivery in some ways. This study therefore recommends that every village should be provided with comprehensive health clinic that would offer free HIV/AIDS treatment while capacity building for agricultural extension agents that will disseminate information on HIV/AIDS to farmers be put in place. Team – work approach among rural development agencies concerned with provision of rural, community social services should also be encouraged.

Keywords: HIV/AIDS disease, Rural communities, Farmers and extension service

1. Introduction

Agriculture remains the largest non-oil export earner and the largest employer of labour accounting for 88 percent of non-oil foreign exchange earnings and 70 percent of the active labour force of the Nigerian population. Despite the low per capital output, technical in-efficiency and low nutritive value per hectare of food produced by farmers, Ijere (1992), the contribution of the agricultural sector to the Gross Domestic Product (GDP) still represented 35.9 percent and 34.6 percent in 2002 and 2003 respectively, (Bango 2005).

However, several studies have shown that Nigeria's food production in the aggregate has been growing at about 2.5% per annum in recent years and food demand has been growing at a rate of more than 3.5% per annum. The gap between the inadequate food supply and demand may further widen if the health of the smallholder farmers who produce about 90 percent of the nation's food and fibre are in danger (Okoro 1987). This is because the quality and quantity of labour supply is highly dependent on the state of their health (Umeh 1999). It implies that labour force of the rural communities is most likely going to be negatively affected in the event of any outbreak of a disease.

In essence, an outbreak of HIV/AIDS in a community could result in inefficiency in the optimum utilization of labour/inputs and as such a decrease in output (Anaeto, Nnadi, Ukpongson, Ugwuoke and Oforka; 2008). HIV/AIDS that was initially seen as urban problem is rapidly moving into the rural communities, (BNARDA, 2003). At the end of 1999, cases of HIV infections have been diagnosed and reported in all the 774 local government areas of the country, cutting across all the social strata of the society. The rapid transmission moved from near zero prevalence in 1990 to 5.8% among the adult population (15 – 49 years) in the year 2001. With an

estimate of 3.5 million cases in Nigeria, the country now ranks second in sub Sahara Africa and fourth in the world. Nigeria, as at 2002, had the highest number of AIDS orphans in the world. It has been estimated that the number of HIV/AIDS orphans in Nigeria has increased to 1.97 million by 2005 and would be 4.2 million by 2015 (NIMR 2003).

HIV/AIDS is mostly transmitted through unprotected sexual intercourse. The most vulnerable are people in the sexually active age. Incidentally, these groups are those in the agriculturally productive age. Food and Agriculture Organization (FAO, 2000) estimated that out of the 27 most affected countries in Africa, 7 million agricultural workers have died from AIDS and more deaths are likely in the next decades. The immediate and long run effect is unprecedented food crisis (FAO 1994). This is because HIV/AIDS is now a determining factor of food insecurity and livelihood incapacitation due to the growing evidences that the epidemic intensifies labour bottlenecks in agriculture, increases widespread malnutrition while causing significant increase in rural poverty and destitution in most affected countries (FAO, 2000 in Okoro, Ekwe, Nwaobiniu and Nwakor; 2009). HIV/AIDS is therefore undoubtedly the most important health and development problem that demand urgent attention and response especially if it is going to affect food production and sustenance of life in the rural communities where adequate access to comprehensive health facilities rarely exist.

Dekina Local Government Area of Kogi State in Nigeira is a typical rural community. It is equally dominated by farmers who have little access to health services and other information. It is therefore imperative to know, how the farmers in this community perceive HIV/AIDS disease. Specifically, what is the level of awareness? What is the level of prevalence among farmers of agriculturally productive age? How can we enhance HIV/AIDS free status among farmers in the rural communities? How does HIV/AIDS infection affect village extension service activities? Can the village extension agents render any assistance? Therefore the specific objectives of this study are to:

1. examine the attitude/perception of farmers on HIV/AIDS disease.
2. ascertain the trend of HIV/AIDS infections between years 2000 and 2005.
3. determine the rate of HIV/AIDS spread among farmers and other occupational groups in the study area.
4. predict the rate of HIV/AIDS spread in the next five years.
5. identify the effect of HIV/AIDS on rural agricultural extension work.

2. Methodology

2.1 Study Area

Dekina Local Government is the largest Local Government in Nigeria with a total land area of 7,691km^2 and a population of 260,312 which represents 9.61% of the total population of Kogi State according to 2006 population census in Nigeria. The local government is located on latitude 6.30^{oN} and 7.30^{oN} and longitude 7.00^{oE} and 8.00^{oE} in the eastern flank of the Confluence State (Kogi State) where rivers Niger and Benue converged. Kogi State is also centrally located in Nigeria otherwise known as the centre of the middle belt of the nation. The principal occupation of the people in this local government is farming on a rich gradually undulating savanna land that favours the cultivation of cereals like rice, maize and bambara nut while tubers like yam and cassava are grown.

2.2 Sampling Techniques

The Local Government has four districts namely: Dekina, Biraidu, Okura and Iyale/Ogbabede. Stratified random sampling was used to pick forty farmers from each stratum. In all one hundred and sixty (160) farmers were interviewed using structured questionnaire. The village extension workers were trained and used as enumerators. Secondary data on HIV infection between 2000 to 2005 were collected from the medical centres in the study areas.

Farmers' perception on HIV/AIDS disease was measured using mean score from five point Likert scale to quantify some perception variables. This scale falls under criterion group instrument whereby items were analyzed against a criterion. Each item has a weight or a score attached to it. Weights are assigned in a way that the higher the score, the more favorable the perception according to Blum and Naylor (1984). Six important statements on perception of farmers on HIV/AIDS spread (three positive and three negative to ensure fair response) were weighed as Strongly Agree (SA) = 5 points, Agree (A) = 4 points, undecided (U) = 3 points Disagree (D) = 2 points and Strongly Disagree (SD) = 1. The average mean score was computed as follows.

$$\text{Average mean score} = \frac{\text{Total sum of perception score}}{\text{Total number of respondents}}$$

Descriptive statistics was used to analyze information on trend of HIV/AIDS and relationship between occupation and rate of HIV/AIDS infection. A projection (forecast) of rate of HIV/AIDS infection was also made using linear regression model between 2005 to 2010:

$$y = bo + bix + u$$

Where:

y = estimated infection level

bo = constant

bi = coefficients

x = year in view (forecasted year)

u = error term

Thirty village extension agents were also randomly picked out of the forty extension workers in the zone. The extension workers were interviewed using structured questionnaire to know the effect of HIV/AIDS on extension work. While Descriptive statistics such as frequency and percentage were use to analyse data generated

3. Results and Discussion

3.1 Perception of Farmers towards HIV/AIDS Infection

From Table 1, a mean score of 3.88 out of a maximum score of 5, agreed with the statement that HIV/AIDS has negative effect on their health. This implies that close to eighty percent of the respondents are aware of the risk inherent in HIV/AIDS infection. These are contact farmers who interact regularly with agricultural extension workers and could have heard or shared idea on HIV/AIDS with them. It could also be as a result of the constant jingles over the radio. However, the fact that many people or farmers are aware of the risk involved in HIV/AIDS, may not stop some people from indulging in what they know can take their lives.

They believe in the statement that "Jesus (for the Christians) and Allah (for the Muslims) would protect me from HIV/AIDS infection and so there is no need for HIV/AIDS test" enjoyed a popular support of 3.25 mean score. This implies that many of the rural farmers appear to hold strongly to their belief about Jesus/Allah's protection to a level that they refused going for a test to ascertain their HIV/AIDS status. More than 50 percent (2.56 mean score) recognized that changing sexual partners is risky. This implies that more than forty percent of the respondents did not agree with the statement that exchange of sexual partners is risky. This implies that more than forty percent of the respondents did not agree with the statement that exchange of sexual partners entails any risk. These categories of farmers are prone to HIV/AIDS infection and also a source of contact/infection to others, especially in a rural community where relations can inherit widows even without knowing the HIV/AIDS status of the inherited partner.

However, mean scores of 4.13 and 3.85 were in favour of the statements that stigmatization and the scaring nature of HIV/AIDS infection respectively prevented them from willingly submitting themselves to HIV/AIDS test. This implies that more than eighty percent of the respondents have not made conscious attempt to check their HIV/AIDS status. This conforms to the findings of Fredrikson and Kanabus (2004), who reported that stigmatization, social rejection and the scaring nature of HIV/AIDS prevented some people from carrying out the HIV/AIDS tests. It also agrees with Human Development Report (HDR, 2004) who asserted that about 70 percent of infected individuals are unaware of their HIV/AIDS status. This implies that an infected individual who is unaware of his HIV/AIDS status and failed to go for HIV/AIDS test may still engage in active unprotected sexual behaviour thereby spreading the disease in multiple folds. The multiplier effect of such practice is extremely dangerous especially in a rural community with little or no health facilities. Any means that will win the psychological support of farmers to encourage them come for HIV/AIDS test should be encouraged.

The inability to go for HIV/AIDS test due to superstitious belief was however not very popular as a mean score of 1.79 has revealed.

<Table 1>

3.2 The Trend of HIV/AIDS Infections Among Farmers in the Study Area

As presented in Table 2, the highest number of HIV/AIDS infection was recorded in the year 2001 with 50.61 percent while the least was in 2005 with 8.91 percent; other occupational groups infected with HIV/AIDS like civil servants, Artisians/Technicians and even business men could also be part-time farmers. The adverse effect of HIV/AIDS on food production should not only be seen as weakening or lowering the quality of farm labour for the full time farmers alone but even the part–time farmers. The figures indicated on the table were reported

cases only. A high possibility exists that many victims might not have been tested to know their HIV/AIDS status. In essence, the number of HIV/AIDS victims could be far – greater than what has been recorded. However, the sharp decline in the number of HIV/AIDS victims in 2005 could be as a result of supportive services provided for HIV/AIDS victims and the effort by the government to change the behaviour of people towards all manners that could promote HIV/AIDS infections and victims.

<Table 2>

3.3 The Trend and Projection of HIV/AIDS Spread in the Rural Communities

The result presented above has established the fact that HIV/AIDS exist in the rural communities and specifically among farmers. Negative perceptions of farmers about HIV/AIDS test and even infection can further intensify the spread of the disease. From table 3, below the HIV/AIDS trend as recorded from the Hospital also agreed with the fact that both full time and part time farmers had fallen victims of HIV/AIDS in their numbers. The quality and quantity of the labour input of the affected farmers must have dropped and as such reduced the level of food production with possible dire consequences if unabated.

A forecast or projection on the trend of HIV/AIDS using model Y = bo + bix + u (Table 3) gave projected number of victim of 1,972 by year 2010. the implication of this is that as many as 1,972 persons (including farmers) all things been equal might still be living with HIV/AIDS in the local government area if the situation is not quickly reversed. Again, the contribution of about 1000 farmers to food production (farmers affected between 2000 – 2005, table 2) will deteriorate in double folds by 2010, if twice of this figure exists.

<Table 3>

From the trend above, as revealed by Hospital Records (2000 – 2005) one can project using

Y = bo + bix + u, to estimate number of HIV/AIDS infected population by 2010.where;

Y = estimated infected level

Bo = 46823.2

Bi = 22.314

U = 0.05

If x is 2010

Y = 46823.2 – 22.314(2010) = 1,972

So estimated infected level by 2010 = 1, 972

3.4 Rural Farmers Sources of Information on HIV/AIDS

From table 4 below, about thirty percent (30%) of the rural farmers received HIV/AIDS information from friends and relatives while 18.75 percent received information on Hiv/Aids from village health extension workers and 15.63 percent from village agricultural extension officers, which implies that both health extension workers and village agricultural extension workers are useful in the dissemination of Hiv/Aids information. It may be necessary therefore to equip the village extension workers with knowledge of Hiv/Aids preventive measures and the methodology to be disseminated to the farmers during the forth night teaching and visit training as suggested by Melude (2006)

<Table 4>

3.5 Influence of HIV/AIDS infected farmers on agricultural extension work

From table 5 below less than twenty percent of the village extension workers agreed that infected Hiv/Aid farmers had affected their extension work in one way or the other. Either through in ability of such farmers to participate in extension training, meetings or even the local leader's inability to come for extension, activities. This can greatly reduce farmers' information diffusion process and even innovation adoption. It is important therefore to emphasize on both formal and informal education as external intervention that would help farm families offset the effect of HIV/Aids as supported by (Pherson 2005)

<Table 5>

3.6 The Implication Of HIV/AIDS Spread In Rural Community On Agricultural Extension Work

Some extension workers accepted that HIV/AIDS infected farmers had affected their extension activities in some ways, such as village extension training, extension meetings and even the use of local leaders. When one or two local leaders are affected with HIV/AIDS, it may reduce or negatively interfere with diffusion and adoption of

innovation. Infected local leaders may not be active in extension programme which may lead to poor or lack of interest of some farmers who attend to extension activities through the influence of the infected local leader. It may not be easy to find another honest or reliable local leader. Continuity of extension work may be affected and as such, non adoption or discontinue adoption of farm technologies may be rampant which is definitely going to reduce food production in the country if the trend continues.

4. Recommendations

Whatever would appeal to the psychology of farmers to capture their attention on the need to know their HIV/AIDS status should be employed? Incentives like free HIV test, success story of farmers who are found to be HIV/AIDS positive may encourage them to be tested too.

Effort should be intensified to move from awareness level to actualizing HIV/AIDS free society through team work approach by all rural development agencies who should educate farmers on the need to be HIV/AIDS negative.

Any person who visits the health centre for whatever ailment should be tested without purposely informing the individual that he is going to be tested against HIV. Governments and donor agencies should improve on the assistance rendered by concentrating more on the establishment of comprehensive health clinics in all villages while HIV/AIDS test machines and other related health services be made free for people living in the rural areas.

5. Conclusion

The interlock between rural health care and agricultural production in the rural communities can be likened to Siamese twins who share the same heart and legs. The movement must go at the same time. If the popular axiom that, "a healthy nation is a wealthy nation" should be correctly used, then the presence of HIV/AIDS in our rural communities must not be allowed to destroy our wealth. Our inability to control HIV/AIDS in the rural communities will worsen the already unsatisfactory level of food production and as such unprecedented food crisis is imminent.

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Table 1. Five (5) Likert Scale test on Perception of Farmers to HIV/AIDS Disease

S/NO	RESEARCH ITEM	SA	A	U	DA	SD	TOTAL NO OF RESPONDENTS	SUM OF RESPONDENT SCORE	AVERAGE MEAN SCORE
1	HIV/AIDS has great negative effect on ones health	70	40	20	20	10	160	620	3.88
2	There is risk in changing sexual partners	40	10	10	40	60	160	410	2.56
3	I am covered with the blood of Jesus/Allah shall protect me against HIV/AIDS	60	30	10	10	50	160	520	3.25
4	I can not go for HIV/AIDS test because of the fear of stigmatization Or social rejection	80	50	10	10	10	160	660	4.13
5	I do not want to know my HIV/AIDS status because of the fear that I may be positive	60	60	6	24	10	160	616	3.85
6	Superstitious belief prevents me from going for HIV/AIDS test and treatment	6	4	20	50	80	160	286	1.79

SOURCE: Field Survey 2006

Table 2. Rate of HIV/AIDS Infection among Farmers (2000 – 2005)

YEAR	FREQUENCY	PERCENTAGE
2000	100	10.12
2001	500	50.61
2002	100	10.21
2003	90	9.02
2004	110	11.13
2005	88	8.91
Total	988	100.00

Source: Hospital/Health Centre Records 2000 – 2005 (field survey 2006)

Table 3. The Trend of HIV/AIDS Infection among Various Occupational Group Year

Occupation	2000	2001	2002	2003	2004	2005
Farmers	100	500	100	90	110	88
Civil Servants	180	250	299	251	205	100
Business or Trading	320	300	800	408	400	293
Students	253	500	400	457	500	200
Technicians	350	200	103	309	480	159
Others	999	90	857	585	905	879
Total	2202	1840	2559	1913	2600	1719

Source: field survey 2006.

Table 4. Distribution of the respondents on sources of information on Hiv/Aids disease

S/No	Information Sources	Freq	Percentages
1	Radio Jingles	10	6.25
2	Friend /relative	50	31.25
3	Village Agriculture Extension Worker	25	15.63
4	Village Health Extension Worker	30	18.75
5	Churches/Mosque	41	25.62
6	Other Mass Media	4	2.50
	TOTAL SCORE	**160**	**100**

Source: field survey 2006.

Table 5. Influence of HIV/Aids infected farmers on agricultural extension work

S/No	Extension Activities	Frequency	Percentage
1	Village Extension Training	1	3.33
2	Contact Farmers meeting	2	6.66
3	Contact Farmers response to extension work	2	6.66
4	Local Leader participation on extension work	1	3.33
5	Has not affected my extension work	24	79.92
	TOTAL SCORE	**30**	**99.90**

Source: field survey 2006.

A Cross-sectional Study on Awareness Regarding Safe and Hygienic Practices amongst School Going Adolescent Girls in Rural Area of Wardha District, India

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Abstract

Onset of menstruation is one of the most important changes occurring during adolescence. In various parts of India, there are several cultural traditions, myths and misconceptions related to menstruation, which make them vulnerable to genital tract infections. To understand the perceptions, source of information and status of menstrual hygiene a cross- sectional study was carried out amongst 300 school going adolescent girls (10- 19 yrs) in the rural area of Wardha district, Maharashtra, India.

Majority of the girls received the information regarding menstruation from their mothers (41%), followed by Media (24%) and friends (19%). Of the girls who developed genital tract infections, 66% used cloth. 37% girls do not disclose about their menstruation. Cleanliness of external genitalia was unsatisfactory. Hence it is important to educate the girls with scientific knowledge and dispelling their myths and misconceptions thereby encouraging safe and hygienic practices for safeguarding themselves against various infections.

Keywords: Adolescent girls, Menstrual hygiene, Menarche, Genital tract infections

1. Introduction

Adolescence in girls has been recognized as a turbulent period which signifies the transition from girlhood to womanhood and considered as a landmark of female puberty (Bansal R. D., 1998). This transitional period is marked with the onset of menarche which is generally accepted by young girls, as a sign of maturity. However some girls show negative responses such as shame, fear, anxiety and depression.

Onset of menstruation is one of the most important changes occurring among the girls during the adolescence. The first menstruation (menarche) occurs between 11 and 15 years with a mean age of 13 years Mehra S., 1995).. In the existing Indian cultural milieu, there are several traditions, myths, misconceptions, mystery and

superstition prevailing about menstruation. The mere mention of the topic has been a taboo in the past and even to this date the cultural and social influences appear to be a major hurdle for advancement of the knowledge of the subject (Greene E. M, 1997).

Menstruation is generally considered as unclean leading to isolation of the menstruating girls and restrictions imposed on them in the family. These practices have reinforced negative attitude toward menstruation in girls. The Center for Social Research in 1990 have reported restrictions in daily activities such as, not being allowed to take bath, change clothes, comb hair and enter holy places. Apart from these, dietary restrictions (taboo on consumption of food like rice, curd, milk, *lassi*, potato, onion, sugarcane etc.) during the menstrual period are also imposed Mehra S., 1995).

There is very little awareness about menstruation among girls when they first experience it. Social prohibitions and negative attitude of parents in discussing the related issues openly has blocked the access of adolescent girls to right kind of information especially in rural and tribal communities.

Women having better knowledge regarding menstrual hygiene and safe practices are less vulnerable to Reproductive Tract Infections (RTI) and its consequences. Hence a cross sectional study was carried out in a rural school of Wardha district, Maharashtra, India with a twofold objective:

1) To evaluate the perceptions and source of information related to menstruation amongst school going rural adolescent girls

2) To determine the status of menstrual hygiene amongst school going rural adolescent girls

2. Methodology

The present study was a cross- sectional study carried out among the adolescent girls in the age group of 10- 19 years in one of the sub-district school in Wardha district. Age of the participants was verified through school records or birth certificate.

The study period was of three months. The school authorities were contacted and explained about the study. After obtaining the permission from the school authorities, the investigator visited the school as per pre-planned schedule for interviewing the adolescent girls. The adolescent girls were explained about the purpose of the study, and assured of confidentiality. A verbal consent was obtained from the girls before administering the questionnaire. In the school, there were a total of 332 girls between the ages of 10-19 years. Of these, only 300 girls who had attained menarche were eligible and participated in the study. Thirty two girls who had not attained menarche were not included in the study.

Girls were administered a pretested questionnaire printed on paper sheet in English and *Marathi*, which is the local language. The girls were instructed on how to fill the questionnaire and explained about each question with the help of female teacher. Adequate time was given to fill up the questionnaire. This was followed by a session educating the girls about the normal physiology of menstruation, the importance of maintaining hygiene and safe hygienic practices during menstruation. Questions and concerns of the participants, if any were also addressed at the end of the session.

The responses of the participants were then analyzed by using SPSS package.

3. Results

The mean age of the adolescent girls found was 14.25 years. Majority of girls received information regarding menstruation from their mothers (40.67%) followed by Television Movies (23.67%) and friends (19.00%). Only 10.33% girls received information from their teacher. 43.67% of girls were scared at the time of their first menstrual cycle. Another 14.33% girls were irritated & disgusted.

Regarding restrictions, 87% of the girls responded that they do not attend religious functions during menstruation, and 12.67% girls do not attend the schools. Surprisingly 17% girls reported that they do not have any restrictions & 28.67% do not hesitate to disclose about menstruation in spite of all cultural milieu &rural area.

Majority of the girls were using cloth (46.67%) and only 15.67% were using sanitary napkins. Amongst those who used cloth, 65.70% were found to be suffering from genital infections as compared to 12.30% in those who used sanitary napkins.

Cleaning of external genitalia was not satisfactory (frequency of cleaning of external genitalia is nil or < 2 times /day) in 34.33% (103) of the girls. Only 59.33% (178) girls used both soap and water for cleaning the genitalia. The percentage of girls reusing the cloth was 40.33% (121). Only 56.57% girls satisfactory disposed the used

cloth pieces or sanitary napkins.

Pain in abdomen (67%) was found to be the most frequent complaint during menstruation followed by headache / irritation (25.67%), loss of appetite (12.67%) & leg cramps (10.33%).

17.67% of the adolescent girls reported excess bleeding; 70.63% had 3-6 days duration of menstrual cycle and 10.33% had more than six days duration of menstrual cycle.

4. Discussion

The mean age of the 300 participants was 14.25 years. Most of the participants had poor knowledge regarding menstrual hygiene and physiology, as it is infrequently discussed at homes or at schools. Some of the girls, who reported to have received information from the mothers, did not have complete and accurate information. This signifies the lack of knowledge and hesitation of parents to talk about reproductive health with their children. In a study by ***Khanna et al*** **(2005),** significant proportion of girls was not aware of menstruation prior to menarche, which is similar to the findings of the present study.

The commonest source of information regarding menstruation was mother (40.67%) followed by Television / Movies (23.67%) and friends (19.00%). About 43.67% of girls said that they were scared at the onset of their first menstrual cycle. Most of the girls perceived menstruation as the natural occurrence of blood every month. Some girls perceived it as a process by which impure blood is thrown out of the body every month; others felt it is the blood spotting every month. Maximum number of girls i.e. 87% did not attend religious functions during their cycle and around 12.67% girls remained absent from schools during menstruation. Surprisingly 17% girls do not have any kind of restrictions during their menstruation. The number of rural girls not practicing any taboo was (21.6%) in the study conducted by ***D.S. Deo, C.H. Ghattargi*** **(2005)**

The study reveals that most of the girls used cloth as a menstrual pad, and they reused the cloth after washing it with soap and water and discarded the cloth by burning it after using it at least for 4 - 5 months. Very few girls use sanitary napkins available in the market; possibly due to low socioeconomic status, less availability at rural areas and lack of awareness. ***Khanna et al*** (2005) and ***Dr. S.Z. Quazi et al (2006)*** in their study also reported that more than three fourth of girls use cotton clothes and reuse them after washing.

Maximum girls developed infection and complained of white discharge, itching and burning mictuiration during their menstrual period. The girls who use cloth were more prone to develop genital tract infection as compared to those using sanitary napkins. Of the girls who developed infection of genital tract, 65.70% used cloth and 12.30% used sanitary napkins whereas 22% were using both cloth and sanitary napkin. This has shown that rate of infection is more common in girls using cloth than sanitary napkins. This is further aggravated by unhygienic condition at school. Though separate toilets for girls and boys are available at school, the lack of cleanliness and poor / intermittent water supply makes it difficult for the girls to maintain genital hygiene and an excuse to stay at home during menstruation. In a similar study conducted among 664 schoolgirls aged 14-18 years in Mansoura, Egypt by ***El-Gilany et al (2005)***the different aspects of personal hygiene were generally found to be poor, such as not changing pads regularly or at night, and not bathing during menstruation with lack of privacy being an important problem.

Cleanliness of external genitalia was unsatisfactory (frequency of cleaning of external genitalia is nil or < 2 times /day) in case of 103(34.33 %) girls. Soap and water was used for cleaning of genitals by 178 (59.33%). 121 (40.33%) girls reused cloth pieces for about 4-5 months. Regarding the method of disposal of the used material, and (56.57%) girls properly disposed the cloth pieces or sanitary pads used, i.e. they wrap the used cloth piece or sanitary pad in a paper bag and disposed in a place used for solid waste disposal. The same findings were revealed in the study of ***Dasgupta A and Sarkar M (2008)***

It was found that 37.33% girls disclose only to their mothers regarding menstruation whereas 28.67% were comfortable about disclosing to all. The various reasons given for not wanting to disclose were; irritation caused due to unnecessary remarks especially for not attending school & functions (46.26%), disgusting feeling (15.89%), & 9.35% to avoid irritation when others talk about it.

Pain in abdomen (67%) was found to be the most frequent complaint during menstruation followed by headache / irritation (25.67%), loss of appetite (12.67%) & leg cramps (10.33%). On being questioned about the problems faced during the process of menstruation by ***Rajni Dhingra & et al*** (2009) majority of the girls reported experiencing stomach ache (63.5%) followed by nausea (41.5%), pain in legs (12%), loss of appetite (24%) and very few (7.5%) stated having headache.

Amount of blood loss during menstruation was normal in 56.33% girls, 17.67% of the girls had excess bleeding, whereas period/duration of menstrual cycle was found 3-6 days in 70.63% & more than 6 days in 10.33%.

Similar observations were found in the studies of ***Mehra (1995) and Greene (1997)***

The girls expressed willingness to use sanitary napkins if they are available at more economical rate. Hence making low cost napkins available to the girls, can prevent many cases of infections arising from unhygienic material/cloth used by girls. However use of sanitary napkins may not still increase due to poverty and recurring cost of these napkins. In such circumstances, it is more important that girls use a clean cloth piece.

It is observed that very few girls (10.33%) acquired the knowledge about menses from their teachers. School teachers must be educated and supported to teach the students about the menstruation and hygienic practices.

Regarding disposal of sanitary napkins it is commonly seen that the pads are thrown by wrapping in paper and thrown in dustbin or simply thrown in latrines, creating unhygienic condition at homes as well as surroundings. So it is must to reinforce instruction regarding proper disposal of napkins.

5. Conclusion

Thus it's important to encourage safe and hygienic practices among the adolescent girls, educating them about issues related to menstruation and bring them out of traditional beliefs, misconceptions and restrictions regarding menstruation, so that they can safeguard themselves against various infections and diseases.

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Table 1. General Information about Menstruation

Categories		No of responses	Percentages
Age at Menarche	Less than 10	09	3.00
	10-12	88	29.33
	13-15	170	56.67
	More than 15	33	11.00
	**Not attain menarche	32	10.67
*Information source	Mothers	122	40.67
	T V & Movies	71	23.67
	Friends	57	19.00
	Magazines	04	1.33
	Relatives	15	5.00
	Teacher / school	31	10.33
Reaction to 1st menstruation	Scared	131	43.67
	Usual	65	21.67
	Discomfort	32	10.67
	Irritation/Disgusted	43	14.33
	Other than above	29	9.67
*Restrictions during menstruation	Religious occasion	261	87.00
	Physical activity/playing	56	18.67
	Schooling	38	12.67
	Attending family functions	43	14.33
	No Restrictions at all	51	17.00
	Household work	21	7.00
	Keeping fast	08	2.67
	Avoiding visit to others home	71	23.67
	Avoiding regular bath	19	6.33

*Multiple responses

**Excluded from the study

Table 2. Menstrual hygiene and practices during menstruation

Practices of menstrual hygiene		No of responses	Percentages
Use of material during menstruation	Sanitary napkins	47	**15.67**
	New cloth	29	**09.67**
	Reuse old cloth	111	**37.00**
	Alternate use of above all	113	**37.67**
Cleaning of external genitals	Not at all	21	**07.00**
	< 2 times	82	**27.33**
	>2 times	102	**34.00**
	As per convenience & privacy	95	**31.67**
Cleaning with	Soap & water	178	**59.33**
	Only water	95	**31.67**
	Piece of paper	08	**02.67**
	Piece of cloth	19	**6.33**
Privacy Maintain	With all except mother	112	**37.33**
	With friends	61	**20.33**
	With relatives/family	41	**13.67**
	Not at all	86	**28.67**
Why privacy? **	Feels disgusting	34	**15.89**
	Feel people will hate	20	**09.35**
	For attending school/functions	99	**46.26**
	For no reason	41	**19.16**
	Avoid irritation when others talk about	20	**09.35**
*Disposal of menstrual Material used	Throwing in dust bin	167	**55.67**
	Flushing in toilets	39	**13.00**
	Washing & reusing	121	**40.33**
	Don't want to tell	31	**10.33**
	Dumping / burning	03	**1.00**

*Multiple responses

** Total respondents 214 excluding those who don't maintain privacy

Table 3. Health problems during menstruation

*Complications	No of response	Percentages
Pain in abdomen	201	67.00
Nausea/vomiting	22	7.33
Headache /irritation	77	25.67
Palpitation /giddiness	17	5.67
Leg cramps	31	10.33
Loss of appetite	38	12.67

*Multiple responses

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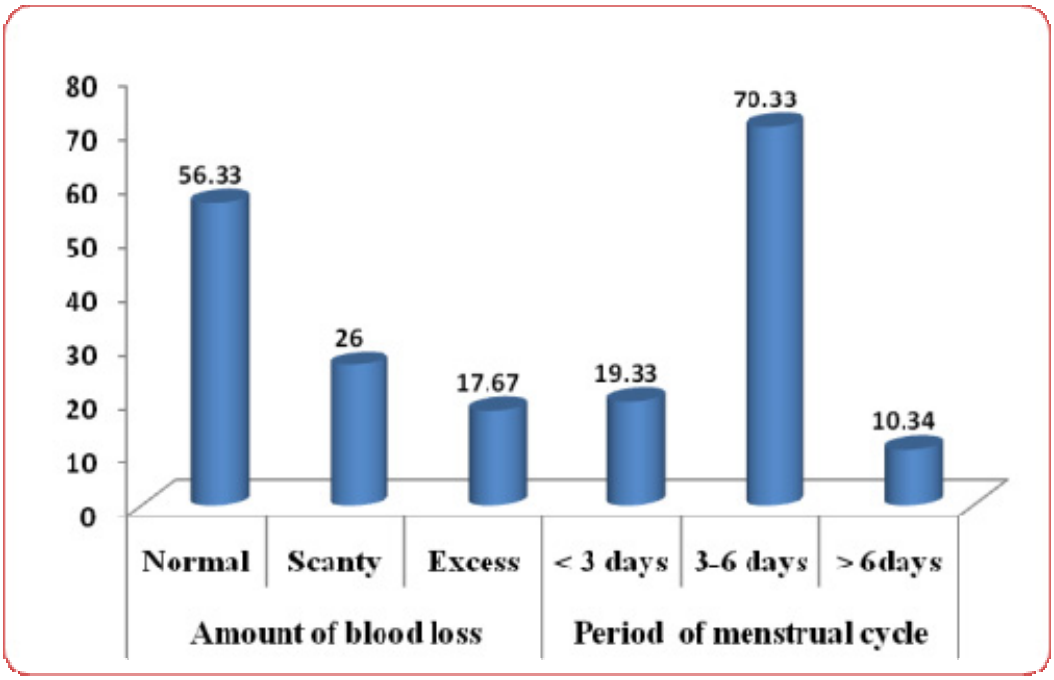

Figure 1. Amount of blood loss and duration of menstrual cycle

Uncertain Models for Bed Allocation

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Abstract

The purpose of this paper is to develop a methodology for modeling sickbed allocation problems with uncertain length of stay for each patient. Two uncertain bed allocation models are presented. Hybrid intelligent algorithm is employed for solving these models. Finally, numerical example is provided to demonstrate the feasibility of the proposed algorithm.

Keywords: Uncertain variable, Sickbed, Allocation, Uncertain programming

1. Introduction

Queue is frequently encountered in daily life. Queueing theory is the mathematical study of waiting lines (or queues) and generally considered a branch of operations research because the results are often used when making business decisions about the resources needed to provide service. It is applicable in a wide variety of situations that may be encountered in business, commerce, industry, public service, engineering and healthcare.

In supermarkets and in banks queues form when there are insufficient server units to meet the demand for service. Similarly, in hospitals, the queues form when there are insufficient beds available to admit ill people. In supermarkets and in banks customers can go elsewhere. But sick people have no alternative options: they just have to wait. When the lack of sickbeds occurs patients wait to be admitted. The bed crisis was considered as a queuing system and discrete event simulation was employed to evaluate the model numerically by C. Vasilakis and E. El-Darzi.

Other researches have existed in healthcare service. A methodology that uses system simulation combined with optimization to determine the optimal number of doctors, lab technicians and nurses required to maximize patient throughput and to reduce patient time in the system subject to budget restrictions was presented by Mohamed and Talal.

Real-life decisions are usually made in the state of uncertainty. By uncertain programming we mean the optimization theory in uncertain environments.

In many cases, fuzziness and randomness simultaneously appear in a system. In order to describe these phenomena, a fuzzy random variable was introduced by Kwakernak as a random element taking “fuzzy variable” values. A random fuzzy variable was proposed by Liu as a fuzzy element taking ”random variable” values. More generally, a hybrid variable was introduced by Liu as a measurable function from a chance space to the set of real numbers. Fuzzy random variable and random fuzzy variable are instances of hybrid variable. In order to

measure hybrid events, a concept of chance measure was introduced by Li and Liu. After that, a general framework of hybrid programming was proposed by Liu.

Uncertainty theory was founded by Liu in 2007 as a branch of mathematics based on normality, monotonicity, selfduality, and countable subadditivity axioms. Uncertain programming was presented by Liu in 2008 as the optimization theory in uncertain environments. It has been applied in system reliability design, project scheduling problem, vehicle routing problem, facility location problem, and machine scheduling problem.

In this paper, we will introduce two uncertain models for bed allocation problem. The rest of the paper is organized as follows: in Section 2, we will briefly review the concepts of uncertainty. Then we describe the assumptions and notations for uncertain bed allocation models in Section 3. After that, two uncertain models for bed allocation are formulated in Section 4. In Section 5, a hybrid intelligent algorithm designed for solving the models is described. In Section 6, a numerical example is given to show the effectiveness of the proposed algorithm. Finally, we discuss the conclusions and provide future direction for research.

2. Preliminaries

Let Γ be a nonempty set, and let L be a σ-algebra over Γ. Each element $\Lambda \in \mathrm{L}$ is called an *event*. M is a set function which follows the four axioms given by Liu:

Axiom 1. *(Normality)* $\mathrm{M}\{\Gamma\}=1$.

Axiom 2. *(Monotonicity)* $\mathrm{M}\{\Lambda_1\} \le \mathrm{M}\{\Lambda_2\}$ *whenever* $\Lambda_1 \subset \Lambda_2$.

Axiom 3. *(Self-Duality)* $\mathrm{M}\{\Lambda\}+\mathrm{M}\{\Lambda^C\}=1$ *for any event* Λ.

Axiom 4. *(Countable Subadditivity) For every countable sequence of events* $\{\Lambda_i\}$, *we have*

$$\mathrm{M}\left\{\bigcap_{i=1}^{\infty}\Lambda_i\right\} \le \sum_{i=1}^{\infty}\mathrm{M}\{\Lambda_i\}.$$

Then M is called an uncertain measure, the triplet $(\Gamma,\mathrm{L},\mathrm{M})$ is called an *uncertainty space*.

A measurable function defined on Γ into $\square$ is called an *uncertain variable*.

2.1 Identification Function

A random variable may be characterized by a probability density function, and a fuzzy variable may be described by a membership function. Liu introduce an identification function to characterize an uncertain variable.

Definition 1 (*Liu) An uncertain variable* ξ *is said to have a first identification function* λ *if*

(i) $\lambda(x)$ *is a nonnegative function on* $\mathcal{R}$ *such that*

$$\sup_{x\neq y}\left(\lambda(x)+\lambda(y)\right)=1;$$

(ii) for any set B *of real numbers, we have*

$$\mathrm{M}\{\xi \in B\}=\begin{cases}\sup\limits_{x\in B}\lambda(x), & \text{if } \sup\limits_{x\in B}\lambda(x)<0.5\\ 1-\sup\limits_{x\in B^C}\lambda(x), & \text{if } \sup\limits_{x\in B}\lambda(x)\ge 0.5\end{cases}$$

Example 1: By a *trapezoidal uncertain variable* we mean the uncertain variable fully determined by the quadruplet $(a;b;c;d)$ of crisp numbers with $a<b<c<d$, whose first identification function is

$$\lambda(x)=\begin{cases}(x-a)/2(b-a), & \text{if } a\le x\le b;\\ 0.5, & \text{if b}\le x\le c;\\ (x-d)/2(c-d), & \text{if } c\le x\le d;\\ 0, & otherwise.\end{cases}$$

2.2 Expected Value

Expected value is the average value of uncertain variable in the sense of uncertain measure, and represents the size of uncertain variable.

Definition 2 (*Liu) Let* ξ *be an uncertain variable. Then the expected value of* ξ *is defined by*

$$E[\xi]=\int_0^{+\infty}\mathrm{M}\ \{\xi\geq r\}dr-\int_{-\infty}^{0}\mathrm{M}\ \{\xi\leq r\}dr$$

provided that at least one of the two integrals is finite.

3. Assumptions and notations

Bed crisis sometimes appears in hospitals. The crisis is usually attributed to factors such as the bad weather, influenza, older people, geriatricians, and lack of cash or nurse shortages. As mentioned above, in hospitals, the queues form when there are insufficient beds available to admit ill people, and sick people have to wait until free bed is available.

When a patient arrives, he/she enter a queuing system. We will divide the service system into three phases including waiting sickbed, preoperative preparation and postoperative recovery. After that, the patient leaves the system.

For optimize the beds allocation during the gusty busy period, we describe assumptions and notations as follows:

3.1 Assumptions

1) treatment received across different sickbeds is identical;

2) the total account of sickbeds is fixed and each bed is occupied by one patient;

3) the out-patients arrivals randomly and independently of each other;

4) LOS(length of stay) for each patient is considered to be a uncertain variable.

3.2 Notations

n : the number of out-patients need to be hospitalized during a period of t days;

m : the number of fixed sickbeds;

$j=1,2,\cdots,m$: the sickbeds;

m_j : the number of patients cared for in sickbed j ;

$i=1,2,\cdots,m_j$: the patients cared for in sickbed j ;

$k(j,i)$: the patient i cared for in sickbed j ;

$\boldsymbol{x}$: the decision vector, where

$$\boldsymbol{x}=\left(k(1,1),k(1,2),\cdots,k(1,m_1),k(2,1),k(2,2),\cdots,k(2,m_2),\cdots,k(j,1),k(j,2),\cdots,k(j,m_j)\right),$$

and the sequence $\{k(j,i)\}$ is the rearrangement of $\{1,2,\cdots,n\}$;

$D\left(k(j,i)\right)$: the arriving time of patient $k(j,i)$, $\left(i=1,2,\cdots,m_j;j=1,2,\cdots,m\right)$;

$T\left(k(j,i)\right)$: the LOS(length of stay) of patient $k(j,i)$, $\left(i=0,1,2,\cdots,m_j;j=1,2,\cdots,m\right)$, and $T\left(k(j,0)\right)$ is the occupation time of initial patient in sickbed j, so patient $k(j,i)$ will leave the hospital at the time $\sum_{i_0=0}^{i}T\left(k(j,i_0)\right)$;

$\boldsymbol{\xi}$: the uncertain vector where $\boldsymbol{\xi}_i=\mathrm{T}\left(\boldsymbol{x}_i\right)$.

Thus the waiting time of patient $k(j,i)$ is $\left(\sum_{i_0=0}^{i-1}T\left(k(j,i_0)\right)-D\left(k(j,i)\right)\right)\vee 0$.

We denote the total waiting times and the longest staying time in hospital of all the n patients by $f_1(\boldsymbol{x},\boldsymbol{\xi})$ and $f_2(\boldsymbol{x},\boldsymbol{\xi})$, respectively. Then we have

$$f_1(\boldsymbol{x},\boldsymbol{\xi})=\sum_{j=1}^{m}\sum_{i=1}^{m_j}\left(\left(\sum_{i_0=0}^{i-1}T\left(k(j,i_0)\right)-D\left(k(j,i)\right)\right)\vee 0\right)$$

$$f_2(\boldsymbol{x},\boldsymbol{\xi})=\max_{1\leq j\leq m}\sum_{i=0}^{m_j}\left(T\left(k(j,i)\right)\right)$$

4. Uncertain Bed Allocation Model

With assumption of the uncertain ξ, we introduce two uncertain models for bed allocation.

4.1 Expected Time Goal Model

In order to balance the above conflicting objectives $f_1(\boldsymbol{x},\boldsymbol{\xi})$ and $f_2(\boldsymbol{x},\boldsymbol{\xi})$, we may have the following target levels and priority structure:

At the first priority level, the expected total waiting time $E\left[f_1(\boldsymbol{x},\boldsymbol{\xi})\right]$ should not exceed the target value b_1. Thus we have a goal constraint

$$E\left[f_1(\boldsymbol{x},\boldsymbol{\xi})\right]-b_1=d_1^+,$$

in which $d_1^+ \vee 0$ will be minimized.

At the second priority level, the expected longest staying time in hospital $E\left[f_2(\boldsymbol{x},\boldsymbol{\xi})\right]$ should not exceed the target value b_2. That is, we have a goal constraint

$$E\left[f_2(\boldsymbol{x},\boldsymbol{\xi})\right]-b_2=d_2^+,$$

in which $d_2^+ \vee 0$ will be minimized.

Then we have the following expected time goal programming model for the bed allocation problem:

$$\begin{cases} \text{lexmin}\left\{d_1^+ \vee 0, d_2^+ \vee 0\right\} \\ s.t. \\ E\left[f_1(\boldsymbol{x},\boldsymbol{\xi})\right]-b_1=d_1^+ \\ E\left[f_2(\boldsymbol{x},\boldsymbol{\xi})\right]-b_2=d_2^+ \\ 1\le k(j,i)\le n \quad j=1,2,\cdots,m, i=1,2,\cdots,m_j, \text{integers} \\ k(j_1,i_1)\ne k(j_2,i_2), \text{if } (j_1,i_1)\ne(j_2,i_2) \end{cases}$$

where lexmin represents lexicographically minimizing the objective vector.

4.2 Chance-Constrained Goal Programming

We assume the following priority structure. At the first priority level, the total waiting time $f_1(\boldsymbol{x},\boldsymbol{\xi})$ should not exceed the target value b_1 with confidence level α_1. Thus we have a goal constraint

$$\text{M}\left\{f_1(\boldsymbol{x},\boldsymbol{\xi})-b_1\le d_1^+\right\}\ge\alpha_1$$

in which $d_1^+ \vee 0$ will be minimized.

At the second priority level, the longest staying time in hospital $f_2(\boldsymbol{x},\boldsymbol{\xi})$ should not exceed the target value b_2 with confidence level α_2. Thus we have a goal constraint

$$\text{M}\left\{f_2(\boldsymbol{x},\boldsymbol{\xi})-b_2\le d_2^+\right\}\ge\alpha_2$$

in which $d_2^+ \vee 0$ will be minimized.

Then we have the following chance-constrained goal programming model for the bed allocation problem:

$$\begin{cases} \text{lexmin}\left\{d_1^+ \vee 0, d_2^+ \vee 0\right\} \\ s.t. \\ \text{M}\left\{f_1(\boldsymbol{x},\boldsymbol{\xi})-b_1\le d_1^+\right\}\ge\alpha_1 \\ \text{M}\left\{f_2(\boldsymbol{x},\boldsymbol{\xi})-b_2\le d_2^+\right\}\ge\alpha_2 \\ 1\le k(j,i)\le n \quad j=1,2,\cdots,m, i=1,2,\cdots,m_j, \text{integers} \\ k(j_1,i_1)\ne k(j_2,i_2), \text{if } (j_1,i_1)\ne(j_2,i_2) \end{cases}$$

5. Intelligent Algorithm Based on Uncertain Simulation

In order to solve the models, we integrate uncertain simulation, neural network and GA to produce a hybrid intelligent algorithm.

Step 1. Generate training input-output data for uncertain functions like

$$U_1 : \boldsymbol{x} \to E[f(\boldsymbol{x}, \boldsymbol{\xi})]$$

$$U_2 : \boldsymbol{x} \to \mathrm{M}\ \{f(\boldsymbol{x}, \boldsymbol{\xi}) \le 0\}$$

for any given decision vector $\boldsymbol{x}$.

Step 2. Train a neural network to approximate the uncertain functions by the generated training data.

Step 3. Initialize *pop_size* chromosomes whose feasibility may be checked by the trained neural network.

Step 4. Update the chromosomes by crossover and mutation operations and the trained neural network may be employed to check the feasibility of offspring.

Step 5. Calculate the objective value for all chromosomes by the trained neural network.

Step 6. Compute the fitness of each chromosome by rank-based evaluation function based on the objective values.

Step 7. Select the chromosome by rank-based evaluation function based on the objective values. Here, we adopt the following rank-based evaluation function $Eval(V_i) = a(1-a)^{i-1}$, $i = 1, 2, \cdots, pop\_size$ where parameter $a \in (0,1)$, $i = 1$ means the best individual, and $i = pop\_size$ the worst individual.

Step 8. Repeat the fourth to seventh steps a given number of cycles.

Step 9. Report the best chromosome as the optimal solution.

6. Numerical Experiments

In this section, we give a simple example to illustrate the effectiveness of the proposed hybrid intelligent algorithms employing MATLAB. Here the parameters are set as follows: the population size is 100, the probability of crossover P_c is 0.6, the probability of mutation P_m is 0.3, and the parameter a in the rank-based evaluation function is 0.05.

Example 2. Let us consider 10 patients arrive in one day and 3 sickbeds are available. The estimated lengths of stay for each patient are trapezoidal uncertain variables as table 1.

At the first priority level, the expected total waiting time $E[f_1(\boldsymbol{x}, \boldsymbol{\xi})]$ should be as little as possible. Then we have a goal constraint

$$E[f_1(\boldsymbol{x}, \boldsymbol{\xi})] - d_1^+ = 0,$$

in which d_1^+ will be minimized.

At the second priority level, the expected longest staying time in hospital $E[f_2(\boldsymbol{x}, \boldsymbol{\xi})]$ should not exceed the target value18. That is, we have a goal constraint

$$E[f_2(\boldsymbol{x}, \boldsymbol{\xi})] - d_2^+ = 18,$$

in which d_2^+ will be minimized.

Then we have the following expected time goal programming model for the bed allocation problem:

$$\begin{cases} \text{lexmin}\left\{d_1^+ \vee 0, d_2^+ \vee 0\right\} \\ s.t. \\ E\left[f_1(\boldsymbol{x},\boldsymbol{\xi})\right] - d_1^+ = 0 \\ E\left[f_2(\boldsymbol{x},\boldsymbol{\xi})\right] - d_2^+ = 18 \\ 1 \le k(j,i) \le n \quad j = 1,2,3, i = 1,2,\cdots,m_3, \text{integers} \\ k(j_1,i_1) \ne k(j_2,i_2), \text{if } (j_1,i_1) \ne (j_2,i_2) \end{cases}$$

A run of the hybrid intelligent algorithm (3000 cycles in fuzzy simulation, 500 generation in GA) shows that the optimal allocation is

Sickbed 1: $4 \to 5 \to 3$;

Sickbed 2: $2 \to 6 \to 9 \to 7$;

Sickbed 3: $8 \to 1 \to 10$.

7. Conclusions

In this paper, with the introduced uncertain variable, the bed allocation problem in hospital is discussed under uncertain environment; thereby two uncertain models are presented. This model effectively reduce the patients' time in queue, thus can improve the public satisfaction to the health service. The realization of this method will open up new research field of the application of uncertainty theory. In the future research, dynamic bed allocation is concerned and we will improve the efficiency of algorithm.

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Table 1. The estimated length of stay for each patient

Patient	1	2	3	4	5
Length of Stay	(6,9,11,14)	(4,7,9,12)	(3,6,8,11)	(1,4,6,9)	(1,3,5,8)
Patient	6	7	8	9	10
Length of Stay	(0,3,5,8)	(1,3,5,7)	(0,1,3,4)	(0,1,3,4)	(0,1,3,4)

Chronic Tension Type Headache and the Impact of Myofascial Trigger Point Release in the Short Term Relief of Headache

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Abstract

Purpose: This study investigated the effect of myofascial release in relieving the symptoms of Chronic Tension Type Headache (CTTH) **Methods:** The study used a convenience sampling pretest-post test design. 31 people (7 men and 24 women, age range 18-58 years, mean age 32 years) with CTTH participated in the study. The headache sample was screened for MTrP in the cranial and pericranial muscles and was treated with myofascial release therapy. The outcomes were measured in terms of the number of headache days in a week and the headache pain level measured in visual analog scale (VAS). **Analysis**: The analysis was done using paired 't' test at 95% confidence interval **Results:** The study showed significant improvements in reduction of the number of headache days ($p < 0.001$) and the headache pain level ($p < 0.001$) following treatment. **Conclusion and Implications:** Myofascial release therapy to the trigger points in people with CTTH has a positive influence in decreasing pain intensity and frequency in CTTH sufferers. In future, during management of CTTH screening for myofascial trigger points and concomitant treatment using myofascial release could be considered.

Keywords: Chronic Tension Type Headache, Cranial muscles, Pericranial muscles, Myofascial trigger point, Referred pain, Myofascial pressure release

1. Introduction

Chronic Tension type headache (CTTH) is one of the most prevalent forms of headache. Population-based studies suggest one year prevalence rates at 38.3% for episodic tension type headache and 2.2% for chronic tension type headache (CTTH) (Schwartz *et al*., 1998). Being one of the common types of primary headache affecting men and women of all ages at sometime in their lives, it often impairs an individual's productivity, social time, family dynamics etc in addition to the physical suffering.

Though there have been a number of factors associated with CTTH, muscular factors have often been considered as one of the major contributors for CTTH, scientific studies strongly suggest that there are myofascial trigger points present in the cranial & pericranial muscles that refer pain to the head which might have a considerable role in influencing the symptoms of headache (Fernandez–de-Las–Penas *et al*., (2006a) ; Fernandez–de-Las–Penas *et al*., (2006b); Fernandez-de-Las-Penas C *et al*., (2007a); Fernandez-de-Las-Penas *et al*., (2007b); Marcus *et al*., 1999). A myofascial trigger point is a hyper irritable spot with in a taut band of skeletal muscle or in the fascia that is painful on compression and that can give rise to characteristic referred pain, tenderness and autonomic phenomena (Simons *et al*., 1999).

There are several studies relating myofascial trigger points with chronic tension type headache. The local and referred pain areas and pain characteristics evoked from temporalis muscle trigger points were assessed in people with CTTH. It was reported that the evoked local and referred pain from active trigger points (TrPs) in the

temporalis muscle and its sensory characteristics shared similar patterns as the habitual headache pain. It was suggested that the local and referred pain from active trigger points in the temporalis muscles may constitute as one of the sources for contributing to the pain profile of CTTH. (Fernandez-de-Las-Penas *et al*., (2007a)).In a similar study the referred pain and pain characteristics evoked from upper trapezius muscle was investigated in 20 people with CTTH. It was reported that the evoked referred pain and its sensory characteristics shared similar patterns as their habitual headache pain consistent with active TrPs. The result suggests that the spatial summation of perceived pain and mechanical pain sensitivity exists in people with CTTH (Fernandez-de-Las-Penas *et al*., (2007b)).

The presence of trigger points in the suboccipital muscles were studied; it was reported that 65 percent of the people assessed showed presence of active myofascial trigger points and 35% showed presence of latent trigger points in the suboccipital muscles. The authors also reported that CTTH subjects with active trigger points reported greater headache intensity and frequency than those with latent TrPs (Fernandez–de-Las–Penas *et al*., (2006a)). In a blinded controlled study the trigger points in upper trapezius, sternocleidomastoid and temporalis muscles were identified and divided in to active and latent trigger points. It was suggested that active TrPs in the upper trapezius, sternocleidomastoid and temporalis muscles were associated with CTTH. It was also shown that CTTH subjects with active trigger points usually reported a greater headache intensity and longer headache duration than those with latent TrPs (Fernandez – de –Las Penas *et al*., (2006b)).

Some characteristics of CTTH, such as pressure or band-like tightness (International Headache Society., 2004) and increased tenderness on palpation of neck and shoulder muscles resemble the descriptions of referred pain originating in trigger points (Simons *et al*., 1999). In the recent years studies have shown strong associations between myofascial trigger points and tension type headache. The people with TTH were shown to have a greater number of either active or latent TrPs than healthy subjects (Marcus *et al*., 1999). The referred pain patterns seen with active trigger points were shown to be similar to that of the type of headache in tension type headache sufferers (Fernandez-de-Las-Penas *et al*., 2006).

There are growing evidences to suggest that there is a strong association between tension type headache and myofascial trigger points. A detailed search in EMBASE, CINAHL, PEDro, and PUBMED from its inception until 2009 and with the search terms chronic tension type headache and myofascial trigger points revealed that until date myofascial trigger points have been associated with chronic tension type headache, predominantly in terms of diagnostic value (Fernandez–de-Las–Penas *et al*., (2006a) ; Fernandez–de-Las–Penas *et al*., (2006b); Fernandez-de-Las-Penas C *et al*., (2007a); Fernandez-de-Las-Penas *et al*., (2007b); Marcus *et al*., 1999). There are very few studies that have targeted myofascial trigger points as an entity in the management perspective of CTTH (Norman *et al*., 2009; Moraska and Chandler 2008). There is further need for evidence in the light of screening all the myofascial trigger points that has been shown to refer pain to the head (Simons *et al*., 1999) and further treat them using standard myofascial release methods and evaluate its effect in the relief of symptoms from headache.

2. Material and methods

2.1 Subjects

Thirty one people with CTTH, 7 men and 24 women, mean age 32 years, S.D 11.37, mean headache years 3.07) were recruited for the study from the outpatient consultation unit of the Department of Neurology, Christian Medical College, Vellore, India. People with CTTH were diagnosed according to the criteria of the International headache society (IHS) (International Headache Society., 2004) by an experienced neurologist. People with CTTH who had headache for at least 3 days in a week for the past four consecutive weeks were selected. The diagnosis was arrived up on the history of the patient done by interview and referring to the medical record of the subject. The exclusion criteria were, surgeries involving the cervical spine, documented Intracranial causes contributing to headache, cervical disc prolapse, and systemic illness contributing to their headache and forms other than CTTH.

All patients recruited for the study were on anti depressants with a drug dosage of 25 mg T.amitriptilline for at least three months before the date of assessment. Due to ethical reasons the existing drug therapy with T. amytriptiline for CTTH was not allowed to be discontinued. However the drug dosage was not increased during the assessment, treatment and during the follow up period of the study. The study was approved by the institutional authorities of Christian Medical College, Vellore. An informed consent was obtained from all the people who took part in this study.

2.2 Myofascial trigger point assessment

The muscles of the head and neck that are shown to refer pain to the head (Simons *et al*., 1999) were selected. The muscles assessed were, sternocleidomastoid, upper trapezius, sub occipitalis, frontalis, temporalis, occipitalis and splenius capitis. The muscles were assessed by an experienced therapist well versed with the assessment and management of myofascial trigger points. The trigger point was located as per the guidelines given in the literature (Simons *et al*., 1999). The muscles were classified as cranial and pericranial muscles. Those muscles that have their attachments within the cranium was classified as cranial muscle and those muscles that have one of their attachment in the cranium and the other outside the cranium was classified as pericranial muscles.

The assessment and treatment for all the trigger points was performed by the same therapist following the diagnostic criteria described in the literature (Simons *et al*., 1999). The diagnostic criteria for a trigger point followed in this study was (1) presence of a palpable taut band in a skeletal muscle; (2) presence of a hypersensitive tender spot in the taut band; (3) reproduction of the typical referred pain pattern of the trigger point in response to compression. The above criterion has been shown to be the minimum acceptable criterions to diagnose a trigger point in the literature (Simons *et al*., 1999).

A trigger point was considered active if the subject had spontaneous pain at the site of the trigger point and also had spontaneous referred pain to the head in the usual site of headache (Simons *et al*., 1999). A trigger point was considered latent if the person did not have any spontaneous pain but had referred pain to the head in the usual site of headache up on palpation (Simons *et al*., 1999). If the person did not have any referred pain but tenderness in a circumscribed spot in muscle up on compression, it was considered as a tender point. Myofascial release was given to both active and latent trigger points but the tender points were not treated.

In this study the tenderness of the trigger point was assessed based on a simple tenderness scale,
Grade 1 - patient complains of pain

Grade 2 – patient complains of pain and winces

Grade 3 – patient winces and withdraws the joint

Grace 4 – patient will not allow palpation of the joint.

The assessment for the trigger point was done by the same therapist throughout the study. The tenderness was elicited by applying pressure over the trigger point with the pulp of the index finger until the nail blanched. The tenderness was graded according to the response of the person. The tenderness grading was used to assess the status of the trigger point before and after treatment.

2.3 Assessment of pain intensity and severity of headache

The number of days of headache in a week was considered as the severity of headache and the intensity of headache was considered as the pain level during headache measured in a 10 cm visual analog scale. The information of number of headache days in a week was obtained by history taking through interview and from the headache records. The person with headache was asked to mark the usual headache intensity in a 10 cm visual analog scale. The method of recording the headache intensity and severity by the interview method has been shown to be a reliable method (Niere and Jerak 2004). All the people included in the study had a history of at least three headache days in a week.

2.4 Treatment

Ischemic compression (trigger point pressure release) (Simons *et al*., 1999) using pincer grasp or point compression, as appropriate, was performed for all the trigger points identified to produce referred pain to the cranium. Trigger point pressure release is a treatment method in which a slowly increasing, nonpainful pressure is applied over a trigger point until a barrier of tissue resistance is encountered. The contact is then maintained until the tissue barrier releases, and pressure is increased to reach a new barrier to eliminate the trigger point tension and tenderness (Simons *et al*., 1999). All the people with headache were treated once; all the trigger point was given one session of treatment. The person with myofascial trigger point was positioned comfortably and the muscle positioned in its neutral length. Digital pressure was applied to the trigger point for a period of approximately **90 sec**.

The pressure was continued until the sensitivity of the trigger point wanes and the tension in the taut band fades. The trigger point was treated once. This was then followed by gentle passive stretches to the muscles treated for trigger points *(Stretching the muscle treated for trigger point is part of the treatment protocol of myofascial trigger point treatment intervention).* The muscle was stretched to its full length twice following the treatment of

the trigger point. A home program of neck active range of motion exercises were taught to the patients and asked to practice it twice in a day for 10 repetitions during morning and evening. The exercises involve active neck flexion, neck extension, side bending to both side and rotations to either side.

2.5 Assessment and Treatment technique (Simons et al., 1999)

2.5.1 Upper Trapezius

This is a pericranial muscle with attachments from the cranium to the cervical vertebrae. Trigger points from this muscle refers pain along the postero lateral aspect of the neck, behind the ear and to the temple. For assessment and treatment the person is positioned in high sitting and the therapist can palpate the trigger point in the upper trapezius using point compression.

2.5.2 Sterno cleido mastoid

This is a pericranial muscle with attachments from the cranium to the sternum and the clavicle. Trigger points from the sternal division refers pain to the vertex, to the occiput, across the cheek, over the eye, to the throat and to the sternum and the clavicular division typically refers pain to the forehead and ear. For assessment and treatment, the person is positioned in high sitting; the therapist palpates the muscle using pincer compression for identifying the trigger point in the sternal fibres and Clavicular fibers.

2.5.3 Sub Occipitals

This is also a pericranial muscle with attachments from the cranium to the proximal cervical vertebrae. Trigger points from this muscle refers pain in to the occiput, eye and the forehead. The sub occipitals are located in the posterior neck, just below the occipital part. The muscle is attached from the occipital protuberance and occipital ridge to C1 and C2 vertebra. For assessment and treatment the patient is positioned in prone lying with the head in neutral position to mild neck extension. The therapist uses point compression to palpate for the trigger point in the sub occipitals muscle.

2.5.4 Splenius capitis

This is a pericranial muscle with attachments to the cranium and the cervical vertebrae. Trigger points from this muscle refer pain to the vertex of the head. For assessment and treatment the person is positioned in high sitting and the trigger point is palpated at the root of the neck using point compression.

2.5.5 Occipitalis

This is a cranial muscle; the attachments are entirely in the cranium. Trigger points from this muscle refers pain laterally and anterior, diffusely over the back of the head and through the cranium, causing intense pain deep in the orbit. For assessment and treatment the person is positioned in high sitting and the muscle is palpated using point compression just above the external occipital protuberance.

2.5.6 Frontalis

This is a cranial muscle as well; the attachments are within the cranium. Trigger points from this muscle evokes pain that spread upward and over the forehead on the same side. For assessment and treatment the person is positioned in high sitting and the muscle is palpated just above the eye brow using point compression.

2.5.7 Temporalis

This is a cranial muscle with the attachments in the cranium. Trigger points from this muscle refers pain throughout the temple, along the eye brow, behind the eye and can be felt in any or all of the upper teeth. For assessment and treatment, the person is positioned in high sitting and the trigger point is palpated in the temple region.

2.6 Follow up

The people with headache were given a headache record and asked to mark their headache profile in the record and come back after one week. The number of days they had headache in the week was taken as the severity of headache and the worst headache marked in the visual analog scale was taken as the intensity of their headache. They were asked to mark the headache intensity in a 10 cm visual analog scale. The number of days they had headache was taken as the severity of headache and the day in which they had the worst headache was taken as the intensity of the headache. Further the tenderness of the trigger point was assessed by the therapist and the tenderness was graded according to the tenderness grading scale to see for any relapse in the trigger point. At the time of one week follow up period no relapse of the trigger point was observed.

2.7 Statistical analysis

Data were analyzed with the SPSS statistical package (11.5 versions). Paired't' test with a 95 % confidence interval was done. The severity of headache measured as the number of days of headache in a week and the intensity of headache measured as the score in the visual analog scale was compared for data obtained before and after treatment intervention. A *P* value less than 0.05 was considered statistically significant.

3. Results

A total of 31 people with CTTH took part in the study, 7 men and 24 women aged between 18 to 62 years (mean 32 years, S.D 11.37, mean headache years 3.07). The mean of the headache intensity before treatment intervention was 7.28+/- 1.53 which reduced to a mean of 1.65 +/- 2.77 on the 10 cm visual analog scale ($P < 0.001$). The severity (frequency) of the headache was a mean of 4.64 +/- 1.97 days in a week before intervention which decreased to 0.61 +/- 1.58 days in a week ($P < 0.001$) after the intervention.

The patients were screened for the presence of myofascial trigger points in the sternocleidomastoid, upper trapezius, suboccipitalis, temporalis, occipitalis, frontalis, and splenius capitis. Out of the 31 people screened, 21 people with headache had myofascial trigger points in all the 3 pericranial muscles. 30 people had trigger points in the upper trapezius, 28 people had trigger point in the sternocleidomastoid and 21 had trigger points in the suboccipitals. All those who had trigger point in the suboccipitals also had trigger points in the sternocleidomastoid and upper trapezius. This is an interesting finding and needs further exploration on the relationship between these three muscles in influencing each other. 6 people had trigger points in the temporalis, and 3 each in the occipitalis and frontalis, it is also interesting to note that all those who had trigger point in the occipitalis also had trigger points in the frontalis.

4. Discussion

There are many factors held to be causative factors of CTTH. In this study the muscular myofascial trigger points was addressed. The trigger points might play an individual role or it could be part of the complex causes that amalgamate and cause the headache. In this study a significant reduction of headache parameters were observed upon treatment of the trigger points, which adds up to the current evidence that treatment of myofascial trigger points has a major role in the management perspective of headache.

It is imperative to understand the mechanism by which a myofascial trigger point can affect CTTH to understand the mechanism of headache relief by myofascial release. Olesen proposed that headache is due to an excess of nociceptive inputs from peripheral structures (Olesen 1991). According to his model, headache intensity is the sum of nociceptive inputs from cranial and extra cranial tissues converging on trigeminal nucleus caudalis neurons. The convergence of the nociceptive afferents from the receptive fields of cervical roots C1-C3 and those of the trigeminal nerve occurs in the nucleus caudalis (Piovesan *et al*., 2003). Continuous or prolonged nociceptive afferent input resulting in temporal and spatial summation could lead to central sensitization and pain perception in CTTH. Fernandez further updated this pain model and proposed that the myofascial trigger points are responsible for the peripheral mechanisms leading to activation or sensitization of nociceptive nerve endings by the liberation of chemical mediators (bradikinin, serotonin, substance P) (Fernandez-de-Las-penas *et al*., 2007; Jay *et al*., 2008). Hence when the trigger point is deactivated by myofascial release the afferent input from the myofascial trigger point is stopped and the headache symptoms are relieved.

Few studies have been done until date in which myofascial trigger points have been targeted in the management perspective of tension type headache. The efficacy of Botulinum toxin A was evaluated in the treatment of CTTH with myofascial trigger points producing referred head pain. Improvements were seen in headache status in the initial follow up period of 2 weeks but found a dissipation of effects by week 12 (Norman *et al*., 2009). This finding suggests that treatment focused at myofascial trigger points do have a role to play in management of CTTH. However this treatment method cannot be adapted by physiotherapists and the risks are relatively higher when injecting in to muscles such as suboccipitals and sternocleidomastoid in which case only a well experienced physician could do the procedure. Massage therapy in association with myofascial release of active trigger points were administered to the patients with CTTH who also had myofascial trigger points (Moraska and Chandler 2008) However in this study only the neck muscles were primarily targeted and the cranial muscles were not considered, moreover one may not want to discount the general analgesic effect of massage in the relief of headache. Hence the contribution from the myofascial trigger point component alone towards the headache would still not be clear.

In this study the treatment was focused only at the myofascial trigger points and 58% of the subjects had complete relief however 42% did not have complete relief during the follow up period. The result obtained from

this study reflects that there could be other causes apart from myofascial trigger points such as psychological factors, osteogenic factors etc that can contribute to the symptoms of CTTH. But considering the vast extent of relief from the symptoms, it could be hypothesized that myofascial trigger points could either have a more important role than the other causes or they all form a cycle interacting and complementing each other. When one of the components is removed the other components also tends to resolve to a certain extent thus resulting in significant relief from the symptoms.

The number of people who had trigger points in the pericranial muscles was more than the cranial muscles (See table 1). In the pain model proposed by Olesen, he proposes that the CTTH is influenced by the convergence of nociceptive afferents from the receptive fields of cervical roots C1-C3 and also from the trigeminal nerve (Olesen 1991). The trigger points in the sternocleidomastoid, upper trapezius and suboccipitals are associated with the cervical roots rather than the trigeminal nerve. This leads to a hypothesis that the cervical roots C1-C3 might have a stronger role than the trigeminal nerve in influencing CTTH. Future studies can be targeted to delineate between the cervical and trigeminal contributions in CTTH.

The follow up period was kept quite short, primarily because the trigger point was treated in an effort to see if it had any effect at all in the headache population. Moreover the chance of relapse of the trigger points is quite high because the cause of myofascial pain syndrome was not addressed. It would have been interesting to note the changes in the headache parameters over time coupled along with mapping of the trigger points at regular intervals. It would have given a clearer picture of the association between the CTTH and trigger points.

5. Conclusion

Myofascial trigger points have been shown to play a significant role in CTTH. All the trigger points that referred pain to the cranium were treated and significant improvements in headache parameters were observed. A simple yet efficient method of treating myofascial trigger points was used which in many cases could be self administered too. There are some limitations in this study. First, only subjects with CTTH was selected and treated. Hence the results cannot be extrapolated to other headache disorders, such as Episodic Tension Type Headache, Chronic Daily Headache, and Migraine etc. It would be interesting to repeat the same procedure with patients suffering from other disorders in order to explore the relevance of head and neck muscle trigger points in headache. The second limitation was the small sample size and methodology. A blinded controlled trial with more samples could confirm the findings seen in this trial. However this study adds further evidence to the non pharmacologic methods for the management of Tension type headache.

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Table 1. Showing the number of people who had referred pain to the head from the trigger points of the muscles assessed

Muscles	Right	Left
Sternocleidomastoid	**28**	**25**
Upper trapezius	**30**	**29**
Splenius Capitis	4	4
Suboccipitals	**21**	**21**
Temporalis	6	6
Occipitalis	3	3
Frontalis	3	3

Revelations of the Blindness Prevention Modes in India and Cuba for China

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Abstract

Though the blindness prevention program is highly effective, but comparing with developed countries and part of developing countries, the gap is still obvious, and the blindness prevention mode and the implementation measures are still influencing the blindness prevention process. The blindness prevention performance of India and Cuba is notable, and the advantages of the Indian cross subsidization method and the Cuba government investment mode should be used for references in China.

Keywords: Blindness prevention, Cataract, India, Cuba

The blindness is divided into the avoidable blindness and the preventable blindness in the WHO. The avoidable blindness means the diseases which could be cured by medicines or surgeries, such as cataract which is the major cause of vision loss in the world, 39% of all blinds. The preventable blindness means the blindness which could not be reversed, but can be controlled by the medical interference, such as glaucoma, diabetes retina pathological changes and so on.

For a long time, the blindness prevention is very important in the department of ophthalmology, and though numerous oculists have paid large effort for the blindness prevention in China, but the situation is still far from being satisfactory, and comparing with developed countries, the blindness prevention of China is still lagged, and even comparing with some developing countries such as India and Cuba, the gap is still large. In recent two years, through the practical works in India and Cuba, the author felt much, and the blindness prevention program of China should use the advantages in India and Cuba for references, and be changed as follows.

1. India blindness prevention mode

India is one of the countries with the prominent performance of blindness prevention, and its amount of cataract surgery rate (the cataract surgery rate in one million people each year) is 3100, eight times of China's (Xu, 2008, P.1-3). Different blindness prevention effects occurred in similar economic states, and following characteristics exist in Indian blindness prevention mode.

1.1 Positioning screening

In this mode, large ophthalmologic hospitals radiate many sub-centers by the network information management, as the center, and many screening positions are established in the schools of some villages, and the doctors will be dispatched periodically to screen and treat eye diseases on the spot, and the patients who could not been treated will be moved to the ophthalmologic hospitals for the surgery treatment. 50% of cataract patients come from that. The large-scale positioning screening could provide convenient and quick medical approaches to solve the mess that poor and far patients could not be treated. And all screenings are free.

1.2 Free operation

Because of the faith, many private hospitals in India could provide free surgeries for cataract patients. The Aravind Ophthalmologic Hospital is a large private ophthalmologic hospital in the South of India, with 3000 beds, and in 2006, there were 0.19 million cataract patients to be treated, and 2/3 of them were free. The hospital adopted the method of cross subsidization, i.e. 1/3 patients' charge with payable ability would be enhanced for the other 2/3 patients. Like China, many people in India are too poor to pay expensive medical charge, and by this method of cross subsidization, many patients could obtain the free surgeries to cure the cataract. Those patients paying for the surgeries will feel calm because they could help others.

1.3 Manual small incision cataract surgery

In the cataract blindness prevent surgery, the hospitals need saving the costs for free surgeries, so they may not invest high-cost equipments and technologies, and *3manual small incision cataract surgery* with cheap cost and equipments just could possess this advantage, and for a good doctor, the after-operation effect of the small incision operation is almost same with the phacoemulsification (Ruit S, Tabin G, 2007, P.32-38 & Gogate P, 2007, P.965-968). Therefore, the small incision operation is very popular in the Indian blindness prevention operations.

India pays more attention to the training of surgery doctors, especially the training of the local doctors. For the local doctors, the small incision operation is one of main courses, and because of its advantages such as low cost, low risk, high quality, and easy operation, it is very welcomed in the blindness prevention operations, and the free patients are all use this technology.

2. Cube blindness prevention mode

The medical treatment is developed in Cuba, and in the planned economic system, the medical treatment of Cuba is advantageous beyond comparison with socialism characteristics. The government would invest large numerous human and materials resources for the blindness prevention, so the blindness prevention of Cube is famous in the world.

2.1 Medical system

The blindness prevention advantage of Cuba comes from the medical system of Cuba, i.e. a free medical guarantee system with wide radiation to every household in the whole country.

The free treatment for all people means that the people of Cuba could enjoy the possible free medical service from the country. In the ophthalmologic domain, the patients could freely enjoy the medical treatment level in all ophthalmologic hospitals. Needless to say these ophthalmologic diseases such as cataract, glaucoma, and eye-ground disease, the refractive surgeries to treat the short sight and the hyperopia by the quasi-molecule laser have been popularized to everyone, and only if the patients would accept the surgery, they could completely enjoy the service with high technology. Therefore, in Cuba, it is hard to see the eye diseases which could not be treated for a long time in Cuba, and the surgery of the hypermature cataract is very rare.

Wide radiation range means that the “three-class medical” system of Cube could radiate the medical service to every family. The “three-class medical” system is composed by three classes, i.e. the primary class, the middle class, and the high class, and the primary medical units include the medical stations established in villages and communities. One medical station could cover about 200~600 residents, which is charged by one doctor and one nurse for 24 hours, and each resident has detailed medical file in the medical station, and medical personnel could provide healthy checking, simple disease treatment and disease prevention. If the patient with eye disease is found in the medical station and needs to be further treated, the doctor will help him to the special hospital for treatment. In this way, the asymptomatic eye diseases such as diabetes and glaucoma could be discovered in the physical checking and transferred to the list of early diagnosis and treatment, and the avoidable blindness could be eliminated. And the cataract patients could be treated as soon as possible.

2.2 Large government investment and numerous oculists

In recent years, the large-scale blindness prevention work of Cube is very famous in the world. With the basic medical guarantee, Cuba has basically eliminated the avoidable blindness such as cataract, and the blindness prevention work has been ascended to the stage of prevention. Aiming at the avoidable blindness patients, their files would be established in the corresponding medical institutions, and they will be treated and interviewed periodically. At the same time, Cuba also invested many capitals for the blindness prevention in the world. In 2004, Mr. Castro presided in the “Miracle Plan” in person to treat the eye diseases in the Latin America and Caribbean. In this plan was implemented in 2004, and Cuba has established the ophthalmologic hospitals in about 50 countries, and most of them were centralized in the Latin America and Africa, and the third world countries, and from 2005 to 2008, there were 1.5 million patients to be treated by the surgery.

So much large foreign assistance plan could not leave the quick development of the medical education, and in 2004, there were only less than 700 oculists in Cuba, and in 2010, this number ascended to 2000, and for the country with 12 million population, it means there is one oculist in 6000 people (there is one oculist in 60000 people in China).

3. The actuality of the blindness prevention in China

China is the developing country, and there are about 5 million cataract blinds in China (Zhao, 1999, P.329-335), 18% of the blinds in the world. The yearly cataract surgery rate is only 448.7, 1/8 of the number in India, which

is largely different in similar economic states, saying nothing of comparing with the blindness prevention of Cuba. With the increase of the population and the advent of the aging society, though China is strengthening the power and adopting various measures to strengthen the blindness prevention, the operation amount each year could only achieve the amount of the new patient, which could not solve the problem in essential.

3.1 Poor people

The cataract patients in China are mainly centralized in the back lands, and they are too poor to accept the operation, which is the main limited factor of the cataract operation. At present, about 40%~60% people could not pay the charge of the medical treatment in rural China, and in the middle and west regions, 60%~80% patients would die at home because of poor conditions.

3.2 Sufferers have not paid more attention to the eye diseases

Chinese people always pay less attention to the eye diseases, and the screening work is rare, so many patients examine only when they find the disease, and many diseases are too late to be treated, and the treatment opportunity has been lost, so is the glaucoma.

3.3 Deficient and uneven doctors

According to the statistics, there are 22 thousand oculists in China, one in 60 thousand people, and most of these oculists are centralized in large and middle cities, and the medical power in the rural and back lands is very weak, and about 1/3 counties in China have not oculists (He, 2005, P.121-123). Oculists' whole technology is lower, and less of the half could do the cataract surgery (Zhang, 2006, P.31-32). Facing large numerous of blinds, many oculists in large hospitals go to back lands for various blindness prevention activities such as the "Health Flier", the "Sunshine Travel", and the "Project Vision", with the helps from various castes and charity institutions. But the power is still too limited to solve numerous blinds.

4. Revelations

4.1 Supports from government and society

As viewed from the economic states and social systems, China has both part of advantages of India and Cuba, and these two countries belong to the third world countries, with undeveloped economy and low average income, but their blindness preventions are better than China. The cross subsidization method of India comes from the love to the society. Rich people would provide part charge for those poor patients to treat the blindness, and the hospitals would abandon the profitable will to help people as they can, and offer the opportunities of screening and treatment. The blindness prevention of Cuba completely comes from the government behaviors, though the finance of the government is not abundant, but it could take much capital for the medical security to perfect the basic medical system, medical education, physical checking, and blindness prevention. Therefore, the blindness prevention of Cuba doesn't only aim at those avoidable eye diseases such as cataract, and the prevention of the preventable blindness could also achieve certain level. Therefore, the work of blindness prevention is not only the work of the ophthalmology, and it represents the basic medical level of one country, and the country quality of one country. It is far sufficient to only depend on ophthalmologic staffs' passions and professional dedications. It needs the care from the government, and the government should increase the investment and the construction of the grassroots medical establishments, perfect the medical system, and make the medical services to every family. With the gradual perfection of the Chinese medical security system, a part of special capitals in the urban and village medical security system and the new rural cooperative medical scheme should be fixed for the blindness prevention. At the same time, the drumbeating of the blindness prevention should be strengthened, and the organization and arrangement of the charities should be increased to introduce more supports and love from all circles of the society.

4.2 Strengthening the trading of the oculists

One main cause to limit the cataract surgery is the deficiency of good oculists. Most good oculists with abundant experiences are centralized in large hospitals in big cities, and the grassroots oculists are deficient, but most blindness prevention operations are assumed by the grassroots oculists and young doctors in big hospitals, so the operation quality is the focus problem. In 0.75 million cataract operations from 1988 to 1996, 11% of the vision after the operation is still lower than 0.3 (Guan, 2006, P.7-9). In addition, in the survey about the vision after cataract operation in Beijing Shunyi, Zhao Jialiang *et al* found that only 25% patients' daily life vision exceeded 0.3 (Zhao, 1999, P.329-335). It is obvious that it is very important to strengthen grassroots and young doctors' operation training. The Indian experiences told us that the small incision operation had low cost and risk, and the doctors with a few intraocular operation experiences could completely grasp this technology through short-term training, so the small incision operation was deserved to be extended in the back lands. If the operation training

bases such as the Aravind Hospital could be established in the whole country depending on big hospitals, the grassroots oculists could be trained systematically, especially for the small incision operations, the quality and quantity of the cataract operation in China could be really enhanced under strictly eligible standards.

4.3 The blindness preventions in city and college should be different

The difference of the rural and urban medical conditions is large, and the blindness prevention works should be different. For the cities with better medical conditions, the eye diseases such as cataract are relatively easy to be solved, and the screening and early prevention and treatment of the avoidable blindness diseases such as glaucoma and diabetes retina pathological changes should be strengthened, and in China, Xu Liang *et al* used the remote image transmission to develop the screening and prevention of the eye diseases in the city (Xu, 2009, P.1-3). For villages, the cataract is the main blindness factor, and many people are blind because of it and lose the living ability. Therefore, the screening and treatment of these avoidable blinds could be strengthened to make them see the sunshine as soon as possible, because it is very important to make all people enjoy the right of the sunshine.

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Comparison of Physiological and Psychological Well-Being in Physical Active and Sedentary Women in Iran

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Abstract

Researcher has shown that habitual physical activity enhances both physiological and psychological health. The objective of the paper was to comparison of Physiological and psychological well-being in physical active and sedentary women in Iran.

Data of 2500 subjects (aged 15-55 years) from a five-state cross sectional study was used in this analysis. Psychological and Physiological well being was assessed using 28-item General Health Questioner (GHQ). It was found that 62.4% single and 69.8% married had good psychological well being. More single (13.5%) than married (5.9%) showed poor psychological well being. There was significant difference between psychological well being and marital status ($p<0.05$). The results shows that about 61.4% of not working and 63.6% of working respondents with good psychological well being while 16.2% of not working and 10.6% of working respondents had poor psychological well being. There was significant difference between psychological, well being and working status ($p<0.05$). There was not significant difference between psychological well being and education of the respondents. More active women respondents (68.2%) were found to have good psychological well being compared to 56.1% of the respondents who did not. There was a significant difference between psychological well being, age and physical activity of respondents ($p<0.05$). The results indicated association between physiological and psychological well-being, as measured using a variety of psychological inventions and regular physical exercise.

Keywords: Psychological well being, Socioeconomic factors, Health, Physical activity

1. Introduction

Exercise has both physiological and psychological benefits. Many adults find that their opportunities to socialize are limited, and many studies have shown that social isolation is associated with poor general health (Brown *et al*, 1992).

People who exercise regularly have reported increased self-confidence, especially when performing physical tasks. Regular exercisers have also reported other psychological benefits such as, less depression, stress, and anxiety, and an improved outlook on life. Studies have demonstrated that sedentary lifestyle is related to

increased risk of lifestyle diseases (Haskell *et al*, 2007; Pedersen and Saltin, 2006; Lindstrom *et al*, 2006). Other studies have demonstrated a decreased risk of lifestyle diseases with an increased level of physical activity and aerobic fitness (Andersen *et al*, 2000; Blair *et al*, 1996). Physical activity is recommended as treatment as well as prevention with regard to a number of lifestyle diseases. Despite of increasing knowledge concerning benefits of physical activity, an increasing number of people are finding it difficult to meet the amount of health beneficial physical activity (WHO; 2004). The results of number of studies have demonstrated a positive relationship between exercise and mental health (Faulkner and Sparkes, 1999; Martinsen, 1993).

Researcher has shown that habitual physical activity enhances both physiological and psychological health. Physical activity is instrumental in the prevention of coronary heart disease, hypertension, osteoporosis, and some forms of cancer (eg, colon). In addition, physical activity builds muscle strength and endurance and increases flexibility, all of which are necessary for the prevention of injuries and disabilities (Diane and Padden, 2002).

Psychological health indicators are important for monitoring and evaluating the health status of communities. Psychological health problems contribute heavily to the total burden of disability in the population. It is known that socioeconomic factors are the main determinants of psychological health as measured by the General Health Questionnaire (GHQ) (Henderson *et al*, 1998). Early detection of psychiatric and physiologic morbidity and its management shortens the duration of patients suffering and results in far less social impairment in the long term. Emotional disorders should therefore be eliminated or minimized at an early stage for a better quality of life.

In recognition of the difficulty in keeping the individual in a physically active lifestyle, Health Psychological research emphasize the fact that behaviour change is anchored in a psychological, social and physiological context. In conclusion, it is essential for offering successful prescribed interventions aiming at behaviour change that attention is directed towards psychological and social issues as well as physiological (Uexküll, 1996; Biddle and Fox, 1998). The importance of the interaction between these factors is underlined by health psychological research showing that these factors is underlined by health psychological research showing that these factors in combination are influencing the individual health status and the ability and will to change behavior (Stelter *et al*, 2005; Mudde *et al*, 1998).

There are many screening instruments and rating scales available to aid the primary care doctors to detect psychiatric and non psychotic disorder among the women. The GHQ has high sensitivity and specificity has been proven to be a valid instrument. The method developed by Goldberg (Goldberg 1972) has been extensively used in different settings and different cultures. It has become a commonly used instrument to detect physiologic and psychiatric disorders such as depression, anxiety and related psychiatric morbidity. It is usually self-administered and is based on the respondents' assessment of their present mental state relative to their usual or normal stat (Goldberg 1972). The method may be used in surveys or clinical settings to identify potential cases, leaving the task of diagnosable general health to an interview.

The objective of this study was to compare the physiologic and psychology well-being in trained and sedentary women and its association with sociodemographic factors in Iran.

2. Methodology

This study was a cross sectional study conducted in five region (North, South, Center, West and East) representing the five geographical regions of Iran. Each of the districts in the state was classified according to urban areas determined by Statistical Department of Iran. A total of 10 districts were chosen and the study was carried out between 2006 to 2007 involving 2500 women aged 15-55 years, living in the selected districts. The active women were considering for participants who exercised at least two or three times per weeks. Stratified sampling or Multistage sampling was used. Women with a history of stroke or transient ischemic attack, cancer diagnosed less than 5 years ago, or previous myocardial infarction were excluded from the study. The study protocol was approved by the Scientific Advisory Committee and Ethical Committee of University Alzahra University.

A structured questionnaire was used in collecting data on socioeconomic and demographic information such as age, marital status, education level, and income and occupation classification.

The GHQ was explicitly designed to measure psychological and physiologic health and to detect acute or current, psychiatrically diagnosable disorders in population studies. The questions consisted of 28 question divided to 4 parts. The first part was based on somatic symptoms, second part Anxiety, third part, social function and fourth was depression. Each question had four responses. Each item is rated on a four-point scale (less than usual, no more than usual, rather more than usual or much more than usual). The total score was determined by adding the

score obtained for each answer in the questionnaire. Based on the GHQ guidelines, scores of 4 and above were considered positive for poor psychological and physical well-being. A score of 0 indicates a good, and a score of 1-3 indicates a moderate psychological and physical well being.

2.2 Statistical Analysis

All statistical analyses were performed with using SPSS 13 (Statistical Package for Social Science). The t-test was used to determine the association of each factor of Physiological and psychological well-being among the respondents. The association between a determining factor, physiological and psychological well-being was considered to be significant at $p < 0.05$.

3. Results

The total numbers of eligible respondents from the five regions were 2550 and of these 2500 agreed to participate, giving the response rate of 98.1%. Table 1 shows the socio-demographic data of the respondents. There were (n=272) 10.9%`North, (n= 364), 14.6%South, (n= 1088) 43.5%Center, (n= 483), 19.3% East, (n= 293), 11.7% west Iranian providence. The 35% respondents aged was 30-45; 31% 18-30; 22%16-15 and 12% more than 45 years. The mean age of respondents in 5 providence was 18-30, years north and south, 30-45 center, east was <18 years. Of them 31.9% high school degree, 26.7 % diploma, 22% student, 12% university, 7% had primary education. Most were married (58%) and single (42%). Majority of the respondents 51% were considered themselves as working and only 49% of them not working (Table. 1)

Table. 2 shows the GHQ scores categories and reliability of this instrument was 0.844 (Alpha Cronbach), maximum score-12 and minimum -0. Majority of physical activity women respondent score 0 in Physical Health, Anxiety, Depression, General Health, Social function were (83.4%, 74.5%, 75.7%, 71.0%, and 63.5%), score 1-3 (13.6%, 23.8%, 22.8%, 26.2%, and 32.6%) and score 4 above (2.9%, 1.7%, 1.4%, 2.8% and 3.8%) respectively. There was significant difference ($p<0.05$) between physiologic and psychological, well being in 2 groups.

Table. 3 shows that 62.4% single and 69.8% married had good psychological well being. More single (13.5%) than married (5.9%) showed poor psychological well being. There was significant difference between psychological well being and marital status ($p<0.05$). About 61.4% of not working and 63.6% of working respondents with good psychological well being. While 16.2% of not working and 10.6% of working respondents had poor psychological well being. There was significant difference between psychological, well being and working status ($p<0.05$). There was not significant difference between psychological well being and education of the respondents. More active women respondents (68.2%) were found to have good psychological well being compared to 56.1% of the respondents who did not. There was a significant difference between psychological well being and physical activity of respondents ($p<0.05$). There was significant ($p<0.05$) difference between psychological well being and age of the respondents.

4. Discussion

Several studies have found that emotional disorders are more among sedentary female than athletic women (Buffone, 1984). This could be explained by the fact that exercisers had effect on moral growth among athletes and non-athletes and improved outlook on life (Bredemeier and Shields, 1986). Moreover, exercise has the potential to influence patients' physical and psychological health simultaneously (Faulkner and Biddle, 2001).

There was significant difference in active women and sedentary respondent between Physical Health, Anxiety, Depression, General Health and Social function well being ($p<0.05$). The athletic women respondent had good physical and psychological well being compared sedentary group.

The present study also found that the prevalence of general health and emotional disorders were significantly higher among Sedentary respondent who did not have a good physical activity. Another study reported that regular exercisers had psychological benefits such as, less depression, stress, and anxiety, and an improved outlook on life (Brown *et al*, 1992).

The current study found that emotional disorders had the highest prevalence among the respondents had >45 years age, however it was not significant. The present study shows that the overall prevalence of psychological disorders among the active women and sedentary was 2.9% 9.8% respectively. More married respondents had good psychological well being compared to single respondents. Mental disorders occur more frequently in working respondents but this can be explained by the socioeconomic and social activity status of the residents (Sijmen and Aart, 1998)

Married respondents had good psychological well being compared to respondents in the single category. Only about 5.9% of the married respondents had poor psychological well being compared to other category. We

believe this is as a result of the lack of support and loneliness among the respondent who remain unmarried. This is supported by the study of Sumihisa *et al*, 2002.

There are different hypothesis for explanation of affective changes in physiologic and neuro-physiological. One of the model known as the hypothermic model. This suggests that the primary stimulus for promoting affective change is the elevation in body temperature from exercise, and this alteration in physiological state is manifested in a number of responses that are orchestrated by the hypothalamus. Specifically, in relation to exercise, Horne and Staff, 1983 concluded from their counterbalanced design that high intensity exercise and passive heating produced similar increases in slow wave sleep (relaxation effect) and that exercise may be a vehicle for these effects.

The endorphin hypothesis proposes that the effects of acute exercise on psychological well-being, in particular 'euphoria', is caused by the release and subsequent binding of endogenous opiods, these being -endorphins to receptor sites in the brain (Steinberg and Sykes, 1985). The endorphin hypothesis originated from early research on rat brain tissue that revealed significant increases in opiate receptor occupancy after the rats had been forced to exercise (Wardlaw and Frantz, 1980).

Respondents from the age category of 15-18 years had good psychological well being compared to the older age groups. Respondents in the age category of >45 years had more poor psychological well being compared to the other age groups.

However, there significant ($p<0.05$) association between age category and psychological well being. Similar finding was reported by Johnson and Cooper, 2003; Yuriko and Masumi, 2003 show that psychological well being decreased significantly with increasing age in both genders13 consistent with this study.

5. Conclusion

This report shows that the current state of knowledge on the relationship of physical activity to the health and social needs of Iranian women warrants the serious attention of public health officials, educators and sport leaders.

Early detection of psychiatric morbidity and its determinants by using such screening instrument can help in planning psychiatric services for the women and thereby contributing towards their physiologic and psychological well-being. Therefore girls should be encouraged to get involved in sport and physical activity at an early age because such involvement reduces the developing a number of health problems and related conditions in elderly.

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Table 1. Social demographic characteristic of respondents (n=2500)

Socio-demographic profile	Variables	N (%)
Region classification	North	272 (10.9)
	South	364 (14.6)
	Center	1088 (43.5)
	West	293 (11.7)
	East	483 (19.3)
Age group(Year)	15-18	550 (22)
	18-30	775 (31)
	30-45	875 (35)
	>45	300 (12)
Marital status	Single	1050 (42)
	Married	1450 (58)
Level of education	Primary education	175 (7)
	Students	550 (22)
	High school	800 (31.9)
	Diploma	675 (26.7)
	University	300 (12)
Working status	Working	1275 (51)
	Not working	1225 (49)
Physical activity	Active	1674 (66.96)
	sedentary	826 (33.04)

Table 2. Prevalence of Physiological and psychological well being in active (n= 1674) and sedentary (n= 826) women

Variable		N(%) G	N(%) M	N(%) P	p-value
Physical Health	**A**	1197 (83.4)	428(13.6)	49(2.9)	P<0.007*
	S	446 (54)	299(36.2)	81(9.8)	
Anxiety	**A**	1264 (74.5)	399 (23.8)	29 (1.7)	P<0.036*
	S	254 (30.8)	514 (62.2)	58 (7.0)	
Depression	**A**	1268 (75.7)	382 (22.8)	24 (1.4)	P<0.02*
	S	467 (56.5)	265 (32.2)	94 (11.3)	
General Health	**A**	1188 (71.0)	439 (26.2)	47 (2.8)	P<0.031*
	S	571 (69.1)	186 (22.5)	69 (8.3)	
Social function	**A**	1068(63.5)	545 (32.6)	61 (3.8)	P<0.024*
	S	544 (65.9)	169 (20.5)	113 (13.7)	

* p<0.05 is consider significant. G – Good,well being; M- Moderate, well being; P- Poor well being. Data were presented as n= number of participant, and percentage. A= active; S= Sedentary.

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Table 3. Prevalence of psychological well being according to demographic factors of respondent (n= 2500)

		GHQ score			
Epidemiologic factors	**N**	**G**	**M**	**P**	**p-value**
Classification		**N(%)**	**N(%)**	**N(%)**	
Age category					
15-18	550	446(81.2)	87(15.8)	16(3)	0.049*
18-30	775	605(78.1)	85(16.9)	38(5)	
30-45	875	627(71.7)	164(18.8)	83(9.5)	
>45	300	190.2(63.4)	75(25)	9(11.6)	
Marital status					
Single	1050	655(62.4)	253(24.1)	141(13.5)	0.043*
Married	1450	1012(69.8)	352(24.3)	85(5.9)	
Education					0.063
Primary education	175	90(57.1)	64(36.7)	10(6.2)	
Students	550	368(67)	169(30.9)	12(2.2)	
High school	800	520(65.1)	285(35.7)	7.2(9)	
Diploma	675	396(58.7)	185(27.5)	93(13.8)	
University	300	192(64.2)	76.0(25.3)	31(10.5)	
Working status					
Working	1275	810(63.6)	328(25.8)	135(10.6)	0.0085*
Not working	1225	752(61.4)	274(22.4)	198(16.2)	
Physical activity					
Active	1674	1141(68.2)	415(24.7)	118(7.1)	0.035*
Sedentary	826	463(56.1)	234(28.4)	128(15.5)	

$p<0.05$ is consider significant. G – Good psychological well being,; M- Moderate psychological well being; P- Poor psychological well being. Data were presented as n= number of participant, and percentage.

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