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COVID-19 Early Detection Tool for Elder Abuse during Epidemics, Digital Analysis of Color Tone on the Surface of the Skin in Elderly People

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Abstract

The purpose of this study was to attempt a digital analysis of body color tone of elderly subjects, thus demonstrating that nurses and caregivers can easily and reliably record changes in body color tone.

This cross-sectional study took place between April 1, 2017 and March 31, 2019. A workshop was set up where observers received explanations from researchers on how to use color charts and recording forms. Measurement instruments (digital cameras) were also standardized in this effort. While the elderly subjects targeted by this study suffered from dementia, they were able to converse and understood the purpose of the study, and the study was conducted with their and their families'consent. In addition, after receiving approval from a research ethics examination from an affiliated university, the target facility gaining this consent was subjected to an ethical review, after which we implemented the study in accordance with ethical guidelines for medical research on humans.

Consent was obtained from 30 subjects (20 female (66.7%), 8 male (26.7%) and 2 for which the gender was unknown; average age: 87.8 years (minimum 80 years, maximum 100 years)). We were able to perform digital image analysis of the lesion site and unaffected parts, and present numerical values.

Evaluations by observers were significantly different depending on the individual, and subjectivity greatly influenced comparisons with the color chart based on visual evaluations. It was confirmed that numerical evaluation of images taken in hospitals and nursing homes could also be performed using general-purpose software.

Keywords: color chart and scale, digital analysis, elderly, body color tone

1. Introduction

1.1 Introduce the Problem

In recent years, it is increasingly common to hear about growing populations of elderly people with dementia, and cases of caregiver abuse. We initially attempted a technique involving observing skin discoloration with the naked eye to check for markers of being hit, struck, or stepped on, and logging these findings, but 80% of participants were unable to accurately perform an observation (Yamada-b, 2020). Therefore, we thought that a tool capable of objectively evaluating and recording the color of the skin on the body surface was needed. We received the consent of the elderly to take photographs and use these in conjunction with reference to their regular nursing records.

With age, the skin of the elderly becomes dry, its elasticity decreases, and various skin complications are more likely to occur. Due to individual differences thickness of fat deposits, original skin color, skin tension or tautness, and moisture content, detecting abnormalities based on skin color alone does not suffice. Generally, nursing observation records include complaints lodged by elderly people as regard bleeding, inflammation, rashes, blisters, and itching and pain.

1.2 Explore Importance of the Problem

When reviewing prior literature on the subject, we found many papers discussing skin discoloration in the elderly

in the context of bedsores. Patients with vertebral injury, reduced motor skills from long periods of convalescence, and those with neurological disorders exhibit reduced activity, causing redness and blisters at sites were body pressure is concentrated at the same position for prolonged periods of time, causing bedsores. The use of bedsore prevention guidelines as a risk assessment tool is currently recommended to clinical practitioners. In prior work (Moore & Patton, 2019) on the efficacy of said risk assessment tools, the report found that, in a population of 1,487 at risk of bedsores, there was no discernible difference in the extent to which the Braden, Waterlow, and Ramstadius risk assessment scales had on the prevention of bedsores over customary clinical judgment modalities.

Screening patients without clear signs of abuse in medical contexts could aid in the identification of those at risk and reduce their exposure to violence and abuse. In Japan, Mimasaka (2010, 2012a, 2012b, 2018) has attempted to diagnose signs of child abuse based on the color of bruises.

According to literature discussing the United States Preventive Services Task Force's IPV screening methodology and abuse of elderly and vulnerable people (Nelson, Bougatsos, & Blazina, 2012), the Elder Abuse Suspicion Index (EASI) yields a sensitivity of 9-47 percent and specificity of 75-97 percent based on the number of affirmative replies to questions. However, studies of abuse in the elderly and vulnerable adults remain scarce. Moreover, we did not find any RCT studies (Feltner et al., 2018) on the inadequate care and neglect of the elderly and treatment of abuse. In the authors' own experience, while some subjects paged nurses for help all through the night, still others refrained from seeking aid to an extent that would leave one wondering why they did not seek help sooner.

1.3 State Hypotheses and Background

Japan is one of the foremost ageing societies in the world, with three points of interest: 1) there are approximately 4M elderly people with mild cognitive impairment that are at risk of dementia (JCO, 2019); 2) elder abuse is on the rise (JCO, 2017), necessitating screenings for early detection of said incidents; and 3) there is no extant scale used for observation of signs of abuse on the skin. Given the above, the authors sought to develop a method of observation of skin tone changes in elderly populations through the use of color charts and scales.

Seeking to resolve the three points above, we developed an objective observation method based on the use of skin surface scales and attempted to perform digital analysis of the skin tone in elderly subjects, and demonstrate the viability of accurately recording said changes in a manner that is minimally invasive to nurses and caregiving practitioners.

2. Method

This was a cross-sectional study performed from April 1, 2017 to March 31, 2019.

2.1 Test population

Elderly persons with discoloration of the skin on the surface of the body.

Of the above group, those hospitalized or regularly commuting to a hospital or care facility.

2.2 Methodology

2.2.1 Standardization of Observation Criteria

Seeking to standardize the observation criteria, to the extent possible, subjects were observed in the same location, at the same time, using the same light source (fluorescent lamps, etc.). Digital cameras were used for daily photographs in order to minimize individual differences that are produced in observations made by the naked eye. The same model of digital camera was used and shooting conditions standardized, with these units then distributed to participating facilities and participants asked to not change the settings.

2.2.2 Observation by Nurses and Caregivers

Prior to each photography session, the consent of the subject was obtained, and regions of the skin exhibiting a changed color were photographed.

These photographs were taken in private rooms or treatment areas to ensure privacy. For the first session, the entire body of the subject (front and in profile) was photographed, as well as specific regions alongside which the color chart and scale were placed. For subsequent sessions, the color chart and scale were used on regions exhibiting changed color, with the region photographed such that its midpoint was in the center of the frame. The image data was then cross-checked with patient logs. In the event of signs of swelling or inflammatory exacerbation, the matter was reported immediately to the attending physician.

2.2.3 Digital Analysis of Color Abnormalities on the Body Surface

Utilizing image analysis software, we compared digital images of the surface of the skin in which abnormalities were observed with the naked eye with a control set of images showing the skin in normal conditions.

Photographic equipment: Canon IXY190

Photography criteria: no strobes, photographed simultaneously with color chart and scale

2.2.4 Image Analysis Methodology

2.2.4.1 Naked eye evaluation: abnormal and normal areas are examined and their relative color and size compared.

2.2.4.2 Digital photographic image analysis: the photos taken were verified using Adobe Photoshop CC (2015 release) as follows:

i. Observe the JPEG image data with the naked eye, and select the entirety, and center of, regions deemed to be of abnormal color using the Lasso tool.

ii. Select Window -> Histogram and record the average, standard deviation, median, and pixel values displayed for RGB/red/green/blue/luminance/color.

iii. Perform comparison of skin tone in areas subject to injury with normal skin tone. Moreover, for those cases in which observation of tonal changes over time was possible, we also examined the characteristics of said change.

2.2.5 Ethical Considerations

We discussed the purposes of this study and its ethical considerations with the directors of hospitals and care facilities and obtained their consent. We then held sessions with nurses and caregivers at the wards of said sites to discuss the research and obtain their cooperation, both orally and in writing. We requested the observation of approximately twenty elderly people at each facility. Those subjects capable of understanding the purpose of the research (including those with dementia, provided they could communicate and comprehend the project) were eligible, and consent of the individuals and their families was obtained. A copy of a consent form was retained by the subject and researcher, respectively, with subjects given contact details for the researcher and a consent withdrawal request form, giving them the right to revoke their participation at any time and make contact as necessary.

Posters indicating the purpose and scope of the research and explaining the use of cameras were posted so as to be visible to subjects and their families, and oral and written consent was specifically obtained from those subjects requiring observation. Daily photographs were performed by a nurse or practitioner with the consent of the subject. The research was conducted with The Ethnical Guidelines for Nursing Research and the approval of the Research Ethics Review Committees of the Japanese Red Cross Akita College of Nursing and the Japanese Red Cross Junior College of Akita.

3. Results

3.1 Subject Attributes and Naked Eye Observation (Table 1)

We obtained the assistance of three hospitals and five caregiving facilities. We analyzed thirty cases for subjects from whom consent was obtained. (20 females, 66.7%; 8 males, 26.7%; 2 unspecified. Average age: 87.8)

Among their medical histories were: Alzheimer's disease (6 subjects, 20.0%); cerebral infarction (3 subjects, 10.0%); and use of anticoagulants or antiplatelets pursuant to administration of drugs with a tendency to cause bleeding (4 subjects, 13.3%).

We prepared two forms: one used for initial observations, and one for daily observations. Approximately eighty percent of remarks regarding skin tone changes and overall bodily condition involved statements on nutrition, physique, medicine being taken under treatment, and currently administered treatments. We also asked observers to record on a body map where skin tone changes were observed, but only about twenty percent considered the size, region, or type of change, and several miss-mapped the left and right sides. The regions in which skin tone changes were observed were: upper body (19, 63%); lower body (18; 60.0%); and head (4; 13.3%).

Table 1. Attributes and physical conditions of the subject

	Item	n	N=30 (%)
Gender	Male	8	(26.7)
	Female	20	(66.7)
	Unknown	2	(6.6)
	Average age (80-100 y.o.)	87.8	
Medical history	Alzheimer dementia	6	(20.0)
	Cerebral infarction	3	(10.0)
	Cancer	1	(3.3)
	None	18	(60.0)
	Unknown	2	(6.7)
Medicine taken	Anticoagulant	4	(13.3)
	Antiplatelet agent	4	(13.3)
	ADP inhibitor	1	(3.3)
	None	21	(70.1)
Region (can overlap)	Head	4	(13.3)
	Breakdown: head	1	(3.3)
	face	3	(10.0)
	neck	0	(0.0)
	Upper extremity	19	(63.3)
	Breakdown: upper arm	2	(6.7)
	forearm	5	(16.7)
	supraclavicular fossa	1	(3.3)
	shoulder	1	(3.3)
	cubital region	1	(3.3)
	wrist	4	(13.3)
	dorsum of hand	4	(13.3)
	finger	1	(3.3)
	Lower extremity	18	(60.0)
	Breakdown: sacral region	5	(16.7)
	lower limbs	2	(6.7)
	knee	3	(10.0)
	calcaneal region	2	(6.7)
	ankle	1	(3.3)
	toe	3	(10.0)
	dorsalis pedis	2	(6.7)
	No answer/mistake	2	(6.7)

Table 2 discusses the size and color observations made per the analog color chart and scale provided. We originally intended for the observation process to last for about ten days, but at the shortest, participants recorded their findings for a period of twenty days, and at the longest, or a period of over two months.

As seen in Table 2, surface skin discolorations observed with the naked eye expanded for about a week from the time of discovery, and then gradually changed in color, with the extent of discoloration subsiding.

Table 2. Naked eye observation of skin discoloration on body surface using color charts

Age/gender	82 y.o. male		85 y.o. male		86 y.o. male	
Medical history	None		Kidney failure		Heart failure (Heart pacemaker)	
Medicine taken	None		Anticoagulant		Anticoagulant	
Cause	Unknown cause		Dialysis		Fell at night	
Discolored area	radial side of forearm		medial aspect of the arm		forehead and both orbital regions	
	Size (cm)	Color code	Size (cm)	Color code	Size (cm)	Color code
0日	8.5×2.5	8	13.5×7.0	18	5.5×4.0 (forehead)	19
1 day later	8.5×3.0	9			5.5×4.0 (forehead)	19
2 days later					5.5×4.5	19
3 days later	9.0×5.0	16				
4 days later	9.0×5.0	17				
5 days later	8.0×4.0	17				
7 days later			22.0×9.5	17		
9 days later	5.5×4.0	17			6.5×5.5 (forehead)	18
10 days later	5.0×4.0	17				
11 days later	4.5×3.0	18				
12 days later	4.0×3.5	23				
13 days later	4.0×3.5	23				
14 days later	3.0×3.5	24	24.0×11.5	17		
16 days later	3.0×2.5	24				
17 days later	2.0×1.0	1				
18 days later	1.0×1.0	1				
19 days later	1.0×1.0	1				
21 days later			23.0×10.5	16		
23 days later					7.0×14.5 (orbit)	17
28 days later			22.0×9.5	16		
30 days later					8.0×14.5 (orbit)	17
35 days later			22.0×9.5	16		
38 days later					7.0×14.5 (orbit)	16
42 days later			21.0×9.0	16		
45 days later					7.0×13.5 (orbit)	14
49 days later			21.0×8.5	16		
52 days later					4.0×13.0 (orbit)	14
56 days later			21.0×9.0	16		
59 days later					3.5×13.0 (orbit)	13
63 days later			21.0×8.5	16		

Color codes: 2-7 green shades 8-14 blue shades, 15-17 purple shades, 18-22 red shades, 23, 24, 1 orange to yellow.

Note. Table 2 repeated measure ANOVA was performed for statistical analysis. Statistically, there is no significant difference in the change over time, but it can be seen that the difference in color tone between the lesion and the normal part decreases with the passage of time.

3.2 Digital Image Analysis

3.2.1 Digital Image Analysis Methodology Explained

3.2.1.1 Observation with the Naked Eye

Differences in color tone rendered onscreen allow for distinguishing between lesions and normal regions. The color ranged from dark purple-red to purple-red, with some areas exhibiting a blue-purple and yellow-brown tone. No additional change in the above was observed over time.

3.2.1.2 Digital Image Analysis

Digital analysis of normal regions and lesions was viable, as was numerical quantification.

3.2.2 Digital Analysis

Collected image data: 1,878 images.

3.2.2.1 Observation with the Naked Eye

Normal skin tone was the expected skin color when observed with the naked eye, but the injured area ranged from purple-red to dark purple-blue, also developing a yellow tone and some areas becoming lighter in color over time. While regions exhibiting abnormal tone gradually decreased and abated over time, in some cases, there were regions that exhibited no marked change during the observation period. There appears to be considerable individual difference and difference from region to region, and the health of the subject is heavily implicated in the formation of objective assessments.

3.2.2.2 Digital Imaging

i. Comparison of normal and abnormal regions

We compared the RGB, red, green, blue, brightness, and color values of the subject's normal surface skin color and that in discolored regions. There was a statistically significant difference between the discolored region and the normal region. (Risk factor $p<.05$, paired t-test)

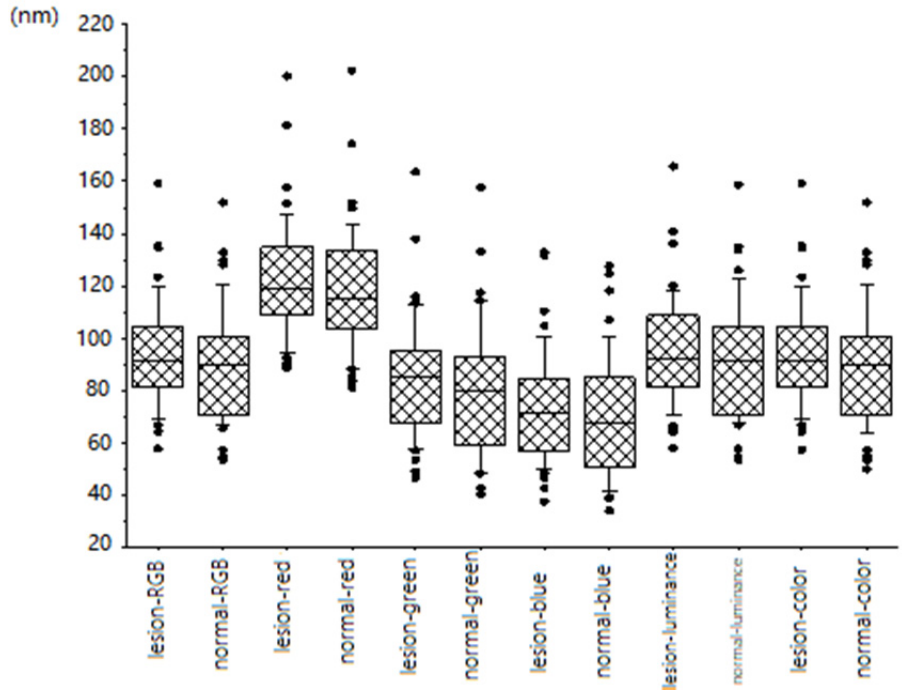

Figure 1. Digital analysis of difference between normal skin color and sites of skin discoloration

Note. This figure is an analysis of color components. RGB is a comparison of all tones, red, green blue, brightness, and color. The paired t-test is used for statistical analysis.

ii. Observation of tonal changes over time (Figure 2)

No statistically significant difference (using the Repeated Measures ANOVA modality) was observed in terms of

changes over time between lesions and normal regions.

Individual differences in evaluations made by observers were considerable, with naked eye observations against the color chart being influenced by subjective opinions. The research found it viable to numerically quantity the results of photographs taken at hospitals and care facilities and use general-purpose software for image analysis.

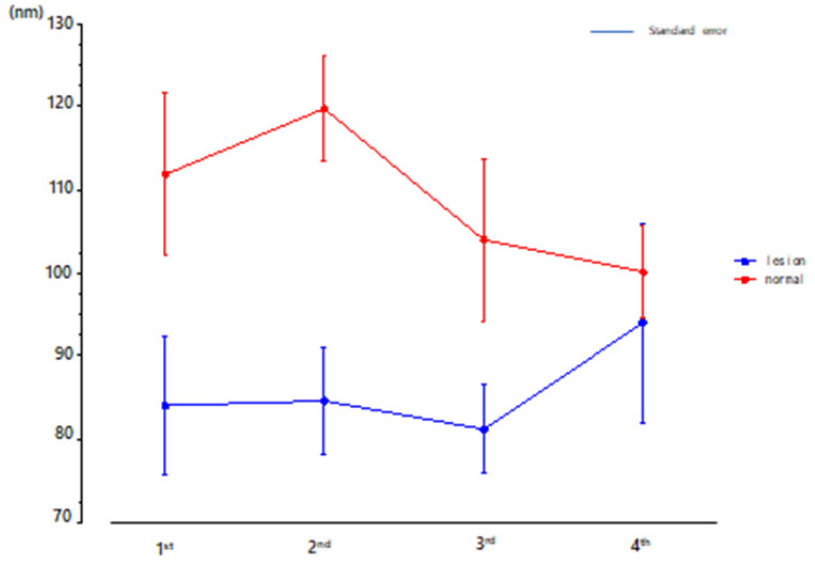

Figure 2. Changes in body surface skin discoloration and normal skin color over time

Note. Figure 2 confirmed the F value and p value using multivariate analysis of variance. The upper polygonal line shows the change in color tone of the normal part, and the lower polygonal line shows the change in color tone of the lesion part.

4. Discussion

For this study, we observed the surface of the skin in an elderly population using color charts and scales, using these records to develop a tool enabling the early detection of the need for intervention.

4.1 Objective Evaluation of Skin on the Body Surface

We attempted to perform a digital analysis of the skin tone on the surface of the body of elderly subjects, and compare the resulting RGB, red, green, blue, luminance, and color values of normal (control) skin, and that exhibiting changes or abnormalities, with each other. A significant difference was found between the normal and changed regions. We demonstrated the viability of a method using digital cameras to record photographs and allow nurses and caregivers to easily log changes in patients' skin tone. In addition, over 80% of remarks made concerned the subject's medical history, current treatment and medicine, the skin surface, and condition of the nails. However, observers appeared to find it difficult to accurately describe in writing the size and location of abnormalities.

When performing digital image analysis, we attempted to consistently handle differences in image size using the scale simultaneously photographed. However, due to the photographing angle, some lesions required evaluation in the absence of such confirmation. Ensuring consistent distance from the light source proved difficult, and some lesions exhibiting differences in brightness were observed. We interpreted this to be an error in the imaging process. It was difficult to make a determination on some images because the angle and size were not uniform when photographing the surface of the discolored skin. To compensate for this, in addition to digital cameras, laptop computers with built-in webcams were installed with the color chart and scale software as an additional means of logging skin tone changes. This allowed for logging and retaining private information separately from patients' actual medical records. Moreover, it enabled nurses and caregivers to save time when logging changes in the size and tone of regions under observation and accurately record changes in skin tone.

4.2 Viability of This Scale

Upon beginning our research, we found it necessary to obtain a tool for the early detection of abuse in elderly and

disabled populations (Yamada, 2016; Yamada, 2020a). However, prior work by Nelson et al. (2012) and Feltner et al. (2018) suggested that there was no objective scale extant. Klasinc et al. (2017) has utilized MRI to analyze wounds on the region cervicalis posterior and observe bleeding in the sternocleidomastoid muscle; Kondou (2017) demonstrated the efficacy of utilizing an immunohistochemical approach to AQP3 in skin in the neck region following ligature strangulation to arrive at forensic conclusions. Ordinarily, detection and diagnosis of bruises is performed by the naked eye under a light source. In some cases, bruises in victims of abuse cannot be readily observed due to factors such as skin color and age. Prior work has found that using an alternate light source is five times more effective at detecting a range of bruises in victims, regardless of skin tone, than white light (Scafide et al., 2020). By contrast, alternate light sources can be used to detect bruises, but other skin lesions (scars, hyperpigmentation, etc.) may appear identical when using this technique, so Scafide (2020) advises against using it for the diagnosis of bruises.

In engaging with elderly populations, we found that some subjects are under considerable duress, but the act of seeking aid is perceived as humiliating and as potentially threatening to their way of life. This is not because abuse victims lack the ability to seek aid as such, but because the circumstances in which they find themselves are quite harsh or extreme; there appear to be complex sets of circumstances preventing them from making cries for help. How to properly interpret cries for help from those in extremely trying situations is a support-side issue; it is not the victims' inability to seek aid that is the problem, but sundry issues such as caregivers inability to detect these cries for help, or such observations and care being eschewed out of busy schedules or cost concerns. Use of the color charts and scale for observation of the skin surface hinges on both digital quantification of the results and of an "analog" approach involving empathetic dialogue with elderly subjects, and using these in conjunction is more effective.

4.3 Future Issues

As seen in the case of the eighty-five year-old in Table 2, it takes considerable time for subcutaneous tissue damage in the elderly to heal, so there were some pathologies in which no change was perceived with the naked eye during the observational period. Differences in the size of recorded photographs were compensated for by using the scale photographed at the same time as the content therein. We also observed some photographs in which the angle at which they were taken impeded forming a definitive conclusion, so the methodology observers' use for taking the photos is one possible issue to consistent implementation. Therefore, utilizing this color chart and scale requires first undergoing training in correct photography methods.

Moreover, digital analysis of changes in a given lesion revealed quantitative changes over time, but there were many lesions the change of which could not be distinguished with the naked eye alone. One current flaw of this model is its inability to account for this discrepancy between the naked eye evaluation and digital analysis, and we consider it a future issue for improvement.

5. Conclusions

This pandemic has changed our lives. At work and at home, they were divided into strong and weak, those with control and those who had no choice but to obey. Many older people fall into the latter category due to illness and diminished physical fitness. A feature of this study is that nurses and caregivers collaborated to observe the skin of the elderly and found tools that help early detection of abuse and self-neglect.

This research revealed the following:

1) Digital images allow for analysis and comparison of lesions and normal (control) areas. Moreover, general-purpose software allows for numerically quantifying and evaluating said images.

2) Differences in the size of recorded photographs can be compensated for by using a scale.

Photographed at the same time as the content therein. Utilizing this scale requires undertaking training in correct photography methods.

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Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Knowledge, Attitude and Practice (KAP) related to Type 2 Diabetes Mellitus (T2DM) among Healthy Adults in Kiribati

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Abstract

Background: Type 2 Diabetes Mellitus (T2DM) kills more than 4.9 million adults yearly, and it is one of the major threats to global public health for low- and middle-income countries that mostly affects the adult population. Kiribati is currently facing the increasing prevalence of morbidity and mortality from T2DM.

Objective: To find out the level of Knowledge, Attitude and Practice (KAP) towards T2DM among healthy adults in South Tarawa, Kiribati.

Methods: This cross sectional study was conducted on South Tarawa, Kiribati at three randomly selected public health clinics from September 25 to November 20, 2017. Non-diabetic patients from both sexes who aged 18 years and above were selected by a simple random sampling technique to participate in this study. A pretested structured questionnaire was used to collect data and SPSS (version 22) was used for data analysis. Descriptive statistics was used to study the characteristics of the population and level of KAP.

Results: 405 persons participated in this study. Majority of the participants were in the age range of 18-24 years (30.4%), were females (66.2%) and had ever married (68.6%). The study revealed that the mean knowledge score was 20.47 (±3.49) which shows that participants had moderate level of knowledge towards T2DM. The mean score for attitude score was 61.06 (±5.48) which shows that participants had high level of attitude towards T2DM. The mean practice score was 4.57 (±2.01) which shows that participants had a low level of practice towards T2DM.

Conclusion: A great emphasis on health education regarding symptoms, risk factors modification and prevention is T2DM are necessary.

Keywords: Type 2 Diabetes Mellitus, Knowledge, Attitude, Practice, Kiribati

1. Introduction

Diabetes is one of the main fast-growing Non-communicable Disease (NCD) risk to global public health (Fatema, et al., 2017). Due to the current rapid demographic transitions, from traditional to more westernized lifestyles, there is a disproportionate increase in the incidence of diabetes in developing countries (WHO, 2015).

Diabetes mellitus is a common metabolic disorder, that accounts for a high number of mortality and morbidity through its micro and macro vascular complications (Srinivasan et al., 2012). It is among the top 10 causes of death in adults, and was estimated to have caused four million deaths globally in 2017 (International Diabetic Federation, 2017). The global diabetes prevalence in 2019 was approximated to be 9.3%, which will rise to 10.2% by 2030 and 10.9% by 2045. The prevalence was higher in urban (10.8%) than rural (7.2%) areas, and in high-income (10.4%) than low-income countries (4.0%). One in two (50.1%) people living with diabetes do not know that they have diabetes (Saeedi et al., 2019). Between 2000 and 2016, there was a 5% increase in premature mortality from diabetes. Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. The World Health Organisation (WHO) estimates that diabetes was the seventh leading cause of death in 2016 (WHO, 2020). Eighty-eight million people aged 18 years and over have prediabetes, a precursor of diabetes. 9 out of 10 don't know that they have pre-diabetes. Hence there is a need to explore the knowledge and perception of the

non-diabetic on diabetes (CDC, 2020).

The three main types of diabetes are Type 1 Diabetes (T1D), Type 2 Diabetes Mellitus (T2DM), and Gestational Diabetes Mellitus (GDM). The majority of people with diabetes are affected by T2DM i.e. 90%–95% of adult diabetes are T2DM (CDC, 2020; Hackethal, 2016). T2DM is on the rise and is no longer believed to be the only diseases of the rich nations.

Kiribati is one of the low-middle income countries that has experienced the fastest growing and greatest burden of T2DM (GBD, 2010). It is ranked as the second highest premature deaths of diabetes after Fiji, accounting for 3,746.6 (Whitman, 2016; Kiribati Institute for Health Metrics and evaluation reports, 2017). Furthermore, Kiribati and other Pacific Island Countries (PICs) are also experiencing the dramatically increasing rate of T2DM (Kiribati Institute for Health Metrics and Evaluation, 2017). According to the Kiribati Ministry of Health statistics reports in 2013, 100 confirmed new cases of T2DM were being reported each year. The report also confirmed 4800 T2DM cases being recorded from 2007 to 2012; 380 of these had undergone amputations (Teitake, 2015; Kiribati Ministry of Health Annual Report, 2011). In 2014, the number of amputations in Kiribati was 136 which was double the figure of the previous year (Whitman, 2016).

Early diagnosis and proper management of diabetes can reduce a lot of problems associated with Diabetes Mellitus (DM) (Nathan et al., 2009). The aim is to have optimal glycaemic control to prevent the macro and micro vascular complications. This involves lifestyle modification such as healthy diet, regular exercise, weight loss in addition to oral hypoglycemics therapy. Therefore, apart from governmental support and good health-care professional involvement, knowledge and attitude play a crucial role in obtaining a healthy life. T2DM remains a big concern in the country and the KAP study is the appropriate tool for creating greater awareness in prevention, diagnosis, risk factor control and disease management as supported by previous KAP studies.

Knowledge plays a pivotal role in development, early prevention and detection of any future disease (Fatema et al., 2017). Because diabetes is a silent disease and many sufferers only become aware of having the disease after developing one of the complications, general knowledge of diabetes can help in earlier detection of the disease and fewer complications (Maryam & Seham, 2016). The chronic comorbidities of DM, that has a significant impact on the quality of life of diabetic patients can be prevented with adequate knowledge on DM. Having the knowledge can aid people to assess their risk of diabetes, encourage them to seek out appropriate treatment and care while inspiring them to take charge of their health (Moodley & Rambiritch, 2007).

For DM patients, positive KAP is important. KAP elements are inter-related and dependent on each other. It is believed that people's attitude to health and their uptake of health services, including health education services, are strongly affected by their knowledge, culture and beliefs. Thus, people with sufficient knowledge, positive attitude and good practices are vital for effective control of T2DM. It is also assumed that people with good knowledge of diabetes had good attitudes and practices (Baradaran & Knill-Jones, 2004; Maina et al., 2010; Rathod et al., 2014). Furthermore, an obvious growing body of evidences for KAP studies have reinforced the need for greater awareness of prevention, diagnosis, risk factor control and disease controlling. Facts have shown that increasing knowledge regarding diabetes and its complications have significant benefits in the prevention, management and treatment of diabetes. Generally, a KAP study correlated to diabetes would be useful for primary detection, prevention and to help diminish the consequences (Saadia et al., 2010; Demaio et al., 2013; Islam et al., 2014; Rathod et al., 2014; Koley et al., 2016).

There are very few studies undertaken on awareness of diabetes of the diabetic patients (Wee et al., 2002) and no data on awareness of diabetes of the entire population (Fatema et al., 2017). Because knowledge is a critical component of behavioural change, it is important for the public to be aware of T2DM (Mahrooqui et al., 2013). Pelope are more likely to participate in prevention and control measures once awareness is created (Ericksson et al., 2001). Even though various forms of media have been used to educate the public about diabetes mellitus, the impact of such efforts is yet to be appraised. It is not clear on how much the public actually knows regarding this disease through the current programs. An understanding of the level of public awareness along with their knowledge, attitude and practice towards diabetes mellitus will be helpful to plan for future programs such as health promotion interventions (Wee, 2002). Therefore, the current study intends for the first time to be conducted on healthy adults visiting public health clinics in South Tarawa, Kiribati to assess their level of KAP. Because the burden of diabetes on health care and its economic implications are enormous especially for developing countries such as Kiribati, prevention is important. The results of the study can aid in future development of programmes and techniques for effective health education and will provide baseline data for evaluating intervention programs as no such studies have been previously conducted in Kiribati.

2. Methods

2.1 Study Design and Setting

This study was a quantitative cross-sectional study design which was conducted over 8 weeks from the 25th of September 2017 to the 20th of November 2017. It was conducted on South Tarawa, Kiribati at three randomly selected public health clinics namely; Temwanoku Betio, Bairiki and Bikenibeu east clinic. These three public health clinics were randomly selected out of the 11 public health clinics as interested sites by the researcher to conduct this research by dividing the area into three groups as one each from the east (Bikenibeu clinic), central (Bairiki clinic) and west (Temwanoku Betio clinic).

2.2 Study Population and Sample

The study population included all I-Kiribati and was conducted among adults aged 18 years and above who attend public health clinics in South Tarawa, Kiribati. The inclusion criteria for people to participate in this study sample were: those willing to participate, non-diabetic patients (who identify themselves as non-diabetics), both sexes, aged 18 years and above, must have attended any one of the three identified public health clinics, and be a Kiribati resident.

2.3 Sampling and Sample Size

This study adopted a cluster sampling based on the geographical location of South Tarawa. There is a total of eleven Public Health clinics on South Tarawa, Kiribati: 3 clinics in Betio (West), 4 in the Central and 4 in the Eastern site of the country. One clinic was randomly selected from each area, i.e. 3 clinics out of the 11 clinics were randomly selected from each geographical location as sites for conducting this survey namely: Temwanoku clinic in Betio (West), Bairiki clinic (Central) and Bikenibeu clinic (East). Then the individual subjects were randomly selected from each clinic, i.e. every 2nd name was picked until the sample size was reached. The sample size was determined using a sample size calculator; employing the 50% knowledge with 5% margin error and 95% confidence interval i.e. the total sample size required for this study was 385 (Raosoft, 2004). Considering the 5% drop out, then the expected sample size of 385 was increased to 405 for this study.

2.4 Data Collection Tools

A self-administered questionnaire in English and Kiribati versions was used to collect information from the participants. The questionnaire in this study was developed to collect data on participants' KAP related to T2DM, by taking questions from previous similar studies and using literature review.

The questionnaire consisted of 52 questions which were divided into four sections. Section A had 12 background related questions, Section B had 15 knowledge related questions, Section C had 15 attitude related questions and Section D had 10 practice related questions.

For the knowledge related questions, each 'correct' answer was coded as '2', "I don't know" as '1' and a 'wrong answer' as "0." The reason for adding the category of "I do not know" is to reduce the chance of guessing the answer and thus getting a right answer by chance which would subsequently increase the knowledge score. A person may have wrong knowledge about the topic asked and hence give an incorrect response which results in score of 0 rather than having no knowledge about it and writing "do not know" to get a score of 1. The rationale for this scoring is that no knowledge is considered better than wrong knowledge. The maximum score was '30' while minimum score was '0'. A 0–15 score were assessed as low level of knowledge, 16–22 as medium and 23–30 as high level of knowledge (Tekanene, 2018)

For the attitude related questions, Likert scale was used to measure the attitude with 5 categories of response. Each item was rated on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). The minimum score was 15 and maximum 75. A score of 15-45 was assessed as low level of attitude, 46–60 assessed as medium and 61–75 assessed as high level of attitude.

For the practice related questions, responses with a 'Yes' were coded as '1'and responses with a 'No' will be coded as '0'. The maximum score was '10' and the minimum was '0'. Scores less than 5 were assessed as low level of practice while scores greater than 5 were assessed as high level of practice (Mohammadnezhad et al., 2015; Lincoln et al., 2017).

In addition, a scale of weight and height measurement was used for measuring individuals Body Mass Index (BMI). BMI under 18.5 kg/m^2 is underweight, 18.5–25 is normal weight, 25–30 is overweight and more than 30 is obese.

The questionnaire was validated by 3 experts in the relevant field for content validity to ensure validity of the study i.e. to assess the construction of each question and to guarantee if they can read it and whether it is answering

objectives of the study and not affected by other factors. Their comments were taken on board in revising and improving questionnaires as a final version prior to the actual commencement of the study. A pre-test was conducted prior to data collection, to assess the validity of the questionnaire. Therefore, a pilot test of the questionnaire was conducted prior to the actual data collection. Ten participants who had met the inclusion criteria were given the questionnaire to ensure that the questions were understandable and readable for face validity. After the validity of the questionnaire, the final version was given to two bilingual translators to ensure the correct translation of English into Kiribati language.

2.5 Study Procedure

The researcher conducted a brief oral presentation for those who came to visit the clinic during their waiting time to inform them about the purpose of the study. An information sheet (English or Kiribati language) was given to them to understand the study and its purpose. For those willing to participate and met the inclusion criteria, a consent form was given (English or Kiribati language) to sign prior to filling the questionnaire. The questionnaire was given to them in both English and Kiribati language, so the participants could choose which one to use. The self-administered questionnaire took an average time of 20–30 minutes to fill.

Any adults coming to the clinic who met the inclusion criteria were first enrolled, and then the selection of samples was based on the enrolment lists, i.e. every 2nd name was picked until the sample size was reached. Next, the information sheet was given to the selected individuals to read and understand about the study. The participants signed an informed consent if they were willing to participate in this study. Then a self-administered questionnaire was given to those who were able to complete the questionnaire at the same time and the researcher collected it herself. For those who wished to complete it later, they were given pre-paid envelop and asked to bring the completed questionnaire in the envelop the next day to the health centre and put in the box that was provided at the clinic. People who cannot read and cannot write were assisted by the main researcher, i.e. by reading the questions and the choice of answers in Kiribati and write down their own answers.

2.6 Data Management and Analysis

The data was coded and checked for completeness and consistency. All responses from questionnaires were entered into Microsoft Excel and a quality check was performed; data cleaning (i.e. initial frequency analysis was done to see that all responses have been entered and any wrong entries were identified easily) and analysis. Then it was exported to SPSS (version 22). Data was analysed using the following tests: descriptive and graphical statistics were used to study the characteristics of the population (including frequency, percentage, table, mean and standard deviation).

2.7 Ethical Consideration

Prior to data collection, the ethics approval was obtained by Fiji National University's College Health Research Ethics Committee (CHREC), and also a consent agreement was obtained from Kiribati Ministry of Health. Participants were given an information sheet, consent form and questionnaire, all in English and Kiribati versions. Participants were also given a full explanation on every component of the study and were fully aware that all information they gave, and their identity will remain anonymous, confidential and will be used for the study purpose only. Those who were not willing to participate in the study were coerced to take part and their decisions were respected. For those who were not able to read particularly aged people were assisted by the researcher and assistant.

The computer used was password-protected, patients completed forms were kept locked in the cabinet for the maximum of 2 years where no one can access them except the main researcher. After analysing data, participants were informed about the result of the study.

3. Results

3.1 General Characteristics of Participants

The sample size of the study was 405 and all participants answered the questionnaire completely with 100% response rate. Majority of the participants were in the age range of 18–24 years (30.4%), were females (66.2%), had ever married (68.6%), had obtained a high school certificate (57.5%), were household owners (53.8%), had about 5–8 members in their family (46.7%), were unemployed (62%), had monthly income of <500 AUD (81.7%), were obese (52.1%), had no family members with diabetes (52.3%) and belonged to Roman Catholic church (55.6%) (Table 1).

Table 1. General characteristics of participants (*n*=405)

Demographic characteristics	**Categories**	**N**	**%**
Age	18-24yrs	123	30.4
	25-32yrs	122	30.1
	33-39yrs	66	16.3
	40+yrs	94	23.2
Sex	Male	137	33.8
	Female	268	66.2
Marital status	Ever Married*	278	68.6
	Single	84	20.7
	Others	43	10.6
Religion	RCC*	225	55.6
	Others	98	24.2
	Kiribati Uniting church	44	10.9
	LDS*	38	9.4
House ownership	Owner	218	53.8
	Live with relatives	163	40.2
	Rented	24	5.9
Family member	<4 ppl	68	16.8
	5-8 ppl	189	46.7
	9-12 ppl	91	22.5
	13+ ppl	57	14.1
Monthly income	<500 AUSD	331	81.7
	501-1000 AUSD	58	14.3
	>1000 AUSD	16	4.0
Occupation status	Not working	251	62.0
	Working	154	38.0
Education level	No education	19	4.7
	Primary school	69	17.0
	High school	233	57.5
	TVET	75	18.5
	University	9	2.2
BMI	<18.5	0	0
	18.5-24	61	15.1
	25-30	132	32.8
	30+	212	52.1
Family member with T2DM	No	212	52.3
	Yes	139	34.3
	I don’t know	54	13.3

*Ever Married (i.e. married, widowed, divorced, separated) *Roman Catholic Church (RCC) *Latter- day Saints (LDS).

3.2 Frequency of Response on Knowledge-Related Questions

Most of the participants knew that T2DM was a chronic disease in which blood glucose was too high (60%), knew the causes of T2DM (71.4%), the dietary restriction of T2DM (30.9%), diet contributing to high sugar (56.5%), the hereditary cause of T2DM (39,3%), knew the symptoms (59%), diagnosis (43.7%) and control (77%) of T2DM and overweight as a risk factors (64.4%) for T2DM and how to maintain a healthy weight (78.3%). However, majority of the participants had no knowledge on types of diabetes (77.3%), insulin (79.5%), complications of T2DM (49.4%) and smoking as a risk factor (50.6%) for developing T2DM (Table 2).

Table 2. Frequency of responses on knowledge-related questions (*n*=405)

Question (n=405)	Responses	N	%
T2DM is a chronic disease in which blood glucose is too high	Yes	243	60.0
	I don't know	152	37.5
	No	10	2.5
How many types of Diabetes are there?	I don't know	313	77.3
	One	73	18.0
	three	19	4.7
What are the major causes of T2DM?	Physical inactivity, unhealthy foods.	289	71.4
	I don't know	112	27.7
	Mosquito bite	4	1.0
Is Type 2 diabetes hereditary?	Yes	159	39.3
	I don't know	142	35.1
	No	104	25.7
Which diet is restricted in T2DM?	Potato/rice	228	56.3
	I don't know	125	30.9
	Fruits	52	12.8
A diet high in fat and sugar	Increases blood sugar levels.	229	56.5
	I don't know	141	34.8
	Has no effect on the risk of getting T2DM.	35	8.6
Can type 2 diabetes be cured?	Yes	147	36.3
	No	139	34.3
	I don't know	119	29.4
Which one of the following is symptoms of T2DM?	Weight loss	239	59.0
	I don't know	143	35.3
	headache	23	5.7
Insulin is a hormone which	I don't know.	322	79.5
	Allows sugar to enter the cells of the body.	61	15.1
	Increases sugar in the blood.	22	5.4
The diagnosis of Type 2 diabetes in made by	A simple blood test measuring your blood glucose level.	177	43.7
	I don't know	138	34.1
	Taking blood pressure, height and weight.	90	22.2
How to control and manage Type 2 diabetes?	Regular exercise	312	77.0
	I don't know	79	19.5

	Wash hands	14	3.5
Being overweight/obese	Increases the risk of getting T2DM.	261	64.4
	I don't know	127	31.4
	Will maintain the blood glucose level.	17	4.2
To achieve and maintain a healthy weight	Exercise regularly	317	78.3
	I don't know	84	20.7
	Drink too much alcohol	4	1.0
Smoking	I don't know	205	50.6
	Has no effect on the risk of getting T2DM.	123	30.4
	Increases the risk of getting T2DM.	77	19.0
T2DM may cause health problems (complications) such as	I don't know	200	49.4
	Kidney disease	194	47.9
	Deafness	11	2.7

3.3 Frequency of Response on Other Questions

With regard to the participants' source of information about T2DM, it mainly came from radios (46.9%). Majority of respondents (68.1%) were aware of T2DM (Table 3).

Table 3. Frequency of responses on other questions (n=405).

Questions	**Responses**	**N**	**%**
Know about T2DM	Yes	276	68.1
	No	129	31.9
Source of information	Radio	190	46.9
	Friends/family	93	23.0
	None	51	12.6
	Others	41	10.1
	Newspaper	18	4.4
	Health care workers	12	3.0

3.4 Frequency of Response on Attitude-Related Questions

Table 4 displays the results of the participants' attitudes based on a Likert scale scoring system consisting only of responses of strongly agree, agree, neutral, disagree, and strongly disagree. Strongly agree and agree were combined together to show the total percentage of good attitude, Neutral for not aware, while disagree and strongly disagree were also combined together to show the total percentage for poor attitude.

The majority of the participants agreed/strongly agreed that diabetes is the worst thing that can ever happen to them (87.4%); that they would feel embarrassed about having diabetes (56.8%); that most people would find it difficult to adjust of having diabetes (55.1%); that seeking help from the clinic for T2DM should be a priority(93.6%); that someone with diabetes should follow a controlled diet, 387 (95.6%); that it is good to include green leafy vegetables and fruit in their daily diet (95.6%); that it is good to avoid extra added salts and sugar in their diets(64.7%); that it is good to have fruit rather than sweets (91.3%); that diabetes complications may be prevented if blood glucose level is well maintained (89.1%), it important for a diabetic to maintain a healthy weight (91.9%); that checking blood sugar level is important (97.1%); that they should be examined for diabetes (97.8%) that family members should be screened for diabetes (92.1%); that missing medicine for a diabetic person has a negative effect on disease control (88.9%); and that regular visits to nurses at the clinic enables one to control the disease (97.5%).

Table 4. Frequency of responses on attitude – related questions

Attitude (n= 405)	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree		Total	
	n	%	n	%	n	%	n	%	n	%	N	%
Diabetes is the worst thing that can ever happened to me	158	39.0	196	48.4	27	6.7	21	5.2	3	0.7	354	87.4
I would feel embarrassed about having diabetes.	79	19.5	151	37.3	42	10.4	111	27.4	22	5.4	230	56.8
Most people would find it difficult to adjust to having diabetes.	51	12.6	172	42.5	50	12.3	100	24.7	32	7.9	223	55.1
Seeking help from the clinic for T2DM should be a priority.	136	33.6	243	60.0	17	4.2	6	1.5	3	0.7	379	93.6
I think someone with diabetes should follow a controlled diet.	202	49.9	185	45.7	12	3.0	2	0.5	4	1.0	387	95.6
I think it is good to include green leafy vegetables and fruits in my daily diet.	187	46.2	201	49.6	10	2.5	4	1.0	3	0.7	388	95.8
I think it is good to avoid extra added salts and sugar in my diet.	113	27.9	149	36.8	18	4.4	46	11.4	79	19.5	262	64.7
It is good to have fruits rather than sweets.	182	44.9	188	46.4	21	5.2	11	2.7	3	0.7	370	91.3
It is important for a diabetic to maintain a healthy weight.	121	29.9	251	62.0	19	4.7	9	2.2	5	1.2	372	91.9
Diabetes complications may be prevented if blood glucose level is well control.	130	32.1	231	57.0	30	7.4	10	2.5	4	1.0	361	89.1
Checking of your blood sugar level is important.	193	47.7	200	49.4	9	2.2	1	0.2	2	0.5	393	97.1
I should be examined for diabetes.	171	42.2	225	55.6	9	2.2	0	0	0	0	396	97.8
Family members should be screened for diabetes.	162	40.0	211	52.1	27	6.7	5	1.2	0	0	354	92.1
Missing medicines for a diabetic person has a negative effect on the disease control.	168	41.5	192	47.4	18	4.4	17	4.2	10	2.5	360	88.9
Regular visits to the clinic to nurses at the clinic enable one to control the disease.	201	49.6	194	47.9	9	2.2	1	0.2	0	0	395	97.5

3.5 Frequency of the Response on Practice-Related Questions

Most of the participants (83.5%) did not go every six months to check their blood glucose; did not control their weight (59%); did not do physical exercise to maintain their weight (52.6%); spent less than 30 minutes per day doing exercise (52.1%; were smokers (55.6%); did not drink alcohol (80%). With regards to the participant's diets, majority had not taken food on time (58.3%), more than half of the participants (52.8%) mentioned that they did add extra salt to their regular diets and neither ate fruits (57%) nor vegetables (51.9%) (Table 5).

Table 5. Frequency on Practice- related questions (*n*=405)

Questions (n=405)	**Responses**	**N**	**%**
Do you go every six months to check your blood glucose	No	338	83.5
	Yes	67	16.5
Do you control your weight?	No	239	59.0
	Yes	166	41.0
Do you normally do physical exercise to maintain your weight?	No	213	52.6
	Yes	192	47.4
How much time do you spend for exercise per day?	< 30 mins	211	52.1
	> 30 mins	194	47.9
Do you smoke?	Yes	225	55.6
	No	180	44.4
Do you currently drink alcohol?	No	324	80.0
	Yes	81	20.0
Do you take food timely?	No	236	58.3
	Yes	169	41.7
Do you add extra salt to your regular diet?	Yes	214	52.8
	No	191	47.2
Do you eat fruits?	No	231	57.0
	Yes	174	43.0
Do you eat vegetables?	No	210	51.9
	Yes	195	48.1

3.6 Level of Knowledge, Attitude and Practice

Table 6 illustrates the distribution of the participants' level of knowledge, attitude and practice towards T2DM and the mean score of each. Most of the participants had a moderate level of knowledge (60.2%) and attitude (49.6%) towards T2DM and high level of practice (51.1%) towards T2DM.

Table 6. Distribution of responses by level of Knowledge, Attitude and Practice and their mean score

Variables	**N**	**%**	**Mean ± SD**
Knowledge			
High level of knowledge (23-30)	115	28.4	
Medium level of knowledge (16-22)	244	60.2	20.47±3.487
Low level of knowledge (0-15)	46	11.4	

Attitude			
High level of Attitude (61-75)	196	48.4	
Medium level of Attitude (46-60)	201	49.6	61.06±5.470
Low level of Attitude (15-45)	8	2.0	
Practice			
High level Practice (≥5)	207	51.1	
Low level Practice (<5)	198	48.9	4.57±2.013

The knowledge score was out of 15 questions, with a minimum score of 0 and maximum score of 30. The mean knowledge score was 20.47 (±3.49) which shows that participants had moderate level of knowledge towards T2DM. The attitude score was created using the Likert scale based on 15 questions, with a minimum score of 15 and a maximum of 75. The mean score for attitude score was 61.06 (±5.48) which shows that participants had high level of attitude towards T2DM. The practice score was out of 10 questions, with a maximum score of 10 and the minimum is 0. The mean practice score was 4.57 (±2.01) which shows that participants had a low level of practice towards T2DM.

4. Discussion

In this study, participant's total knowledge about T2DM indicated that they had moderate level of knowledge. In other words, although on average, participants are familiar with T2DM, causation, diets, symptoms, diagnosis, control and management, risk factors, prevention of T2DM, but still there is a lot of room for improvement. Given the results of the present study, the knowledge mean score of 20.47(±3.49) was categorized as moderate.

Looking at the correct responses to each question, it was easy to identify and locate some of the knowledge gaps among participants, as shown from the presented study results such as inadequate or in correct knowledge on types of DM, the role of insulin in T2DM, the complications of T2DM and smoking as a risk factor for T2DM. The study results presented a better knowledge about symptoms of T2DM than did the study that was conducted by Asmawaw et al., (2015). This discrepancy might be due to socio-cultural differences between the study populations.

Unlike most studies from developing countries which reported poor knowledge of diabetes among the general public, the present study shows that the overall mean score of participant's knowledge was 20.47 (±3.49), that the participants had moderate level of knowledge towards T2DM. The results of the present study were similar to previous studies showing that the level of knowledge among the general public, is comparatively better, with the majority (>75%) having either moderate or good knowledge (Mohan et al., 2005; Al-Maskari et al., 2013; Demaio et al., 2013; Islam et al., 2014; Herath et al., 2017). This could be because of the similarity in the study design used, which are institution-based studies or increased awareness and campaigns regarding diabetes in these countries.

Knowledge is the greatest weapon in the fight against diabetes mellitus (Al-Naggar et al., 2017). Extensive knowledge, attitude and good practice could be the means to control and avoid diabetes related consequences and cost-effective measures in low- and middle- income countries (LMICs) (Gautam et al., 2015). Participants who had heard about T2DM had 4.4 times increase in their diabetes knowledge level as compared to subjects who had not heard of it previously. The findings were supported by the finding conducted in Bangladesh that revealed that respondents who get information regarding diabetes scored significantly higher than the group who did not get any information (Mumu et al., 2014; Kassahun & Mekonen, 2017).

Looking at the interpretation of the results based on the attitude toward T2DM among participants in South Tarawa, the study results revealed that the level of the participants' attitude towards T2DM was high; findings showed the participants' overall mean attitude score was 61.06 (SD=5.48). This means that a large number of people in Kiribati have very positive attitude towards T2DM. Observing the responses on this section, the majority of the participants responded positively to the attitude related questions on T2DM. Even though the attitude was good or positive among the participants, there are still a few gaps identified which need to be improved. Observing the number of each individual response on the attitude related questions of T2DM, the study identified three of the attitude gaps that were scored low with both 'strongly agree' and 'agree' with those responses. For instance, more than half (56.8%) of the respondents said that they were feeling embarrassed about having diabetes, and 44.9% of the participants saying that it is not difficult to adjust to having diabetes, and lastly, there were still some respondents, (35.7%) stating that adding extra salt and sugar in their diet did not matter to them. However, the rest

of the questions were scored higher, i.e. between 87.5% and 97.8%, showing a significant positive attitude towards T2DM. The present study revealed that people in South Tarawa have a positive or high level attitude toward T2DM. These findings agree with the findings of a study conducted in India and Saudi Arabia (Haval et al., 2012; Al-Aboudi et al., 2016), but contrasts with an Emirate study that reported that many of the subjects had a negative attitude (Al-Maskari et al., 2013). It seemed that participants understood how to prevent T2DM and know how to take good care of themselves with the disease and this could be highly attributed to increased awareness on diabetes.

The above findings are encouraging to know that they have positive attitudes towards T2DM. These findings do not mean that with good attitude, individuals cannot easily put it into practice towards T2DM, but this positive view will allow the individuals to think of preventing themselves from the disease is better. Positive attitude towards diabetes management and support from friends and family were associated with adequate diabetes management (Shawton et al., 2016).

The improvement of knowledge and attitude about T2DM is only a tool towards that ultimate goal, which is the improvement of T2DM related practices. It is essential to identify that high level of knowledge and attitude and practice towards the prevention of T2DM. It is common in the literature that with good knowledge and positive attitude, there is always a lack in converting or not transferring those to actual practice (Saleh et al., 2012; Herath et al., 2017).

When it comes to the overall assessment of practice and T2DM on the part of the respondents, the result of the present study was low levels of attitude (4.57, SD= ±2.013). It means that people of Kiribati have poor attitude towards T2DM, which requires a big effort to try and address it to promote the health of every individual from contracting such a disease. Observing the responses from the participants, it clearly shows that people of Kiribati have overwhelmingly poor practice towards T2DM in terms of attending regular clinic and lifestyle such as weight control, smoking and drinking. Smoking is accountable for NCDs related death (WHO, 2017; Gautam et al., 2015). There were 236 or 58.3% who did not take food timely, and 214 or 52.8% of the participants did add extra salt to their diet. About 231 or 57% of the respondents did not eat fruit, and 210 or 51.9% did not eat vegetables.

4.1 Limitations of the Study

This study had several limitations that should be taken into consideration when interpreting the results of the present study. First, the results of this study cannot be generalized to all populations in Kiribati as it was cross sectional. The participants for this study were recruited from the outpatients only and therefore the results may not be truly representative of the general public. In addition, the setting where the study was conducted is in public health clinics, where there might be bias in their knowledge about T2DM as they are exposed to information on T2DM at the clinics through pamphlets and posters available at the clinic or education may be readily accessible. Due to time limitation, reliability test was not done in the pilot study.

5. Conclusion

In this study, it was discovered that participants aged 18 years and above had a moderate level of knowledge, with a high level of attitude and a low level of practice with regard to T2DM suggesting a gap between the three. Therefore, it should become a priority for policy makers to enhance the knowledge and attitude of this nondiabetic group through strategies and programs so that it has a positive impact on their practice. The study provides a baseline information on the KAP of the non-diabetic population of Kiribati. This depicts the need for urgent educational campaigns with a prioritized focus on the non-diabetics to prevent diabetes, its management and complications. T2DM and its complications can largely be prevented if appropriate and timely measures are taken. Given that the study found a reasonable gap between knowledge and practice, overcoming that is very important when formulating and implementing certain strategies by which positive attitudes can be converted into beneficial practices. Knowledge and practice of the general population can be improved by structured programmes. Therefore, various issues need to be addressed to close the gaps between KAP towards T2DM. Education of vulnerable communities can become a cost-effective public health strategy. A large-scale awareness program has to be created through the use of mass media to spread the message of diabetes to the general population. It is essential for the health care professionals to take appropriate measures to increase awareness regarding the risk factors, causes, symptoms, treatment, management and complication of T2DM. Studies can be carried out in future to compare the KAP of the diabetic and nondiabetic population to identify gaps.

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Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Depression by Association? Mental Well-Being of Women in Urban Slums of Pakistan

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Abstract

Background: The association of mental health with parenthood is complex and varies across many social contexts. Previous studies place mothers with young children at a high-risk for depression. Therefore, the study aimed to understand the association of parity as a risk factor for maternal depression in a cross-sectional survey.

Method: A total of 255 women were surveyed at two primary health care centers in Karachi, a Metropolitan city of Pakistan between May 2019 and July 2019 with an anonymously answered Public Health Questionnaire (PHQ) 9. The demographic characteristics and related variables were determined as potential correlates of vulnerability to maternal depression. Significant predictive factors associated with risk factors were analyzed by means of linear correlation and multiple regression analysis.

Results: The PHQ 9 score noted an 89.2% prevalence of depression in the study sample. Of those, 72.6% (0.001 p-value) were multiparous women (3-5 children). When analyzed within each individual parity category, grand-multiparous women (6 or more children) had the highest percentage of depression at 92.6% followed by multiparous women (2-5 children) at 90.6%.

Conclusion: The result showed the greatest frequency of depression among multiparous women. However, grand multiparous unemployed women were at the highest risk of depression among low-income urban populations.

Keywords: maternal depression, parity, PHQ-9, questionnaire survey, mental wellbeing

1. Introduction

Pakistan is the sixth most populous country in the world with a population of over 207 million people according to the census of 2017(Pakistan Bureau Of Statistics, 2017). Studies conducted in Pakistan over the past decade have set the prevalence range between 22% and a whopping 60% for anxiety and depression(Ahmed, Enam, Iqbal, Murtaza, & Bashir, 2016). These high rates coupled with an annual population growth rate of 2.4% (Pakistan Bureau Of Statistics, 2017) warrants a look at the mental health of the caretakers of the future generation(Niloufer Sultan Ali, Mahmud, Khan, & Ali, 2013; Gulamani, Shaikh, & Chagani, 2013; LeMasters et al., 2020; Maselko et al., 2016; Rahman, Lovel, Bunn, Iqbal, & Harrington, 2004).

The association of mental health with parenthood is complex and varies across the many social contexts. Previous studies place mothers with young children at a high-risk for depression (B. Ali et al., 2002; Naeem, 1992; Rahman et al., 2004). The importance of maternal health and well-being is as important for the growth and development of young children as it is for the mother (Nusrat Husain et al., 2017; Nærde, Tambs, Mathiesen, Dalgard, & Samuelsen, 2000). This consideration of adverse effects on the children calls for urgent focus to maternal mental health beyond that of the pregnancy and post-partum period that has been studied relatively more in our population (Niloufer S Ali, Azam, Ali, Tabbusum, & Moin, 2012; Niloufer Sultan Ali et al., 2013; Gul, Sherin, Jabeen, & Khan, 2017; Gulamani et al., 2013; LeMasters et al., 2020; Rahman et al., 2004; Shah & Lonergan, 2017).

In our society, caring for the children is considered primarily the mother's responsibility. Hence, the mental well-being of the mother and her children are also linked. The demands of caring for children requires the mother to be emotionally and physically strong (Weissman, Paykel, & Klerman, 1972). Depression impairs this ability of the mother to cope with the stressors of parenting especially when coupled with other influencing factors such as

socio-economic status, family unit, education etc. (Heneghan, Silver, Bauman, Westbrook, & Stein, 1998; Nærde et al., 2000; Rahman et al., 2004). The risk of negative effects of maternal depression on the children (Niloufer Sultan Ali et al., 2013; Nusrat Husain et al., 2017) is significant enough to warrant research to check for stressors that can then be addressed to help them cope (Cree et al., 2018).

The objective of our study is to check for association of bearing and parenting one or more children affects the mental wellbeing of women. This paper attempts to add to the above-mentioned knowledge gap as most of the studies published in Pakistan focus on the post-partum phase only. Evidence is drawn from a cross sectional survey in Pakistan where mothers are considered as the primary caregivers. Two main areas are explored: i) Is there an association of the number of children (parity) with depression in mothers? ii) What are the socio-demographic risk factors for vulnerability to depression in mothers?

2. Methods

2.1 Study Setting

This cross-sectional survey was conducted in the primary health care center in Clifton and general practice clinic at Qayyumabad, Karachi, Pakistan.

2.2 Sampling

All mothers aged 18-48 years with at least one child under the age of 15years (including first time mothers) presenting at the clinic, having no previous history of diagnosed depression and who had given birth to healthy babies were included in the study. Mothers below 18 years and above 48 years, those who could not understand Urdu, those with previous history of diagnosed major depression/anxiety disorders and who used medication for that, and mothers having children with congenital abnormalities or those who had pre-mature babies were excluded, mothers having co-morbids such as thyroid and diabetes were also excluded. A sample size of 255 women was calculated using 5% margin of error and 90% Confidence Interval (CI). A total of 350 women were identified as eligible, and of those, 255 consented to be enrolled in the study. Informed consent was obtained at enrollment.

2.3 Data Collection

Enrolled women were interviewed using a pre-coded structured questionnaire comprising of questions regarding parity that was noted as the total births including live and still births over 20 weeks of gestational age. In addition, socio-demographic variables including the woman's age, ethnicity, education, working status, family structure was also added to the questionnaire followed by the Patient Health Questionnaire for depression (PHQ9) (Mitchell, Yadegarfar, Gill, & Stubbs, 2016) to assess the current status of depression or lack of it among participants. The PHQ–9 is a self-administered depression-specific questionnaire developed in the United States of America. The score of the PHQ-9 questionnaire as a measure of severity, ranges from 0-27 as it marks each of the nine criteria from "0" (not at all) to "3" (nearly every day)(Mitchell et al., 2016). Use of this questionnaire has been validated for primary care setting(Beard, Hsu, Rifkin, Busch, & Björgvinsson, 2016; Mitchell et al., 2016) and also specifically for Pakistan(Ahmad, Hussain, Akhtar, & Shah, 2018). The Urdu version of the PHQ-9 has noted a high internal reliability (Cronbach's alpha = 0.844) and high internal consistency (Cronbach's alpha =0.844) for community-based screening of depressive symptoms in Pakistan (Gallis et al., 2018). A total of 255 women were interviewed between May 2019 and July 2019.

2.4 Data Analysis

In the PHQ-9 total score for the nine items ranges from 0 to 27. The PHQ- 9 depression severity score is 16 (3 items scored 1, 2 items scored 2, and 3 items scored 3). Scores of 5, 10, 15, and 20 represent cut points for mild, moderate, moderately severe and severe depression, respectively. Primiparity was coded as having one live or still born, over 20 weeks of pregnancy. Multi parity was coded as having 2 or more live or still born, over 20 weeks of pregnancy. Grand multi parity is defined as having children live or still born over 20 weeks equal to or more than 5.

SPSS20 was used for data analysis. We ran frequencies and percentages for depression in the study sample. We then ran association of depression with number of children live or still born after 20 weeks of pregnancy. Fischer Exact test was applied to check for significance. Again, a Fischer Exact test was applied, and p-values determined. P-Value less than equal to 0.05 was considered statistically significant.

2.5 Ethical Consideration

All women determined eligible were briefed about the study by the researcher and informed consent was obtained before commencing with the interview. For ease of understanding, the questionnaire had been translated into local language Urdu. Confidentiality was maintained by removing personal identifiers and allotting identity (ID) codes

to the questionnaires. The participants were also given the option of notifying them of positive screening results and/or referral to their medical practitioners. All depression screening results from the study were kept confidential and only shared with the participants and/or their medical practitioner upon participant's consent. They had the right to refuse consent to this information being disclosed. Ethical approval for the study was obtained from the Ziauddin University's ethics review committee (Reference Code: 1950220TAFM).

3. Results

Frequency of depression was noted to be 88.6% (226) of the total 255 women included in the study. Mean age of the study participants was 32.6±7.1 yrs. Their ethnic distribution included majority of Punjabis followed by Urdu speaking and Hindko. In addition, there was also Pushtoon, Sindhi and Saraiki representation noted. This ethnic mix is representative of the metropolitan city of Karachi. All our study participants belonged to the low- and lower middle socio-economic status based on their household income.

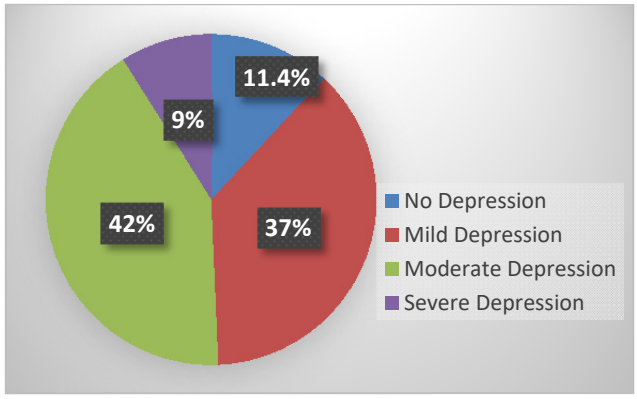

Figure 1. Depression (%) among participating women

Figure 1 demonstrates that 37.6% (96) mothers had mild depression, 42% (107) had moderate depression whereas 9% (23) had severe depression. (The category of moderately severe and severe was merged into 'severe').

Table 1 revealed that of all those mothers who were depressed, 72.6% were multiparous (2-5 children) followed by grand-multiparous (6 and more children) women at 19.5% result being statistically significant (p-value 0.001) hence depression showed clear connection with parity in our study.

Table 1. Association of parity and socio-demographic factors with depression

Parameters	**Mean ± SD**	**Frequency of Depression n (%) =226(100)**
Mean age	32.6 ± 7.1	
Ethnicity		
Punjabi		69(30.5)
Urdu speaking		61(27.0)
Hindko		44 (19.5)
Pushtoon		30 (13.3)
Sindhi		17 (7.5)
Family Structure		
Nuclear		105(46.5)
Joint		121(53.5)
Employment Status		
Jobless		156(69)
Full time		31(13.7)

Part time	16(7.1)
Self employed	23(10.2)
Education	
Illiterate	62(27.6)
Primary	29(12.9)
Secondary	19(8.4)
Metric	47(20.9)
Intermediate	4(1.8)
College	64(28.4)
Parity	
Primiparous	18(8)
Multiparous	164(72.6)
Grand-multiparous	44(19.5)

However, when we analyzed the prevalence of depression within each individual parity category using the Exact Fisher Test (Table 2), we noted that 92.6% of all Grand-multiparous women were depressed and 90.6% of all multiparous women had depression. This result was statistically significant with a p-value of 0.001. Since, 53.5% mothers who were depressed lived in joint families. When education level was analyzed in those that were depressed, 28.4% (64) went to college while 27.6% (62) never went to school. Results were statistically significant with a p-value of 0.039. Employment status of those who were depressed noted that 69% were jobless.

Table 2. Percentage of depression within each parity category

Parameters	**%**	***p*-Value**
Depression in primiparous women	66.7%	
Depression in multiparous women	90.6%	0.001
Depression in grand multiparous women	93.6%	

4. Discussion

The current study builds on the limited studies on depression among women with young children in Pakistan (B. Ali et al., 2002; Naeem, 1992; Rahman et al., 2004). The results of this study are consistent with other studies of depression among women with young children using standardized symptom and diagnostic assessments (McCue Horwitz, Briggs-Gowan, Storfer-Isser, & Carter, 2007; Nærde et al., 2000), as well as national studies (B. Ali et al., 2002; N Husain, Creed, & Tomenson, 2000; Naeem, 1992; Rahman et al., 2004). This high frequency of depression found in mothers in our study suggests that the current mental well-being, is sub-optimal. Upon analyzing the frequency of depression in mothers, the highest number on women with depression was multiparous (Table 1). This being statistically significant and on further analysis, when we studied the prevalence of depression within each category of parity, we found that the women with 5 or more children (Grand multiparous) had 93.6% depression amongst them making it the highest among all categories (Table 2) with multi parity standing at 90.6% (Table 2). From the above findings, we establish that while there is greater frequency of depression among multiparous women, the Grand multiparous women are at the greatest risk of depression. The family size in context of maternal mental health in this study appears to be critical as increased number of children may also means increased pressure on family resources and more emotional, physical and mental input required to take care of the family regardless of the economies of scale (Rainwater, 2017).

Previous studies from Iran, Norway and the United states have also reported that larger family size may be responsible for negative effects on the mental health of the family suggesting the possible cause as raising many children with inadequate resources (Grinde & Tambs, 2016; Molavi, Shargi, Nadermohammadi, Salvat, & Tavakoli, 2019; Wade & Kendler, 2000). All our study participants belonged to the low-socio-economic status adding to the already established link identified between mental health and low economic status (Cairney, Boyle,

Offord, & Racine, 2003; Israel, Farquhar, Schulz, James, & Parker, 2002; Mathiesen, Tambs, & Dalgard, 1999; Moak & Agrawal, 2010; Wade & Kendler, 2000). Furthermore, our findings are also in line with the increasing number of studies on depression in low-income earning mothers (Israel et al., 2002; Mathiesen et al., 1999; Wade & Kendler, 2000). Our study shows a majority of mothers dealing with moderate and severe forms of depression living in a joint family setup. Even if she does seek out support of family members as shown in studies from India and Pakistan (Atif et al., 2017; Atif et al., 2016; Lanes, Kuk, & Tamim, 2011), there is a high chance it will not be enough to overcome the negative factors of poor financial status, parenting and other associated stressor as noted by a study from rural Pakistan (Maselko et al., 2019). Several studies in the low- and middle-income countries (LMICs) including India, Uganda, Nepal, South Africa, Ethiopia and Pakistan suggest formal management of the depression coupled with informal support would be a more suitable course to take if any noteworthy improvement in mental health outcomes is expected in these mothers of young children (Baron et al., 2016; Malik, Khan, Hussain, & Hashmi, 2019).

Finally, our findings are in contradiction to earlier research (McCue Horwitz et al., 2007), that states that completing equal to or more than twelve years of schooling was associated with a higher probability of depression. Studies also shows that women having higher education level and belonging to the low socio-economic status may be at increased risk of depression (Beeber et al., 2014). In contrast, our study showed that even though the population that visited the clinics were of low socio-economic background, illiterate women and women possessing college level education were nearly equally depressed. A possible explanation for this may be that a majority of these women were also unemployed which may be another important contributing factor. It appears that education may not shield these women against depression, probably because of the other associated factors of being poor, with multiple children, and unemployed. Further research in this area is recommended to deepen our understanding. Given the resource constraint of a developing country such as Pakistan, we may want to dig deeper into other factors affecting maternal mental health when designing health and well being intervention for the economically vulnerable population. Our study findings suggest that in addition to the current focus on education attainment for health and well being interventions, family planning initiatives also need refocusing and reforming as it empowers these women to determine the number and spacing of children (Miller & Babiarz, 2016; Prata et al., 2017). Consideration should also be given to other social support initiatives (Atif et al., 2016; Nusrat Husain et al., 2017; Naeem, 1992) such as the employment support programs, child support and access to mental health services. Evidence from other LMICs namely India, Uganda and South Africa suggests that women are open to 'talking therapies' more formally known as psychosocial interventions than taking medicines for treating depression (Baron et al., 2016). Otherwise, the efforts may not be sufficient to protect young families from the detrimental effects of maternal depression and achieve the Sustainable Development Goals of promoting good health and wellbeing (Starbird, Norton, & Marcus, 2016).

There are several limitations worth noting in this study. Firstly, this study is missing a baseline assessment of depression history if any in the participants prior to entering the study. Secondly, our variables were limited to education, family setup and employment status and parity. Other risk factors (e.g., substance use) associated with maternal depression (Heneghan et al., 1998) were excluded from this analysis because of the amount of missing data. Thirdly, we limited our sample to those who visited the health facilities and volunteered to participate. As a result, the findings may reflect sample bias. We however applied the Simple Random Sampling technique, a proven effective method researcher used to prevent sampling bias and our samples were selected strictly by chance (Smith, 2008).

5. Conclusion

Our findings establish a clear association of parity with depression in women with more than one child. It also shows that Grand-multiparous women with six or more children were at highest risk of depression in low-income urban population. The importance of minimizing the stressors of bearing and parenting, larger families need to be considered when planning and resourcing interventions. Further studies into the links of parity with depression in mothers and the stressors of bearing and parenting are needed. Our study contributes to the knowledge base regarding depression in women in the hope for other studies to build on it and highlight the issue regarding depression in the community to inform policies around family planning, social support and chronic stressors that contribute to mental health problems in the community.

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Ethics Approval

Ethical approval for this study was sought from the Ethics Review Committee of Ziauddin Medical College, Pakistan. Reference Code: 1950220TAFM.

Patient Consent

Informed consent was obtained from all the participants of the study.

Availability of Data and Materials

Study data and material is available on written request to the corresponding author.

Authors Contributions

TE was involved in conceptualizing, designing, bench work, analysis and writing the manuscript. FJ was involved in writing the manuscript, proof reading and supervising the study. RN's contributions include tool development, literature review, analysis and writing the manuscript.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Factors Contributing to the Late Commencement of Antenatal Care at a Rural District Hospital in Lesotho

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Abstract

Antenatal care (ANC) is a key approach aimed at improving maternal and infant health. Numerous factors are associated with late commencement of antenatal care. Sub-Saharan Africa countries are exception to the problem of late commencement of antenatal care. The qualitative, explorative, descriptive and contextual approach was followed. The pregnant women meeting the inclusion criteria, were above 16 weeks and attended antenatal care at the time of the study. Different authorities granted permission to conduct face-to-face, unstructured in-depth interviews. Tesch approach enabled the qualitative researchers to immerse themselves through systematic organization and synthesis of data to create manageable units. An independent co-coder also analyzed data independently. Afterwards, they met and agreed on specific themes and sub-categories. The following five themes emerged; personal and family factors, cultural beliefs and practices, health systems and poor infrastructure. Measures aimed at improving accessibility to the health centers include; road infrastructure, telecommunication and more client centered services**.** Improvement of early commencement of antenatal services becomes an ideal approach influencing excellent maternal and neonatal outcomes. Therefore, government initiatives aimed at empowering communities on the benefits of commencing antenatal care on time is necessary.

Keywords: delay, commencement and antenatal care

1. Introduction and Background

Antenatal care remains the crucial entry point offering pregnant women a broad range of maternal health care promotion and preventative services. It is the umbrella term describing the relevant family centered health care services offered during pregnancy through screening, education and referral of complicated cases. The initiative has significantly reduced maternal and fetal mortality and morbidity rate globally (Cumber, Diale, Stanly, & Monju, 2016; Oyerinde, 2013). About, 303,000 women and adolescents died in 2015 due to pregnancy, birthing related complications. Ninety-nine percent (99%) of women predominantly from low resourced countries died, and approximately 2.6 million babies were stillborn in 2015. Between 2007-2014, only 64% of pregnant women attended minimal antenatal care of four contact sessions (The WHO report on recommendations on antenatal care for a positive experience, 2016). In Lesotho, the high maternal and infant mortality rate associated with pregnancy related complications still remain a concern. The maternal and child health program in Lesotho focuses on the following key issues: delivery, ante/postnatal care and childhood vaccination and treatment of common childhood diseases (Maternal and Child Health in Lesotho, 2019). This paper is keen in establishing factors contributing to the delay in commencing antenatal care in the mountainous parts of Lesotho.

The low and middle income economies have seen notable improvement in the attendance of antenatal care services since WHO introduced ANC model in 2002. The model offers a goal oriented approach aimed at delivering evidenced-based interventions carried out during each critical antenatal visitation period (The WHO report on recommendations on antenatal care for a positive experience, 2016). A more holistic health promotion and preventative approach driven through the Prevention of mother to Child HIV/AIDS initiative aims at improving maternal and neonatal health care outcome.

The difficult topography in the mountainous parts of Lesotho compromises desirable delivery of health care services at any given time. The mountainous country is divided into the north-western lowlands and south-eastern highlands with the altitude of 1800 metres above sea level. Sixty percent (60%) of the country is mountainous and

rural with minimal infrastructure compared to the lowlands. Access to basic health care services including antenatal care to rural communities is quite difficult, due to challenges like; transportation, poor telecommunication network and harsh weather (St James Mission hospital newsletter, 2021).

Lesotho has ten administrative districts located in different regions of the country, each having at least one hospital operating at different levels of care. St James mission hospital forming the context of this study is situated in Mant'sonyane within Thaba-tseka district. The district is located in the heart of Maloti Mountains about 125 kilometres away from the capital, Maseru. Four satellite health centres and posts forming the crucial referral points, surround the hospital. The nearby Mohale dam that is part of the joint Lesotho/South African highlands water project, has significantly improved the connection of the highlands with the lowlands through improved roads infrastructure and telecommunication. This has significantly improved the remote lifestyle experienced by rural communities in this district (St James Mission hospital newsletter, 2021).

The clinics and health care centres in Lesotho operating at the periphery, form crucial primary entry point into district hospitals in both urban and rural areas. The third level of care offered at tertiary care, treats complicated conditions within different specialities like; paediatrics, obstetrics and gynaecology, internal medicine and surgery. More complicated conditions requiring more specialized care are referred to more advanced academic hospitals in the Free State (Lesotho Ministry of Health, Health PHC revitalization plan 2011-2017).

The maternal mortality ratio in Lesotho estimated at 1,155 deaths per 100,000 live births between1990-2015 puts the country among the highest in the region. Proactive measures aimed at reducing maternal deaths to 300 deaths per 100,000 live births by 2015 have been implemented by Lesotho government (Satti, Motsamai, Chetane, Leshoboro-Marumo, Barry, Riley, McLaughlin, Seung, & Mukhere, 2012). One of the key approach aimed at reducing maternal mortality and morbidity is attainable through provision of cost-effective antenatal care, thereof making it more accessible to women (Price Water Coopers, Health system Innovation in Lesotho, 2013).

Commencement of antenatal care in Lesotho differs in different regions, namely the highlands and lowlands. For instance, the mountainous areas of the country usually experience harsher living conditions worsened by extremely cold weather due to the rugged mountainous terrain. Accessibility of health care facilities in the heart of maloti mountains is difficult except through horse backs (St James Mission hospital newsletter, 2021).

Antenatal care attendance in Lesotho like in many other countries is strongly associated with high levels of education (Gill, Hoffman, Tiam, Mohai, Mokone, Isavwa, Mohale, Matela, Ankrah, Luo, & Guay, 2015). People living in the lowlands in Lesotho, are generally better educated than their counterparts living in the highlands. Women with better education, are more likely to receive the four antenatal sessions recommended by WHO in comparison to the less educated ones. Availability of resources is in more urban settings offers women better opportunities and they become more financially independent. This is a positive influence, enabling women to commence antenatal care on time (The Lesotho Ministry of Health demographic and health survey report, 2014).

In the more rural high lands regions of Lesotho, men have less opportunities of education compared to those residing in urban, low-land districts. For instance, only 21% of men living in highlands districts are literate compared to 50% of their counterparts residing in lowlands districts. As a result, women residing in the highlands areas of Lesotho tend not to be adequately supported by their partners who are ignorant on different reproductive related issues (The Lesotho Ministry of Health Demographic and Health Survey report, 2014).

The stigma associated with teenage pregnancy is another obstacle associated with late commencement of antenatal attendance. This becomes a major concern especially among adolescents and younger women. Separate private facilities become a meaningful option enabling pregnant adolescents to access the services without experiencing immense stigma (Pell, Men, Were, Nana, Afrah, Chatio, & Poo, 2013). Adolescent Health Corners offering different services tailor-made to specific needs of the young women address their diverse needs. Such facilities are gradually becoming popular in many countries including Lesotho. The reproductive health care corners for younger mother are intended to offer a range of sexual and reproductive health care needs including; antenatal care services offered to the adolescents through education, and counseling programs. The unique facilities offer needed privacy to younger women, who usually do not feel comfortable to receive joint services with older clientele (Gill et al., 2015; Matobo, Makatsa, & Obioha, 2009).

Certain cultural myths, including witchcraft within the Basotho culture are quite influential in delaying commencement of antenatal care on time. The rural, less educated women tend to conceal the early stages of pregnancy due to fear that they might be bewitched pregnancy (Semenya & Letsosa, 2013; Ochako et al., 2011).

The extended family setup becomes quite influential in determining desirable antenatal attendance within the Basotho culture. The young married couple usually resides at the groom's patriarchal home under the parents'

authority. This arrangement becomes even more evident, where a young man is sometimes compelled to seek employment in the lowlands of Lesotho or even to the neighboring South Africa (Matobo, et al., 2009; Gill et al., 2015). The remaining mother, has to plan her needs around the routine of her in-laws. The extensive routine including normal home chores of cleaning, washing and cooking for the extended family and even farming related duties can be quite daunting for the pregnant young woman making it difficult to find time to attend antenatal care. The complicated extended family setting, compels the pregnant woman to seek consent from the husband or in-laws to commence antenatal care (Gill et al., 2015).

Poor antenatal care attendance if further compounded by attitudes of service providers. The unprofessional behavior of health care providers tends to impact negatively on health service utilization. The unappealing behavior of some midwives who are reputable to being harsh, unfriendly, rude and careless during antenatal, labor and post-natal periods causes gross dissatisfaction to some pregnant women (Chiwaula, 2011).

The dawn of HIV/AIDS has significantly influence attendance of antenatal care especially in the Sub-Saharan countries due to the associated stigma of the disease (Turan, Hatcher, Medema-Wijnveen, Onono, Miller, Bukusi, Turan, & Cohen, 2012). The HIV/AIDS infection in pregnancy poses a greater risk to the unborn baby likely to get infection through vertical transmission. In Lesotho, (27.7%) of HIV/AIDS prevalence rate is concerning. The high prevalence rate of HIV/AIDS infection affecting everyone, associated with immense stigma amongst concerned couples/partners acts as a deterrent for antenatal care attendance. (Lesotho Ministry of Health, PMTCT guidelines, 2017).

Excessive waiting time in the antenatal health care becomes a major barrier affecting proper adherence to antenatal care attendance (Ekabua & Njoku, 2011). The current disease burden from both communicable and non-communicable illnesses is putting so much pressure on PMCTC program nurses who are usually quite few in numbers. As a result, prolonged waiting time in antenatal care clinics has become a norm especially in most public health care facilities offering services on the ground. The lack of resources especially labor becomes a serious setback to employed pregnant women who are obliged to receive services from the disgruntled and insensitive nurses experiencing numerous challenges including poor staffing. Consideration of creative solutions accommodating working people, in quite sensible (Sibiya, Ngxongo, & Bengu, 2018).

2. Methods

2.1 Study Design

The subjective and systematic nature of qualitative studies bring in life experiences through description of the unique encounters enabling the researcher to explore the depth, richness and complexity of a phenomenon being discussed (Burns & Grove, 2009; Creswell, 2009). The qualitative study was explorative, descriptive and contextual in nature. This shed light on the thoughts and behaviours of participants concerning late commencement of antenatal care (Boyce & Neale, 2006).

2.2 Study Setting

St James mission hospital has a 60 bed capacity. A number of health care centers and clinics offering Primary Health Care services refer complicated cases requiring further management. The fully operational departments within the hospital, offer the following services; out patients, dental and pharmacology. Tertiary and allied social development services are also offered (St James mission hospital. The Anglican Diocese of Lesotho, 2021). In-depth face-to-face unstructured interviews were conducted at a private venue of the antenatal care clinic.

2.3 Population and Sampling

The population of the study constituted by all pregnant women, meeting the inclusion criteria, above 16 weeks of gestation and commenced antenatal care within the specific month of the study (Polit & Beck, 2012). The non-probability purposive sampling technique used in the selection of the sample, revealed those significant factors contributing to the late commencement antenatal care.

2.4 Data Collection

In-depth face-to-face unstructured interviews were conducted with participants coming from the surrounding rural villages within St James Hospital catchment area. The necessary arrangements with the authorities of the hospital were made prior entry into antenatal care clinic setting. A suitable venue offering privacy improved interaction and the quality of interview sessions. Prior conduction of each in-depth face-to-face unstructured interview session, the purpose and the other technicalities of the study were introduced, during briefing exercise. Voluntary participation in the study was emphasised and those agreeing to participate, signed the consent form. This question formed the basis of interviews: *"What are the contributing factors towards your delay in commencing antenatal care at this*

clinic?" The following qualitative interviewing techniques considered by the researcher included; probing, reflecting clarifying and paraphrasing (Polit & Beck, 2012). The interactive approach enabled the participants to engage more freely with the researcher through integrating phrases like; please clarify this issue more, did you mean this, Oh! This make sense (Polit & Beck, 2012). The participants were cautioned that in-depth face-to-face unstructured interviews would be tape-recorded. The researcher's good communication skills facilitated the desirable flow of the discussions through striking a good balance between talking and listening (Ngomane & Mulaudzi, 2010). The researcher took cognizance of relevant non-verbal cues that could reflect discomfort from the participants and so on (Ngomane & Mulaudzi, 2010). The in-depth nature of interviews enabled the participants to discuss their concerns and challenges encountered with ease. The interviews were conducted in Sesotho which is the language commonly spoken and the principle of data saturation was considered. After each face-to-face unstructured in-depth interview session, a debriefing exercise was initiated to get further gain clarity on any outstanding issue.

2.5 Data Analysis

The analysis of qualitative data does not necessarily follow a specific trend. Cautious synthesis, multi-layered in nature, builds upon itself till a meaningful, contextual-derived, and verifiable interpretation is attained (Roller & Lavraks, 2015). The similarities, inconsistencies and close-knit contextual input obtained in qualitative studies affirm the inductive stance that builds up from inside out, through analytical interpretations culminating in meaningful themes (Roller & Lavraks, 2015). Analysis of data in this study followed Tesch's approach. Vast data elicited was transcribed from Sesotho into English. It was read thoroughly; similar topics were identified, those matching were abbreviated into codes; most descriptive wording of topics was checked and turned into major themes/categories; related topic grouped together to diminish total list of categories, final decision on codes and written in a sequential order (Creswell, 2009).

2.6 Trustworthiness

Trustworthiness seeks to establish confidence on the data collected. Qualitative researchers adopt this technique through adhering to the four principles of truth and value by Lincoln & Guba; credibility, confirmability, dependability, and transferability (Creswell, 2009; Polit & Beck, 2012).

2.7 *Ethical Consideration*

Prior commencement of the study permission the following authorities gave ethical clearance: Health Science Faculty, University of the Free State, Ethics Committee Department of Health Lesotho, administration of the hospital and antenatal clinic and the participants. The following ethical principles were held; beneficence, confidentiality, informed consent and justice.

3. Results

The elaborate transcription of data culminated in the following five themes each with its sub-category: personal factors, family, cultural beliefs and practices, health systems and poor infrastructure.

Table 1. Outcomes of late commencement of antenatal care

Themes	Sub-categories
1. Personal factors	1.1 literacy level
2. Family factors	2.1 Attitudes of in-laws
3. Cultural beliefs and practices	3.1 Age
	3.2 Parity
	3.3 Marital status
4. Health systems	4.1 Compulsory HIV testing
	4.2 Compulsory accompaniment by husband
	4.3 Cost of antenatal care
	4.4 Slow service
	4.5 Service provision by male nurses
5. Poor infrastructure	5.1 Inaccessible health care facilities

3.1 Personal Factors

The low literacy rate is one the personal factors influencing commencement of antenatal care in the highland regions of Lesotho.

3.1.1 Literacy Level

Literature affirms that people living in the lowlands regions are generally better educated than counterparts living in the highlands regions which are more rural. For instance, the proportion of women with at least some secondary education ranges from 29% in Thaba-tseka (highlands) to as high as 61% in one of the lowlands districts.

The participants affirmed the issue of poor literacy level of people residing in the mountainous regions of Lesotho:

"…..We are mountainous people, so we are not well informed on a number of issues. As a result, we lack adequate knowledge and consequences thereof of not commencing antenatal care on time"…. (Participant # 1).

3.2 Family Factors

The extended family setting, commonly found within most African cultures offers experienced family members to share their reproductive related experiences that assists the pregnant mother during pregnancy, childbirth and antenatal period (Haobijam, Sharma, & David, 2010).

3.2.1 Attitudes of In-Laws

Decision to attend antenatal care in certain culture depends on the support by the family especially mother-in law who takes charge of domestic responsibilities. The young mother has to assists the family with common chores, before being permitted by the mother in-law to attend antenatal care (Simkhanda, Porter, & Van Teijlingen, 2010*).*

The participants confirm the existing lack of decisive power by pregnant Basotho women concerning their reproductive lives:

"Sometimes mothers-in-law is not pleased when one plans to go to the clinic due to daily numerous domestic Chores". (Participant # 1).

3.3 Cultural Beliefs and Practices

In Lesotho, similar culturally related fears regarding witchcraft tend to affect the announcement of the pregnancy (Semenya & Letsosa, 2013). The statements below confirm the participants' fear of commencing antenatal care services on time due to cultural stereotypes associated with witchcraft:

"One is not keen to commence antenatal due to fear that one will be bewitched". (Participant # 6).

One participant recognizes the significant role played by traditional healers in treating rural communities through tapping in their enormous knowledge of indigenous medicine:

"We belief that even if one does not attend antenatal care, the traditional medications prescribed by our traditional healers still help us a lot." (Participant # 1).

3.3.1 Age

Most primary health care clinics do not separate antenatal care services according to age due to lack of resources (Matobo et al., 2009). The following statements confirm the participants' concerns on maternal young age as being key:

"Sometimes being very young and pregnant, one will find that they are alone among adults." (Participant # 5).

3.3.2 Parity

Women with several children tend to rely on their experiences from previous pregnancies. More experienced women with many children that there is no need to attend antenatal care or be ridiculed by nurses due to improper child spacing (James et al., 2012). Poor child spacing posing as an impediment was raised by one participants who said:

"Sometimes when a woman becomes pregnant frequently, she becomes shy to make the pregnancy known by going to the clinic due to fear of being ridiculed by nurses." (Participant # 6).

3.3.3 Marital Status

In Lesotho, pregnancy out of marriage is quite shameful to the girl as well as her parents (Resty, 2011). One participant affirmed the shame;

"It becomes one embarrassing situation influencing the unmarried girl not to attend antenatal care on time. (Participant # 7).

3.4 Health Systems

Improving maternal and child health is a priority in many countries including Lesotho through making services accessible to all women despite their socio-economic background.

3.4.1 Compulsory HIV Testing

Routine HIV Voluntary Counselling and testing for pregnant women and their partners enables them to gain access to HIV treatment and other preventative interventions received through PMTCT initiative.

One major impediment echoed by different participants was fear of testing for HIV.

"…Both we as pregnant women and our partners fear to test for HIV. Such a test usually creates serious conflicts in our relationships, especially if one test positive and one negative." (Participant # 1).

3.4.2 Compulsory Accompaniment by Husband/Partner

The husbands are usually unavailable to accompany their wives to the antenatal care clinic due to work commitments and even those who are available do not necessarily support idea because it is purely female responsibility.

The pregnant women raised their concerns regarding accompaniment by partners:

"…Sometimes you will find that the husband is not staying at home due to work commitments. The rule of the clinic is that we should come along with husbands to clinics." (Participant # 2).

3.4.3 Cost of Antenatal Care

Lack of money due to unemployment is a key barrier to some women to access antenatal care on time. One participant raised the lack transport or minimal services money as a serious impediment:

"There is no money to pay for the user fees of R15.00 and transport. Some of us are unemployed" (Participant # 2).

3.4.4 Slow Service Delivery

The slow services at some of these clinics create risk for the women who have to travel back home sometime alone in quite dangerous terrain. One participant echoed the concern of slow services:

"…In addition, long waiting for the services at the clinic is another factor. It means that one has find someone to accompany them when they finish late at the clinic…" (Participant # 6).

3.4.5 Service Provision by Male Nurses

Within the Basotho culture, incorporating male nurses into such a female dominant profession still creates a lot of discomfort amongst Basotho women (Yanikkerem, Ozdemir, Bingol, Tatar, & Karadeniz, 2009). One participants shared their discomfort around being examined by male nurses:

"One removes clothes in front of male nurses at the clinic, to be examined, they insert fingers. This practice is not acceptable for us as Basotho…*"* (Participant # 7).

3.5 Poor Infrastructure

The poor roads, insufficient telecommunication network and impaired transportation becomes a major obstacle affecting meaningful antenatal care services (Onta, Choulagai, Shrestha, Subedi, & Bhandari, 2014).

3.5.1 Inaccessibility of the Health Facility

Accessibility to health care for remote communities with minimal infrastructure still remains key challenge especially during the winter season. The concern of meaningful access to the antenatal care clinics was raised by a participant:

"Most of us are staying far away from the health services".

Clinics are very far and we are not able to start antenatal care on time…" (Participant # 6).

4. Discussion of Results

Effective antenatal care management within the first trimester influences desirable outcomes (Ndidi & Osereman, 2010). Different reports from developed countries like the United Kingdom, identify late commencement of antenatal as a significant risk factor for maternal deaths across different racial groups (Haddrill, Jones, Michell, & Anuba, 2014). The indecisiveness of the mother in discontinuing or keeping the pregnancy at the on-set, ultimately resulting concealment of pregnancy, jeopardizes the desirable obstetrical and neonatal outcome (Siyange, Sitali, Jacobs, Musonda, & Michelo, 2016). Extensive analysis of qualitative data culminated in five emerging themes;

personal factors, family related factors, cultural and beliefs and practices, health systems and poor infrastructure.

A number of personal factors significant in contributing towards delayed antenatal care are highly individualistic, thereof unique. In the context of this study, low literacy level of pregnant mothers came out as critical influence. For instance, women with better education are more likely to attend the minimal recommended four sessions by WHO. In rural parts of Lesotho, even educated women still recognize the significant position of husbands and their notable leadership role in family related decisions (Gill et al., 2015). The education disparity between the high and low lands districts of Lesotho reveals the variance between Thaba- tseka district (highlands) in which 29% of women have obtained minimum secondary education contrary to 61% seen in the Lowland district of Berea (Gill et al., 2015). *"We are mountainous people, so we are not well informed on a number of issues as a result we lack adequate knowledge."*

The family centred approach is a preferred means of successful delivery of antenatal care services through initiatives such PMCTC. The extended family setup in rural Lesotho has a number of cultural stereotypes affecting timeous access to antenatal care. Elderly women as experienced traditional birth attendants, play a significant role in influencing decisions on issues of pregnancy, birthing and puerperium. Therefore, they tend to be sceptical to encourage younger pregnant women to commence antenatal care at designated health care facilities where services offered by a midwife are available (Edmonds, Paul, & Sibley, 2011). *"Sometimes the mother in-law tends to discourage us from listening to nurses' advice because they feel that they are equally experienced."*

Basotho stereotypical lenses concerning the cultural practices around pregnancy, birthing and postnatal care practices, influence desirable antenatal follow-up to a certain extent (Breckenridge, Deveney, Kroll, Lazenbatt, & Taylor, 2014). For instance, the myths of witchcraft remain a serious concern influencing the disclosure of pregnancy to health care workers who are not members of the family especially in the rural areas of Lesotho (Semenya & Letsosa, 2013). This denies a pregnant mother opportunity of screening, treatment and referral if the need arise (Lesotho Government Strategic Plan, 2013). *"One is not keen to commence antenatal due to fear that one will be bewitched".*

The socio-demographic dynamics such as maternal age, parity and marital status also have an impact on a mother's decision to start antenatal care. The stigma associated with pregnancy out of the wedlock especially on teenage girls contributes to delayed commencement of antenatal care (Pell et al., 2013). The dawn of civil rights movement in different countries worldwide brings a remarkable milestone, where health care systems are embarking on measures ensuring utmost privacy of all the women including grand multiparous women scared of service providers' criticism on poor family panning practices seen through frequent pregnancies. *"Sometimes when a woman becomes pregnant frequently, she becomes shy to make the pregnancy known by going to the clinic due to fear of being ridiculed by nurses."*

Pregnancy out of the wed-lock common to young pregnant mothers exposes vulnerable women to societal criticism and isolation (Pell et al., 2013). In different countries, the notion of protection of young mothers is quite central to preventative reproductive health care programs (Matobo et al., 2009). Reproductive services offering needed privacy to the teenage mothers aligned to the mainstream reproductive health care basket are preferred. The protective and preventative approach where the teenagers get individual counselling tends to alleviate social consequences of repeated adolescent pregnancies culminating in the exclusion of young pregnant girls from the mainstream education system (Pell et al., 2013; Matobo et al., 2009). *The pregnant young woman usually fears community especially adults and friends on what they will say about pregnancy* outside marriage".

Access to meaningful antenatal care is the right to every mother. The strong antenatal care policy is an anchor to any progressive health care system. A client-centred approach where prompt services are offered attracting working clientele is meaningful. Cognizance on issues of gender related stereotypes relevant to the Basotho culture on reproductive related matters brand the services to a widest clientele. Family centred facilities inviting participation by partners are preferred. It is sensible to create polices accommodating even women who cannot afford the cost of such services and make such facilities accessible to all women across the spectrum. In different, rural parts of Africa including Lesotho, pregnant women still travel lengthy distances between three to four hours on foot to access the nearest health care facility. *Clinics are very far and we are not able to start antenatal care on time…"*

Sometimes tardiness in manner in which the services by despondent staff is not only a time waster, but pose as a danger to women who have to travel alone long distances on foot in areas which still do not have good transport (Sanda, 2014). Such risky terrains expose the pregnant women for attacks by wild animal, psychopathic personalities who sometimes rape and kill these vulnerable women (Andrew, Angwin, Auwun, Aniels Mueller, Phuanukoon, & Pool, 2014). "*In addition, long waiting for the services at the clinic is another factor".*

The lack of employment opportunities in the rural parts of Lesotho disadvantages women residing in the heart of maloti mountains with minimal resources to receive antenatal screening on time. Some women who do not have transport money cannot afford the minimal consultation fee of fifteen Maloti covering overheads for each antenatal visit. This prevents them access to antenatal care services on time. *"There is no money to pay for the user fees of R15.00 and transport."*

The dawn of HIV/AIDS has brought even more scepticism for many rural pregnant women in many parts of the world to commence antenatal care on time (Bernstein, Marcus, Nieri, Philip, & Klausner, 2010). Despite the inception of Prevention of Mother to Child Transmission programs (PMCTC) recommending more family centred approach, there is still gross apathy among younger and older pregnant couples to attend antenatal care which recommends intense initial screening for communicable diseases like HIV/AIDS. The fear of testing HIV positive tends to bring irreconcilable conflicts among couples (Shamu, Zarowsky, Shefer, Temmerman, & Abrahams, 2014). In many rural communities, where younger families do not consistently reside together due to work commitments by male partners, the separation creates temptation to both males and females to engage in extra marital sex. The subtle uncertainty on the couples' HIV status becomes a deterrent for commencement of antenatal care on time. *"We fear to go for inclusive HIV testing at the antenatal clinic. It creates irreconcilable conflicts between couples."*

A notable milestone by many governments saw health care services provided by male nurse practitioners in different African countries. This initiative has broken the long-standing gender stereotypes within a predominantly female nursing profession. However, the findings of study conducted by Yanikkerem et al., (2009) on women's attitudes and expectations regarding gynaecological examinations revealed more preference to female gynaecologists/midwives versus male health care practitioner, due to too much exposure during such examinations. This practice causes great discomfort to more conservative rural Basotho women. *"One is removing clothes in front of male nurses at the clinic, for physical examination, they insert fingers."*

Lack of good infrastructure in rural communities of Lesotho, makes health care services inaccessible (Onta et al., 2014). The poor road infrastructure, ineffective telecommunication and lack of transport in some villages, contributes to the delay in commencing antenatal care services. *"Clinics are very far and we are not able to start antenatal care on time…"*

This paper attempts to reflect on the ongoing plight of rural women who still experience immense challenges frustrating access to antenatal care. For instance, rural women still travelling long distances to clinics, lack resources, constant skeleton staff over-worked due to a more comprehensive delivery of Primary Health Care services approach operating with meagre resources, unwelcoming attitudes, long waiting times and lack of transport money to the clinic and socio-cultural practices influenced by beliefs like witchcraft (Sibiya et al., 2018).

A picture painted through these findings, being systems inclined is quite insightful. The collectiveness of different stakeholders like; families, communities and political affiliates externally, influences the health care systems to integrate progressive antenatal care services policies. It is sensible to improve road infrastructure, telecommunication and health care facilities to make services more accessible to rural communities of Lesotho. Internally, it is sensible to consider quality improvement systems addressing the following issues; a more transformative internal policy, taking heed of pertinent ethical issues like; confidentiality, privacy, justice and gender related issues.

The findings are quite informative, but limited. Other scholars bring in a broader perspective on the findings, through adding other significant influences into three broad categories namely; socio-demographic, socio-economic and biological factors. The socio-demographic factors emphasise the need for availability of resources in order to deliver quality improved antenatal care services. The supportive family structure allows women to commence antenatal care on time. Socio-economic factors being equally significant include; educational level of a woman, wealth level and their current employment status. Lastly, the biological factors equally being crucial determinants consider aspects such as; first pregnancy, current age, previous foetal loss and so on (Sinyange, Sitali, Jacobs, Musonda, & Michelo, 2016).

5. Conclusions

Lesotho still experiences challenges of gross shortage of supplies especially in rural clinics, in certain instances. The delays in the ordered supplies including drugs becomes worse in the freezing winter months and it becomes difficult to transport medicinal supplies by road or air. The lack of supplies discourages women to commence antenatal care on time (Satti et al., 2012). Notable concerns affecting rural women in Lesotho are heighted by geographic and economic barriers drastically affecting access of women to antenatal care services (Satti et al.,

2012). In rural settings of Lesotho, the traditional birth attendants still play a significant role in antenatal care, delivery and puerperium. The indigenous attendants, forfeit a commission if they do not assist women to deliver personally. As a result, they tend to be quite skeptical to refer women for antenatal care in conventional clinics where women are screened and examined and referred if necessary. Such practice could be quite detrimental to the mother and child (Satti et al., 2012).

6. Recommendations

6.1 Improve Resources

Implementation of effective and comprehensive health care programs in rural settings depends on availability of resources. Improving resources such as road infrastructure and other health care resources in the difficult mountainous areas eases the referral process for critical emergencies for transfer to more advanced tertiary health care institutions in the low lands of the country.

6.2 Collaborative Approach with Traditional Medicine

A more positive approach sets a common ground for lasting partnerships between more scientific bio-medical approaches with existing Basotho socio-cultural practices influencing meaningful antenatal care commencement through a comprehensive family centred approach.

6.3 Taking Cognizance of Gender Preferences in Different Region by Leadership

The significant role played by male nurse is notable stride achieved by health care system in Lesotho and other countries globally through integrating the engendered nurses in different nursing specialities inclusive of obstetrical care. However, in rural settings, cultural stereotypes males and female nurses' roles call for health care leadership that that is quite sensitive towards cultural beliefs and practices of specific communities when allocating nurses.

6.4 Community Partnership with Local Government

Establishment of community partnerships with local government including chiefs to discuss any incidents that resulted in foetal and maternal deaths including those relating to professional mal-practice is quite sensible. Such positive platforms offer relevant parties' opportunities to agree on meaningful strategies aimed at improving the delivery of reproductive health care services.

6.5 Health Education Campaigns

On-going health education campaigns on prevention of teenage pregnancy and communicable diseases like; HIV/AIDS through mass media and other avenues is quite essential. It is important for the Ministry of Health in Lesotho to promote inclusive reproductive health services to rural families through accommodating working males (looking either after animals or migrant labourers or those working in the low lands).

7. Limitations of the Study

- The women who commenced antenatal care before 16 weeks were not included;
- Some participants were hurried to complete interviews because they had to travel back home alone before sun set.
- Women meeting the inclusion criteria were limited
- The biographical information was not elicited from the participants.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Self-Ear Cleaning Practices and the Associated Risks: A Systematic Review

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Abstract

Background: Naturally the ear produces soft wax from the sebaceous and ceruminous gland. This is what is referred to as earwax. This wax is important for protection of the ear by trapping dust and other foreign particles that could damage the eardrum. It also has some antibacterial properties. Jaw movements, like during chewing, moves the old earwax from inside the ear canal to the outside and finally flakes off. Build-up of this wax in the ear causes hearing loss, pain in the ear, irritation, dizziness and ringing in the ears. Self-ear cleaning refers to self-insertion of objects into the ear canal, with an attempt to remove the wax to get rid of these symptoms. It is a common practice amongst many individuals. Potentially, this rids the ear of its protective defences in addition to posing a risk of ear related injuries. This review paper aims to determine the prevalence of self-ear cleaning, the common methods used and the complications associated with this practice.

Methods: Electronic retrieval of articles for review was done from PubMed, Google and Google scholar with key-ward – self-ear cleaning, ear-wax, cerumen. Many articles were retrieved but only a few were about self-ear cleaning and only seven could be included in this review. The inclusion criteria included: article published in English language; study carried between 2005 and 2020 inclusive; article discussing materials used and complications associated with self-ear cleaning. Articles older than 15 years or published in languages other than English were excluded.

Results: On average the prevalence of self-ear cleaning amongst all studies was 76.6%. The commonest method used for ear cleaning was cotton buds with an average of 69.6%. Wax/dirt removal was the commonest reason for engaging in this practice. Several complications arising from this practice included perforation of eardrum, retained foreign body and otitis externa.

Conclusion: In addition to ridding the ear of its natural protection, self-ear cleaning is associated with a risk of injury to the ear drum and retention of foreign bodies. Community education to avoid this practice is therefore of paramount importance. Trained health care providers should be consulted whenever someone has a problem related to hearing or any other symptoms.

Keywords: cerumen, cotton bud use, ear-injury, earwax, self-ear cleaning

1. Introduction

Self-ear cleaning is the practice of inserting an object into the ear canal with the aim of cleaning the internal part of the ear. However, this practice potentially compromises the integrity of the natural cleansing mechanism of the ear, and pose a risk to possible injuries (Khan, Thaver, & Govender, 2017). It is not uncommon for people to get rid of wax in their ears and it is a global assumption that wax is considered dirt, despite its physiological usefulness of protecting the ear from dust and foreign bodies. The ear has a physiological, natural cleansing mechanism, thus the practice of inserting objects into the ear canal for cleaning it is not necessary and may be harmful. There are risks of inflicting injury to the ear and in worse cases these complications may need urgent medical attention i.e., tympanoplasty or instrumental removal of retained objects. These complications may lead to life-long sequelae, such as hearing impairment (Khan, Thaver, & Govender, 2004). Common objects inserted into the ear canal include cotton buds, matchstick, broomsticks, tree twigs, towel tips, ball pen tips or their covers and the fingers. Inserting these objects into the ear may disturb its normal pH, function and anatomical structure (perforation).

There is lack of understanding the importance of consulting a trained health professional in the case of ear problems such as itch, dizziness, loss of hearing due to wax impaction, etc. Health professionals are trained to clean ears by safer means if medically required.

Ear wax lubricates, cleans and protects the external auditory canal. Self-ear cleaning rids the ear of this wax and potentially leads to ear infections, trauma and perforation of the tympanic membrane as objects are inserted blindly into the ear canal. Wax removal alters the integrity of the ear's natural physiological defences. Ignorance of this fact leads to wrong practices with serious consequences (Oladeji, Babatunde, Babatunde, & Sogebi, 2015). Several hospital-based studies have shown that self-ear cleaning is common in several countries including Nigeria, Malaysia, England, and the United States. A study on "Self-Ear-Cleaning Among Educated Young Adults in Nigeria by Olaosun (2014) showed that 90% of participants practiced self-ear-cleaning and majority of those who did, believed that it was for ear hygiene.

According to, Afolabi, Kodiya, Bakari and Ahmad (2009), the tradition of self-ear cleaning should be discouraged as it may be an otologic poison with unfavourable long-term effects such as otitis externa, otomycosis and impaired hearing. The practice is also associated with some other diseases of the ear (Afolabi, Kodiya, Bakari, & Ahmad, 2009).

2. Methods

In this review paper, we aimed at determining the prevalence of self-ear cleaning, the methods used to perform the practice and the associated complications. We reviewed seven articles with similar objectives; self-ear cleaning practices and the associated risk of ear injuries. Electronic retrieval of articles for review was done from PubMed, Google and Google scholar with key-ward – self-ear cleaning, ear-wax, cerumen cotton but use. Many articles were retrieved but only seven were about self-ear cleaning and could be included in this review. The inclusion criteria included: article published in English language; study carried out between 2005 and 2020 inclusive; article discussing self-ear cleaning, materials used and complications associated. Articles older than 15 years or published in languages other than English were excluded.

3. Results

The results of our search, screening and evaluation of the studies are summarized in the table below:

Table 1.

Author **Year** **Country**	**Study design** **Population group** **N= respondents**	**Age range** **Males vs females**	**N=practice self-ear cleaning,** **Male vs female**	**Commonest method and others in chronological order**	**Commonest reason and others**	**Symptoms experienced**	**Complications experienced** **(need urgent medical attention)**
Amutta et al. 2013 Nigeria	Prospective study Patients and staff and students of UDUTH N=200	18-60 (mean 30.29) years N= 93 males (46k.5%) N= 107 females (53.5%)	N=160 (80%)	Cotton bud (N=146; 91.2%) Feather Broom stick Finger Match stick	Removal of dirt (N=65; 40.6%) Itchy ears Ear wax removal Water in ear Ear blockage Prevention of infection	Not demonstrated in this study	Only 25% of those practicing self-ear cleaning experienced complications Otitis externa Retained object in EAC Pain Bleeding from EAC
Khan, Thaver and Govender 2017 South Africa	Descriptive study First to final year undergraduate students in the School of Health Sciences at UKZN N= 206	Mean age range 20-21 years old N= 48 males (23.4%) N= 158 females (76.6%)	N= 201 (98%)	Cotton bud (65%) Towel Finger Match stick ENT Other	(participants chose more than one reason, responses=275) Wax removal (N=99; 32%) Dirt Itchiness Soothing Hearing difficulty Earache	Of those who use cotton buds (N=154; 74.7%) Itchiness (N=85/137; 62%) Earache (N=73/128; 57%) Feeling of fullness in ear (N=39/102; 38.2%) Tinnitus Hearing difficulty Ear discharge	N=5 (2.4%) out of 206 participants Perforated tympanic membrane (N=2) Lacerations and ear infections (N=3)
Gadanya, et al. 2016 Nigeria	Descriptive cross-sectional study Medical doctors working in Aminu Kano Teaching Hospital N=118	Age range: 25-55 (mean age=33.6 years) Males N=38; 32.0%	N= 53 (44.9%)	Cotton buds was the only method included in this study, hence N=53 (44.4%)	Out of 53 participants: Hygiene (N=29; 54.7%) Ear wax removal	Wax impaction (N= 23) Discharge from ear (N=10) Tinnitus (N=2)	Retained product in EAC (N=48) Trauma to ear (N=29)

			Females N=80; 68.0%			(N=15; 228.3%) Itchiness (N=2; 3.8%) Others (N=7; 13.2%)		
Adegbiji, et al. 2018 Nigeria	Descriptive cross-sectional study in the rural community, mostly farmers, unemployed artisans and civil servants N=182	Age range: all age groups Mean age=21-30 years old Males N=166 (46.4%) Females N=192 (53.6%)	N= 358 (93.7%): By self: N=178 (49.7%) By parents: N=122 (34.1%) By a friend: N=31 (8.7%) By spouse: N=27 (7.5%)	Some respondents had more than one object/method: Sticks were the commonest (N= 155; 43.3%) Finger (N= 121; 33.8%) Cotton bud (N= 94; 26.3%) Feather (N=45; 12.6%) Keys (N=26; 7.3%) Toothpick (N= 14; 3.9%) Biro cover (N=9; 2.5%) Paper roll (N=2; 0.8%)	Out of the 385 participants: Dirt/earwax removal (N=108; 30.3%) Personal hygiene (N=81; 22.6%) Itching (N=56; 15.6%) Hearing impairment (N=39; 10.9%) Water in ear (N=37; 10.3%) Ear blockage (N= 19; 5.3%) Ear discharge (N=18; 5.0%)	Out of the 358 participants, 135 participants did not have symptoms/complications. Otalgia (N=223; 62.3%) Itching (N=168; 46.9%) Dirty ear canal (N=157; 43.9%) Hearing loss (N=122; 34.1%) Tinnitus (N=41; 11.5%) Bleeding (N=23; 6.4%) Ear discharge (N=19; 5.3%) NOTE: some respondents had more than 1 symptom	Retained product in EAC (N= 128; 35.8%) Injury in externa ear (N=78; 21.8%) Perforated tympanic membrane (N=17; 4.7%)
Adoga & Nimkur 2013 Nigeria	Cross-sectional study amongst Health Professionals at the Jos University Teaching Hospital N= 141	Age range 25-59 years (mean age of 42 years) Males N=94 Females N=47	N=129 (91.5%)	Commonest is cotton buds (N=115; 89.1%) Spatula Ball-pen covers Ball-pen tips Match sticks Bobby pins Chicken Feathers Fingers	Reasons for self-ear cleaning was not explored in this study	(n=117; 90.7% had no injuries or symptoms experienced) Wax impaction N=1	N=12 (9.3%) Abrasion to EAC N=10 Perforated tympanic membrane N=1	

				Car keys				
Olaosun 2014 Nigeria	Cross-sectional study among educated young adults in Nigeria N=1012	Age range not demonstrated but mean range is 25.3 years. Males N=488 Females N=507	N= 929 (93.4%) Males N=465 (91.7%) Females N=464 (95.1%)	Commonest object used were cotton bud (85.1%) of respondents. Other methods were not demonstrated in this study	–	–	–	
Lee, Govindaraju & Hon 2005 Malaysia	Prospective study amongst patients who attended outpatient clinic at Hospital Kuala Lumpur (random, but excluding patients with ENT problems) N=50	Age range 15-74 (mean age of 40.7 years) Males N=25 Females N=25	N=18 (36%)	From the n=18: cotton buds = 86% Towel = 6% Metal probe= 6% Finger =2%	Wax= 70% Itchy= 15% Water=6% Dirt=9%	–	Otitis externa N=1 (2%)	

In a prospective study done in Nigeria, amongst patients and healthy individuals (staff and students) from Usmanu Danfodiyo University Teaching Hospital (UDUT), 19.5% (n=39) did not engage in self-ear cleaning practice while 80% (n=160) practiced self-ear cleaning (Amutta et al., 2013). The participants were in the age range of 18–60 years with mean age of 30.29 years old. There were more females than males, n=107 (53.5%) and n=93 (46.5%) respectively. In descending order, the methods or objects used for self-ear cleaning were cotton buds (n= 146; 91.2%), biro cover/tip (n=6; 3.7%), feather (n=3; 1.9%), broom stick (n=2; 1.3%), finger (n=2; 1.3%) and match stick (n=1; 0.6%). The reasons for performing self-ear cleaning were removal of dirt with n=65 (40.6%), itchy ears (n=48; 30%), ear wax (n=25; 15.6%), ear blockage (n=22; 13.8%), and water in the ear (n=10, 6.2%). Out of the160 respondents who admitted to self-ear cleaning practices, 25% (n=40) of them experienced complications. The complications included otitis externa 10.6% (n=17), retained object in external auditory canal (EAC) 6.9% (n=11), pain 6.3% (n=10) and bleeding from EAC 1.2% (n=2).

In another descriptive study in South Africa amongst undergraduate students in the School of Health Sciences at the University of KwaZulu-Natal (UKZN) (Khan et al., 2017), there were a total participant of n=206 with a mean age range of 20–21 years old. Majority of these participants were females n=158 (76.6%), compared to males n=48 (23.4%). Out of 206 participants, 98% (n=201) reported to have practiced self-ear cleaning. The methods used for self-ear cleaning in this study included cotton buds (65%), towel (20%), fingers (5%), match sticks (2%), ENT (2%) and others (3%). The most common reason for self-ear cleaning included removal of wax 36% (n=99), dirt 31% (n=85), ear itchiness 20%, soothing 8%, hearing difficulty 3% and earache 2%. Only 2.4% (n=5) of the 206 respondents experienced complications that required medical attention, 2 with perforated tympanic membrane of which one needed tympanoplasty and 3 had lacerations and ear infection.

In a descriptive cross-sectional study amongst a group of medical doctors at Aminu Kano Hospital in Nigeria by Gadanya, Abubakar, Ahmed, and Maje (2016), out of a total of 118 participants, 44.9% (n=53) admitted to having done self-ear cleaning before. All of them used cotton buds. The reasons given for self-ear cleaning included keeping good hygiene 54.7% (n=29), removal of ear wax 28.3% (n=15), itchiness 3.8% (n=2) and other reasons13.2% (n=7). In this group, complications from the practice that required urgent medical attention included retained foreign body (n=48) and trauma to the ear (n=29).

In a descriptive cross-sectional study in a rural community of Nigeria by Adegbiji, Olajide, Olubi & Aluko (2018), the participants were mainly farmers and civil servants. The total number of respondents was 382 of whom 166 (46.4%) were males and 192 (53.6%) were females. The mean age group was 21-30 years of age. Only 47.9% (n=178) had practiced self-ear cleaning. The objects used to clean ears included sticks 43.3% (n=155) followed by fingers 33.8% (n=121), cotton buds 26.3% (n=94), feathers 12.6% (n=45), keys 7.3% (n=26), toothpick 3.9% (n=14), biro cover 2.5% (n=9) and paper roll 0.8% (n=2). The reasons for self-ear cleaning in this group included dirt/earwax removal 30.3% (n=108), personal hygiene 22.6% (n=81), itching 15.6% (n=56), hearing impairment 10.9% (n=39), water in ear 10.3% (n=37), ear blockage 5.3% (n=19) and ear discharge 5.0% (n=18). Complications experienced by this group included retained foreign bodies in EAC 35.8% (n= 128) of which 21.8% (n=78) received medical attention to remove foreign bodies, injury to external ear 21.8% (n=78) and perforated tympanic membrane 4.7% (n=17).

A cross-sectional study involving 141 (94 males and 47 females) Health professionals at Jos University Teaching Hospital in Nigeria by Adoga and Nimkur (2013), demonstrated that 91.5% (n=129) of the participants practiced self-ear cleaning. The participants were in the age range 25-59 years with mean age of 42 years. 89.1% (n=115) of those who practiced self-ear cleaning used cotton buds. Other methods/materials used included spatula, ball-pen covers, ball-pen tips, matchsticks, bobby pins, chicken feathers, fingers and car keys. This study did not explore the reasons for self-ear cleaning. Only 9.3% of those who practice self-ear leaning reported complications including abrasion to EAC, perforated tympanic membrane and wax impaction.

In a cross-sectional study involving 1012 young educated participants (488 male and 508 females) in Nigeria by Olaosun (2014), found that 929 (93.4%) of all participants (465 males and 464 females) practiced self-ear cleaning. In this study the commonest object, 85.1%, used were cotton buds. This study also did not explore the reasons for self-ear cleaning.

A prospective study involving 50 outpatients (25 males and 25 females) in Kuala Lampur, Malaysia by Lee, Govindaraju and Hon (2005) demonstrated 36% (n=18) practiced self-ear cleaning practices. Their age range was 15-74 years with a mean range of 40.7 years. Of those who practiced self-ear cleaning, 85% used cotton buds. Other objects used included towel (6%), metal probe (6%) and finger (2%). The reasons for self-ear cleaning identified in this study were wax (70%), itchiness (15%), water in ear (6%), and dirt in ear (9%). Only one respondent reported a complication of otitis externa as a result of self-ear cleaning.

In a prospective study carried out at the Tundun-wada community and National Ear Care Centre, Kaduna by Abdulrahmnam and colleagues, about 27% had ear discharge, 22% wax impaction and 12% had foreign bodies as complications resulting from self-ear cleaning. In this study there was a total of 372 participants with age range 1-76 years, a mean age of 30.37 years, median age 29.00 (S.D. = 13.79) and M:F ratio of 1:1. Mothers responded for their children except for grown up. About 47.3% of the subjects were unemployed and these were either children or complete house wife. About 90% of the subjects interviewed practiced self-ear cleaning and over 90% believed the ear should be cleaned to remove wax, over 50% because of itchiness or for cosmetic reasons. Cotton bud was the commonest material used for cleaning.

4. Discussion

4.1 Prevalence of self-ear cleaning

The findings in the articles reviewed showed the prevalence of self-ear cleaning to be persistently above 90%. Only two studies (Lee, Govindaraju & Hon, 2005 and Gadanya et al., 2016) had lower prevalence of 36% and 44.9% respectively. It is, therefore, evident that the self-ear cleaning is a common practice. Since these studies were conducted in different settings (educated population, health professionals, university students, rural settings), it can be deduced that the practice of self-ear cleaning is common in all social backgrounds. The prevalence is mainly high in those in their 2^{nd} -3^{rd} decades (Amutta et al., 2013; Khan, Thaver, & Govender, 2017; Gadanya et al., 2016; Adegbiji et al., 2018; Olaosun, 2014). Only two studies (Lee, Govindaraju, & Hon, 2005; Adoga & Nimkur, 2013) had peaks in the prevalence in the practice in the 4^{th} decade. Regarding gender, only one study by Olaosun (2014) analysed gender difference and found that females are more likely to perform self-ear-cleaning than males. According to Adegbiji et al. (2018), however, females are generally more active in personal hygiene compared to males.

4.2 Materials used for Self-Ear Cleaning

Several methods/materials were found to have been used for self-ear cleaning in these studies, but what came most commonly were cotton buds. Significantly, however, a study by Adegbiji et al. (2018) carried out in the rural community showed that sticks were more commonly used (43.3%), followed by fingers (33.8%) and cotton buds (26.3%). It, therefore, can be deduced that the object used is dependent on the environment and the socio-economic status of the population. Hence, sticks, feathers and fingers are more commonly used in rural areas whereas cotton buds are commonly used in urban settings (Adegjibi et al., 2018).

4.3 Reasons for Self-Ear Cleaning

In the articles that were reviewed, there were several reasons for individuals to practice self-ear cleaning. The commonest reason was to remove dirt/wax from the ear. Wax is wrongly perceived as dirt or debris and thus the urge to remove it. The other reasons were itchiness, feeling of water in the ear, soothing, and ear blockage or impaired hearing. It is evident in several studies that earwax is believed to be dirt and unhygienic due to its brown sticky characteristic. However, Cerumen (earwax) is a normal physiologic excretion from the ceruminous and the sebaceous glands forming part of the outer third of external auditory canal. Earwax is composed of glycopeptides, lipids, hyaluronic acid, sialic acid, lysosomal enzymes and immunoglobulins. Earwax serves a protective function, by maintaining an acidic environment (pH of 5.2 - 7.0) in the external auditory canal as well as lubricating the canal. Additionally, earwax has antibacterial and antifungal properties (Oladeji, Babatunde, Babatunde, & Sogebi, 2015). According to Khan et al., (2017), self-ear cleaning practices has evidently been found to compromise the integrity of the ear's self-cleansing mechanism.

4.5 Complications of Self-Ear Cleaning

Some subjects from all articles reviewed have had complications resulting from self-ear cleaning. According to Khan et al. (2017), the most frequently seen complications in the ENT departments are retained cotton bud ends as well as match stick ends stuck in the ear. Other complications of self-ear cleaning include perforated tympanic membrane and otitis externa. Majority of patients who get complications are from the rural setting (Adegbiji et al., 2018). Nonetheless, most of these complications are self-limiting. In a study by Khan et al. (2017), however, 5 of 206 participants had serious complications two of whom experienced perforated tympanic membrane and one required tympanoplasty.

5. Recommendations

Based on the literature, there is no doubt that self-ear cleaning is a common practice. It is also evident that risks such as injuries to the inner ear and complications such as perforation of tympanic membrane and retention of foreign bodies are real. We therefore recommend the following:

- Health education against self-ear cleaning. It is recommended that priority be put on teaching primary school pupils to avoid putting objects in their ears. They should as well be made aware of the possible dangers/complications of doing so right from the young age such that the vice should not be done in adulthood.
- For adults and the general public, health education against self-ear cleaning could form part of health promotion package given at primary health care facilities. The community should be sensitized about the danger and the complications that may occur because of self-ear cleaning practices. Ear, nose and throat (ENT) department should create awareness campaign conveying basic information on the danger of self-ear cleaning practices; people should be encouraged to develop a health seeking behaviour from trained health personnel.
- Health professionals need to promote safe practices for the public to follow. The review has shown that some health professionals also practice self-ear cleaning yet they know that it is harmful. This habit should be discouraged, as it is a slow otologic poison leading to potential risks of ear injuries (Afolabi et al., 2009).

6. Conclusion

The practice of self-ear cleaning among all ages is common. In addition to ridding the ear of its natural protection, self-ear cleaning is associated with a risk of injury to the ear drum, retention of foreign bodies and other complications as someone blindly inserts objects into the ear canal. Community education to avoid this practice is therefore of paramount importance. Trained health care providers should be consulted whenever someone has a problem related to hearing or any other symptom.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Predictors of Adolescent Parent Communication and Safe Sexual Behaviour among In-School Adolescents

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Abstract

Adolescents in communicating about their sexual and reproductive health (SRH) issues are faced with the obstacles created by expected social norms and taboos related to sexuality and gender. This study aims to determine the relationship between adolescent-parent communication and its relationship with safe sex behaviour among adolescents.

The study was a descriptive cross-sectional. Data was collected from 400 adolescents in Ife-East local government using a pre-tested semi-structured questionnaire. We used a multistage sampling technique to select the required study subjects. We carried out simple frequencies and chi-square.

Fifty –five percent (55.3%) of the respondents were females, while 44.8% are males. The mean age (±SD) of the participants was 15.50 ±1.55years. Of the respondents, only 37% had good knowledge of sexual and reproductive health issues, while 63% had poor knowledge of sexual and reproductive health issues. The predictors of adolescent parent communication among respondents are private schools (OR=2.546, P = 0.005, CI=1.327-4.885), Female sex (OR=12.128, P<0.001, CI=11.590 – 25.534), family size (OR=14.772, P= 0.003, CI=13.037 –20.015) and good knowledge of sexual and reproductive health issues (OR=19.521, P= 0.007, CI=19.521 –29.078). There is a statistically significant relationship between adolescent parent communication and safe sexual behaviour (X^2=152.998, P <0.001, df = 1).

The findings of our study revealed that adolescents were not communicating much with parents about sexual and reproductive health issues; and that there is an association between adolescent parent communication and safe sexual behaviour.

Keywords: adolescents, parents, communication, sexual and reproductive health, safe sex behaviour

1. Introduction

There are more than one billion adolescents all over the world. About 70% of them live in resource-poor countries (Department of Economic and Social Affairs (DESA, 2010). Studies have shown that adolescents have a limited understanding of various physiological changes that take place in them (Farzaneh, Lori, & Karima, 2008; Jejeebhoy, 2006; Seme & Wirtu, 2008). This lack of knowledge about pubertal changes may harm this group of people. In the past, researchers noticed that many adolescents who survived all childhood health challenges enjoyed a period of relatively low morbidity and mortality. However, due to civilization, urbanization, and lifestyle changes, adolescents' health is presently at stake (Berhane, Berhane, & Fantahun, 2005; Shiferaw, Getahun, & Asres, 2014). The greatest threat to adolescents' wellbeing is sexually transmitted infections and other reproductive health challenges (Berhane et al., 2005).

Across the globe, between 2.5 and 3 million adolescents acquire sexually transmitted infections (STIs) annually (Fanta, Lemma, Sagaro, & Meskele, 2016). This fact implies that in the developed countries, approximately one out of every ten adolescents acquire STIs annually. More than one million pregnancies occur among adolescents each year, out of which sixty percent are unwanted due to unprotected sexual intercourse (Yesus & Fantahun, 2010).

Sixteen million girls aged 15-19 give birth annually. This proportion is about 11% of all deliveries globally (Morris & Rushwan, 2015); 95% of these deliveries occur in developing countries (Morris & Rushwan, 2015). Significant differences arise across regions; for example, the proportion of births from teenage pregnancy to all deliveries range between approximately 2% in China to 18% in Latin America and the Caribbean, to more than 50% in Sub-Saharan Africa (WHO(Organization, 2004). Teenage pregnancy is a significant problem. In low-middle income countries (LMICs), about ten percent of teenagers become mothers before 16, with the highest rates in Sub-Saharan Africa and Southeast Asia (WHO (Organization, 2004).

In communicating about sexual and reproductive health (SRH) issues, adolescents tend to face obstacles created by expected societal norms and beliefs regarding sexuality and gender (Kusheta, Bancha, Habtu, Helamo, & Yohannes, 2019; Motsomi, Makanjee, Basera, & Nyasulu, 2016). These obstacles lead to a culture of silence, especially for the girls, in expressing their worries, discussing, and accessing information about SRH (Motsomi et al., 2016). Similarly, because of religious and cultural beliefs, parents tend to avoid discussion about sexual issues with adolescents. Parents believe they are too young for such discussion. This belief, in turn, hinders adolescent-parent communication on sexual health issues by creating an unfavorable environment for discussion (Kusheta et al., 2019; Motsomi et al., 2016).

Adolescents need their parents to spend time with them and show a genuine interest in them. Although adolescents often find it difficult to discuss sexuality with their parents, they tend to imbibe healthy sexual behavior when their parents engage in a robust discussion on SRH issues (DeVore & Ginsburg, 2005). Researches have also shown positive parenting practices involve discussion on sex-related topics, such as abstinence, contraception, and combatting HIV and other sexually transmitted infections (STIs) (DeVore & Ginsburg, 2005; Guilamo-Ramos & Bouris, 2008).

In Nigeria, surveys have not adequately explored the predictors of Adolescent–parent communication on sexual and reproductive health (SRH) challenges. Titiloye and colleagues employed mixed methods to estimate SRH discussion between adolescents and their parents. This method is limited in depth of information about triggers of parent-child communication and does not look into the predictors of adolescent-parent communication SRH issues (Titiloye & Ajuwon, 2017). Izugbara used qualitative methods to explore how and why these discussions happen. He conducted the study in rural areas alone, limiting its transferability to non-rural settings (Izugbara, 2008). These studies were selective in scope, coverage, and assessment of adolescents' SRH issues. This present study conducted more comprehensive research on adolescent-parent communication predictors on SRH issues and its association with adopting safe sex behaviors.

2. Methodology

We carried it out in Ife East local government (LGA) of Osun State, Nigeria, between August and October 2019. Geographically, Ile-Ife lies on latitude 7˚28'N and 7˚45'N and longitude 4˚30'E and 4˚34'E. The city experiences two distinct seasons, the rainy season spanning between April and October and the dry season between November and March. The average rainfall is about 1,000-1,250mm, with the highest temperature hovering over 28.3˚ Ife East LGA lies between latitude 70 20 "N and longitude 40 33 "E. We classified urban settlement with a total population of about 221,340, a mixture of Yoruba, Igbo, Hausa, and other tribes (Commission, 2009). The Local Government Area has 84 senior secondary schools.

2.1 Study Design

The study employed a descriptive cross-sectional design.

2.2 Target and Study Population

The study population is adolescents (10-19years) in selected schools.

2.3 Sample Size

We determined the sample size with the formula for estimating single proportions described by Armitage & Berry and cited in Gahlinger & Abramson). P is assumed prevalence of 87% (Fanta et al., 2016). Considering 10% non-response rate

n= 350+35= 385. We rounded this number up to 400 for robust sampling.

2.4 Sampling Technique

We selected the respondents using the multi-stage sampling technique. The researcher obtained a list of all secondary schools in the study area, which had already been classified as public and private schools from the Ife East Local inspector of Education office. Stage 1: Six public and private senior secondary schools were selected by

balloting from 84 senior secondary schools within the LGA. We evenly distribute the sample size over the six schools chosen to know the number of respondents per school, giving a total number of 67 respondents per school. Stage 2: Schools selected had more than an arm, from which we selected two arms of each class using a simple random sampling technique by balloting. Stage 3: Eligible respondents from the arms chosen were selected from the class register using simple random sampling.

2.5 Inclusion and Exclusion Criteria

Inclusion criteria are Students that are in session during data administration. Students who are seriously sick at the time of data collection were excluded from the study. Students writing their senior secondary school certificate examination. Single-Sex Secondary School.

2.6 Data Collection Methods

The adolescent-parent questionnaire was adopted from previous studies for data collection. The question has three sections: A. Socio-demographic status, B. Knowledge on major selected aspects of SRH, C. Level of communication on SRH, and Safe sexual behavior questionnaire. We developed the safe sexual behavior scale according to Dilorio et al. (DiIorio, Parsons, Lehr, Adame, & Carlone, 1992). It contains 27 items, which responses never have, sometimes, almost all the times, and always. We scored the items by awarding 1 for never and 4 for always, giving a score range of 27-108. A score of 78 and below indicates a lower level of safer sex behavior and scores greater than 78 indicate a higher level of safer sex behavior. The questionnaire was pre-tested among secondary school adolescents in Ife Central Local Government Area to ensure its reliability and content validity, and we made necessary changes after that.

2.7 Data Analysis

Each questionnaire was cross-checked daily on the field to ensure accurate data collection before data entry. The statistician analyzed the data using Statistical Package for the Social Sciences (SPSS) soft wear package version 20.0.

We generated frequencies and percentages for socio-demographic factors, including mean (standard deviation) for the age. The statistician generated statistical indices (chi-square, p-value, and degree of freedom) for the association between socio-demographic factors and adolescent-parent communication on SRH.

He also generated statistical indices for a statistical association between adolescent-parent communication on SRH and safe sexual behavior. We presented the data using tables. We used the Chi-square test to compare categorical variables and set statistical significance at $p<0.05$.

We generated Multivariate analysis using binary logistic regression for statistically significant socio-demographic factors and safe sexual behaviors.

2.*8 Ethical Consideration*

We sought ethical approval from the institute's ethical and research committee of public health OAU, Ile-Ife. We gave all participants verbal and written information about the study and the right to withdraw at any time without suffering any form of disadvantage. We then obtained their verbal consent. The researcher also assured them of confidentiality of their identities and information.

3. Results

Table 1 reveal s that fifty–five percent (55.3%) of the respondents were females, while 44.8% are males. The respondents' mean age was 15.50 ±1.55 years. Also, half of the students (52.5%) were in SS 1. Most of the respondents (90.3%) belonged to the Yoruba ethnic group, and the majority of them (87.8%) were Christians by religion. Seventy –six percent (77.5%) of the respondents were living with both parents. Less than half (46.5%) of their parents were living together. The respondents' mean family size was 4.74±1.56. Forty percent (40.0%) of the respondents' mothers were secondary school certificate holders, and 23.8% of respondents' mothers were small-scale merchant and private employees each. Thirty-three (33.0%) of the respondents' fathers were postgraduate degree holders, and 39.0% of respondents' fathers were government employees.

Table 1. Socio-Demographic Characteristics of respondents

Variables	**Frequency n (%)**
Age(years)	
10-13	49 (12.3%)
14-16	219 (54.8%)
17-19	132 (33.0%)
Total	400 (100%)
Mean	15.50
Standard Deviation	1.55
School	
Private	183 (45.8%)
Government	217 (54.3%)
Total	400 (100%)
Class	
SS 1	210 (52.5%)
SS2	190 (47.5%)
Total	400 (100%)
Gender	
Male	179 (44.8%)
Female	221 (55.3%)
Total	400 (100%)
Religion	
Christianity	351 (87.8%)
Muslim	46 (11.5%)
Others	3 (0.8%)
Total	400 (100%)
Ethnicity	
Yoruba	361 (90.3%)
Hausa	3 (0.8%)
Ibo	27 (6.8%)
Others	9 (2.3%)
Total	400 (100%)
Parents Marital status	
Together	186 (46.5%)
Separated	146 (36.5%)
Divorced	34 (8.5%)
Widowed	34 (8.5%)
Total	400 (100%)
Family Size	
1-4	86 (21.5%)
>/=5	314 (78.5%)
Total	400 (100%)

Mean	4.74
Standard Deviation	1.56
Mother's educational status	
Non-formal	17 (4.3%)
Primary school certificate	44 (11.0%)
Secondary school certificate	160 (40.0%)
Diploma	25 (6.3%)
Tertiary education	52 (13.0%)
Postgraduate	102 (25.5%)
Total	400 (100%)
Father's educational status	
Non-formal	16 (4.0%)
Primary school certificate	42 (10.5%)
Secondary school certificate	121 (30.3%)
Diploma	35 (8.8%)
Tertiary education	54 (13.5%)
Post-graduate	132 (33.0%)
Total	400 (100%)
Mother's occupation	
House wife	42 (10.5%)
Employed(private)	95 (23.8%)
Employed (Government)	82 (20.5%)
Small scale merchant	95 (23.8%)
Farmer	23 (5.8%)
Others	63 (15.8%)
Total	400 (100%)
Father's occupation	
Employed(private)	89 (22.3%)
Employed (Government)	156 (39.0%)
Small scale merchant	37 (9.3%)
Farmer	55 (13.8%)
Others	63 (15.8%)
Total	400 (100%)

Table 2 shows the knowledge assessment of major selected SRH issues among the participants. A total of 320 (80%) participants knew about the age at first menses (menarche). The reported age at menarche in this study was 11.01±1.98 years. Only 37% of the participants had good knowledge of SRH issues, while 63% had poor knowledge.

Table 2. Knowledge of major selected sexual and reproductive health issues among respondent

Variables	Frequency (%)
At what age does menstruation starts?	
9-13	280 (70.0%)
14-18	40 (10.0%)
19-24	80 (100%)
Do you know STDs?	
Yes	279 (69.8%)
No	121 (30.3%)
*Which STD do you know?	
Chancroid	108 (49.1%)
Syphilis	110 (55.0%)
Gonorrhea	200 (90.1%)
Lymphogranuloma venerum	43 (19.5%)
HIV/AIDS	215 (97.7%)
Herpes simplex	23 (10.4%)
Do you know about contraceptives	
Yes	228 (57%)
No	172 (43%)
*Which contraceptives do you know?	
Pill	175 (79.5%)
Depo-Provera	54 (24.5%)
Implant	182 (82.7%)
IUCD	89 (40.4%)
Condoms	218 (99.1%)
Knowledge score	
Good: (mean score ≥5.5)	148 (37%)
Poor: (mean score <5.5)	252 (63%)

Table 3 shows that two-thirds (63.7%) of the respondents have discussed SRH issues, out of which 39.2% had talked with their parents while 56.9% and 3.9% have consulted with their peers and siblings, respectively.

Table 3. Adolescent communication on SRH issues

Have you ever had communication on SRH issues in the past?	Frequency	Percentage
Yes	255	(63.7%)
No	145	(36.3%)
To whom do you discuss?		
Parents	100	(39.2%)
Peer friend	145	(56 .9%)
Others	10	(3.9%)
Adolescent –parent communication		
Sexually active	60	60.0%
Not sexually active	40	40.0%
Total	100	100.0%

Table 4 Three percent of the respondents insist on condom use, while 3.34% stop foreplay early enough to put on a condom (or for my partner to put on a condom) during sexual intercourse. Fifteen percent of the respondents engage in sexual intercourse on a first date, while 1.0% abstain from sexual intercourse when they do not know the partner's sexual history. Seventeen percent (17%) of the sexually active respondents practice safe sexual behavior, while 83.3% do not practice safe sexual behavior.

Table 4. Participation in Safe sexual behavior questionnaire among respondents

Behavior	**Frequency(299)**	**Percentage(%)**
* I push for condom use when I have sexual intercourse	9	3.01%
* I use cocaine or other drugs before or during sexual intercourse.	55	18.39%
* I stop foreplay early enough to put on a condom (or for my partner to put on a condom).	10	3.34%
* I enquire from potential sexual partners about their sexual histories.	12	4.01%
* I avoid direct contact with my partner's semen or vaginal secretions.	10	3.34%
* My partner and I use spermicide and a condom with each act of sexual intercourse.	11	3.68%
* I have sexual intercourse with intravenous drugs (IV drugs) users.	8	2.67%
*I ask my potential sexual partners about the history of bisexual/homosexual practices.	7	2.34%
* I engage in sexual intercourse on a first date.	45	15.1%
* I abstain from sexual intercourse when I do not know my partner's sexual history.	4	1.34%
* I avoid sexual intercourse when I have sores or irritation in my genital area.	4	1.34%
* If I know an encounter may lead to sexual intercourse, I carry a condom with me.	5	18.39%
* I insist on examining my sexual partner for sores, cuts, or abrasions in the genital area.	2	0.7%
* If I disagree with my partner's information on safer sex practices, I state my perspective.	11	3.68%
* I engage in oral sex without using protective barriers such as a condom or rubber dam.	54	18.1%
* I use rubber gloves for sexual foreplay when I have cuts or abrasions on my hands.	10	3.34%
If swept away in the moment's passion, I have sexual intercourse without using a condom.	50	16.7%
* I engage in anal intercourse.	33	11.0%
* I ask my potential sexual partners about the history of IV drug use.	12	4.01%
If I know an encounter may lead to sexual intercourse, I have a mental plan to practice safer sex.	4	1.34%
* If my partner insists on sexual intercourse without a condom, I refuse to have sexual intercourse.	12	4.01%

* I avoid direct contact with my sexual partner's blood.	14	4.68%
* It is difficult for me to discuss sexual issues with my sexual partners	55	18.39%
* I initiate the topic of safer sex with my potential sexual partner.	9	3.01%
* I engage in anal intercourse without using a condom.	32	10.7%
* 1 drink alcoholic beverages before or during sexual intercourse.	32	10.7%
Safe Sexual behavior	50	16.75
Unsafe Sexual behavior	249	83.3%

*Multiple responses.

Table 5 shows a statistically significant relationship between adolescent parent communication and safe sexual behavior ($X^2 = 152.998$, $P < 0.001$, $df = 1$).

Table 5. Relationship between AdolescentAdolescent –parent communication and safe sexual behavior

A-P Communication	Safe sexual behavior (%) (50)	Unsafe sexual behavior (249)	Statistical indices
Yes (60)	42 (84.0)	18(7.2)	X^2=152.998
No (239)	8(16.0)	231 (92.8)	P <0.001 Df = 1

Table 6 reveals the predictors of adolescent parent communication among respondents. Respondents in private schools were three times more likely to discuss sexual and reproductive health issues with their parents than their public school counterparts (OR=2.546, P = 0.005, CI=1.327-4.885). Female respondents are 12 times more likely to discuss sexual and reproductive health issues with their parents than males (OR=12.128, P<0.001, CI=11.590 – 25.534). Respondents with family size 1-4 were 15times likely to discuss sexual and reproductive health issues with their parents compared with their counterparts from family size ≥5 (OR=14.772, P= 0.003, CI=13.037 –20.015). Respondents with good knowledge were 19 times more likely to discuss sexual and reproductive health issues with their parents than their counterparts with poor knowledge (OR=19.521, P= 0.007, CI=19.521 –29.078).

Table 6. Predictors of Adolescent Parent Communication Among Respondents

Variable	**Odds Ratio**	**(95% Conf. Interval)**		**P-value**
		Lower limit	Upper limit	
School				
Public (RC)	1.0000			
Private	2.546	1.327	4.885	0.005*
Sex				
Male (RC)	1.0000			
Female	12.128	11.590	25.534	0.000*
Family size				
≥5 (RC)	1.0000			
1-4	14.772	13.037	20.015	0.003*

Knowledge of sexual and reproductive health issues				
Poor (RC)	1.0000			
Good	19.521	12.253	29.078	0.007*

4. Discussion

Adolescent sexuality is a significant point of discussion at different health fora over the past decade. Previous studies established the fact that Adolescent- parent communication is central to safe sexual practice among adolescents.

About one-third (39.2%) of the adolescents that ever communicated on SRH issues discussed with their parents, while 56.9% discussed it with their friends. This result is higher than those of the studies from Bullen Ethiopia, Awabel, and Lesotho, which place the prevalence of Adolescent –parent communication on SRH issues at (29%), (25.3%), (20%), respectively(Ayehu, Kassaw, & Hailu, 2016; Mturi, 2003; Yesus & Fantahun, 2010). This present study's findings are lower than the research conducted in Zimbabwe (44%) (Kim, Kols, Nyakauru, Marangwanda, & Chibatamoto, 2001). Cultural differences associated with discussing sensitive matters such as SRH issues may account for this variation.

We also found a statistically significant association between adolescent-parent communication and safe sexual behavior. This study revealed that 84.0% of adolescents who practice safe sexual behavior discussed SRH issues with their parents. In contrast, 92.8% of those who didn't practice safe sexual behavior had no prior communication with their parents. This finding is similar to the results of previous studies. They showed that communication with parents plays a major role in enhancing safe sexual behavior (DeVore & Ginsburg, 2005; Guilamo-Ramos & Bouris, 2008; Guilamo-Ramos et al., 2012; Widman, Choukas-Bradley, Noar, Nesi, & Garrett, 2016).

Few of the respondents in this study insist on condom use, stop foreplay long enough to put on a condom, and abstain from sexual intercourse when they do not know the partner's sexual history. This result is less than 34.8% reported from Bale, South West Ethiopia (Dida, Kassa, Sirak, Zerga, & Dessalegn, 2014), 47.9% from Woreta Town, Northwest Ethiopia (Birhanu, Bisetegn, & Woldeyohannes, 2014), and Harar, East Ethiopia (Yadeta, Bedane, & Tura, 2014). Cultural differences and changes in associated interventions concerning sexual and reproductive health problems among the study settings may account for this variation.

The predictors of adolescent-parent communication in this study include small family size and good knowledge of sexual and reproductive health issues. Our survey revealed that there is an association between sex and adolescent parent communication. This result is comparable to previous reports, which showed that female sex is a predictor of adolescent-parent communication SRH. This finding might be because girls tend to spend more time at home with their parents; and that parents usually focus more on the girls regarding abstinence and pregnancy avoidance (Ayehu et al., 2016; Kumi-Kyereme, Awusabo-Asare, Biddlecom, & Tanle, 2007; Motsomi et al., 2016).

This study showed that good knowledge of SRH issues is a predictor of adolescent parent communication. This finding is similar to previous survey reports, which showed that knowing sexual and reproductive health issues(SRH) is a strong predictor of adolescent parent communication on SRH issues (Fanta et al., 2016; Melaku, Berhane, Kinsman, & Reda, 2014). This finding may be because students who know SRH issues were eager to initiate a discussion with their parents on SRH issues.

5. Conclusion

This study revealed that the prevalence of adolescent-parent communication is low in our setting even though it plays a central role in enhancing safe sexual behavior in adolescents. The study also identified good knowledge of SRH issues as a predictor of adolescent-parent communication on sexuality.

5.1 Recommendation

Parents should engage both male and female adolescents equally during the discussion on Reproductive Health issues. Responsible agencies like the district health office, town administrative office, and others should provide parents with the necessary information, education, communication material, and communication skills on Reproductive Health-related issues. There should be transparency at home and in the community to enhance open discussion among family members, especially adolescents. We should furnish adolescents with accurate RH

information in various ways, such as participating in different health clubs both in and outside school. Policymakers should introduce comprehensive family life education programs into the school curriculum. Advocacy should target homes, churches, mosques, and health facilities regarding adolescent-friendly SRH services.

5.2 Limitation of the Study

We base Adolescent–parent communication on sexual and reproductive health issues on self-report from the adolescents, and the study did not explore factors from the parent's perspective.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Etiologies of Liver Cirrhosis and Their Clinical Presentation among Inpatients in Medical City Complex - Baghdad Teaching Hospital

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Abstract

Background: Liver cirrhosis is one of common diseases that doctors deal with during working days, so it is important for all doctors to have a basic knowledge about its etiologies, clinical presentations, complications and prognosis.

Aim of the study: 1) To detect the most common causes of liver cirrhosis among Iraqi patients. 2) To Find the most common clinical presentations and look for any association between them and a particular etiology. 3) To make recommendations regarding screening for the most common etiology among population and deal with it and treat it early prior to development of liver fibrosis and cirrhosis.

Patient and methods: A cross-sectional study was conducted from January 2016 to January 2019. 1000 patients were enrolled in the current study and followed at medical wards at Baghdad teaching hospital, taking detailed history from them including history of alcohol intake, drug history, etc... and sending them for complete work up including Abdominal US, virology screening, autoimmune, Wilson, iron study etc... and calculating Child - Pugh score for each patient.

Results: 1) The most common causes of liver cirrhosis are alcoholic liver disease (20%) and HCV (20%) followed by HBV (18%), NAFLD (14%), cryptogenic (14%), AIH (6%), Wilson (4%), PBC (4%). 2) the most common presentation of liver cirrhosis from all causes are ascites (38%) and encephalopathy (38%). followed by bleeding varices (21%), jaundice (11%). 3) HCV was associated significantly with Encephalopathy, NAFLD significantly associated with bleeding varices, Cryptogenic significantly associated with ascites, Wilson disease and PBC significantly associated with jaundice.

Conclusions: HCV and alcoholism are so common among Iraqi patients with liver cirrhosis, while NAFLD cases are commonly related to diabetes mellitus and obesity. Ascites and encephalopathy are the most common presentation at medical wards from all causes of liver cirrhosis. Most cases of liver cirrhosis due to HCV are within middle and elderly. While Wilson disease should be kept at the top of differential diagnosis of liver cirrhosis among young individuals as it is significantly related to young age group. Cryptogenic cases of liver cirrhosis need aggressive work up and screening for uncommon causes.

Keywords: hepatic cirrhosis, etiology, presentation

1. Introduction

1.1 Definition of Liver Cirrhosis

Cirrhosis, which can be the final stage of any chronic liver disease, is a diffuse process characterized by fibrosis and conversion of normal architecture to structurally abnormal nodules. These “regenerative” nodules lack normal

lobular organization and are surrounded by fibrous tissue. The process involves the whole liver and generally is considered irreversible. Although cirrhosis is histologically an "all-or-nothing" diagnosis, clinically it can be classified by its status as compensated or decompensated. Decompensated cirrhosis is defined by the presence of ascites, variceal bleeding, encephalopathy, or jaundice, which are complications that result from the main consequences of cirrhosis: portal hypertension and liver insufficiency (Lee Goldman, Andrew I. Schafer. 2016).

1.2 Diagnosis of Liver Cirrhosis

Although cirrhosis is strictly speaking a histologic diagnosis, a combination of clinical, laboratory, and imaging features can help confirm a diagnosis of cirrhosis.

A clinical stigmata of liver cirrhosis includes palmar erythema, Terry's nails, Clubbing of the fingernails, Gynecomastia, Spider telangiectasias (or angiomata), Dilated abdominal veins (caput medusae) with flow away from the umbilicus, toward the inferior vena cava in the infraumbilical area and toward the superior vena cava in the supraumbilical area, suggest intrahepatic portal hypertension. On the other hand, dilatation of veins in the flank with blood draining toward the superior vena cava suggests inferior vena caval obstruction. Parotid enlargement is also a feature of cirrhosis, especially alcoholic cirrhosis.

Patients with a history of chronic liver disease with gastroesophageal varices, ascites, or hepatic encephalopathy are likely to have cirrhosis, and liver biopsy is not essential in such cases for confirming cirrhosis. In patients with a diagnosis of chronic liver disease without these complications, physical findings of an enlarged left hepatic lobe with splenomegaly, along with the cutaneous stigmata of liver disease described earlier, suggest cirrhosis, especially in the setting of thrombocytopenia and impaired hepatic synthetic function (e.g., hypoalbuminemia, prolongation of the prothrombin time). If physical and laboratory findings are not suggestive of cirrhosis, imaging studies can help make a diagnosis of cirrhosis. A small nodular liver with splenomegaly and intra-abdominal collaterals and the presence of ascites on abdominal US (or other cross-sectional imaging study) suggests cirrhosis.

Liver biopsy has long been the gold standard for diagnosing cirrhosis but may be associated with costs and procedure related risks, albeit infrequently the major concerns regarding the use of a liver biopsy to diagnose cirrhosis includes sampling error and interobserver disagreement in the estimation of the extent of fibrosis. The ideal combination of clinical findings and routine laboratory tests to determine whether a patient has cirrhosis without the need for a liver biopsy has been addressed in a systematic fashion (Mark Feldman, Lawrence S. Friedman, Lawrence J. Brandt. 2016).

1.3 Etiologies of Liver Cirrhosis and Their Epidemiological Studies Worldwide

1) Alcoholism
2) Chronic viral hepatitis: hepatitis B, Hepatitis C
3) Autoimmune hepatitis
4) Nonalcoholic steatohepatitis
5) Biliary cirrhosis: Primary biliary cirrhosis, Primary sclerosing cholangitis. Autoimmune cholangiopathy
6) Cardiac cirrhosis
7) Inherited metabolic liver disease: Hemochromatosis, Wilson's disease, Alpha 1 antitrypsin deficiency, Cystic fibrosis
8) Cryptogenic cirrhosis

HCV infection:

The worldwide seroprevalence of HCV infection, based on detection of antibody to HCV (anti-HCV), is estimated to be 3%, with more than 170 million people infected chronically. The overall worldwide prevalence increased from 1990 to 2010.1 marked geographic variation exists, with infection rates ranging from 1.3% to 1.6% in the United States to 15% in Egypt. In 2002, between 3.2 and 5 million persons were infected with HCV in the United States, [(3)] but the incidence of HCV has declined continually since 1994. The highest prevalence in different age groups shifted from 35 to 44 years (2.5%) to 55 to 64 years in 2005 (2.7%). It has therefore been recommended that all persons born between 1945 and 1965 be tested for anti-HCV (Smith BD, Morgan RL, Beckett GA, et al. 2012*)*.

HBV infection:

The sequelae of chronic HBV infection vary from an inactive carrier state to the development of cirrhosis, hepatic decompensation, hepatocellular carcinoma (HCC), extrahepatic manifestations, and death. The prognosis appears to vary with the clinical setting. Long-term follow-up studies of HBsAg positive blood donors have shown that the

majority remain asymptomatic with a very low risk of cirrhosis or HCC (Villeneuve JP, Desrochers M, Infante-Rivard C, et al. 1994), (Manno M, Cammà C, Schepis F, et al. 2004).

The prognosis is worse in HBV-infected patients from endemic areas and in patients with chronic hepatitis B (Fattovich G, Brollo L, Giustina G, et al.), (Liaw YF, Lin DY, Chen TJ, Chu CM. 1989).

Alcoholic liver disease:

Excessive alcohol consumption is associated with a range of hepatic manifestations, including alcoholic fatty liver disease (with or without steatohepatitis), alcoholic hepatitis, and cirrhosis. Patients with an alcohol intake of 30 or more grams per day are at increased risk of cirrhosis, although the majority of patients will not develop cirrhosis despite heavy alcohol intake (point prevalence of 1 percent for those who drink 30 to 60 g/day and 6 percent for those who drink 120 g/day). Unfortunately, among those who do develop liver disease, symptoms often develop only after severe, life-threatening liver disease has already developed (Bellentani S, Saccoccio G, Costa G, et al. 1997)

NAFLD:

Nonalcoholic fatty liver disease (NAFLD) refers to the presence of hepatic steatosis when no other causes for secondary hepatic fat accumulation (eg, heavy alcohol consumption) are present. NAFLD may progress to cirrhosis and is likely an important cause of cryptogenic cirrhosis (Caldwell SH, Oelsner DH, Iezzoni JC, et al. 1999), (Poonawala A, Nair SP, Thuluvath PJ. 2000).

Nonalcoholic fatty liver disease (NAFLD) is subdivided into nonalcoholic fatty liver (NAFL) and nonalcoholic steatohepatitis (NASH). In NAFL, hepatic steatosis is present without evidence of inflammation, whereas in NASH, hepatic steatosis is associated with hepatic inflammation that histologically is indistinguishable from alcoholic steatohepatitis (Ludwig J, Viggiano TR, McGill DB, Oh BJ. 1980), (Sheth SG, Gordon FD, Chopra S. 1997).

Autoimmune hepatitis:

Autoimmune hepatitis is a chronic hepatitis that occurs in children and adults of all ages. It is characterized by immunologic and autoimmunologic features, generally including the presence of circulating autoantibodies and high serum globulin concentrations (Krawitt EL. 2006).

Autoimmune hepatitis has a heterogeneous and fluctuating nature, leading to marked variability in its clinical manifestations. The spectrum includes asymptomatic patients, those with considerable and sometimes debilitating symptoms, and those with acute liver failure. Furthermore, long periods of subclinical disease may occur before or after presentation. Physical findings range from a normal physical examination to the presence of hepatomegaly, splenomegaly, stigmata of chronic liver disease, and jaundice (Muratori P, Granito A, Quarneti C, et al. 2009).

Primary biliary cirrhosis:

Primary biliary cirrhosis (PBC) is characterized by a T-lymphocyte-mediated attack on small intralobular bile ducts. A continuous assault on the bile duct epithelial cells leads to their gradual destruction and eventual disappearance. The sustained loss of intralobular bile ducts causes the signs and symptoms of cholestasis and eventually results in cirrhosis and liver failure (Kaplan MM. 1996), (Moebius U, Manns M, Hess G, et al. 1990).

PBC occurs worldwide and predominantly in women, with a female-to-male ratio of 9: 1.

The diagnosis of PBC usually is made between the ages of 30 and 60 years, with a range of 21 to 93 years. The disease has been documented in even younger patients-2 teenagers 15 and 16 years of age, respectively (Dahlan Y, Smith L, Simmonds D, et al. 2003).

Hemochromatosis:

Hereditary hemochromatosis is an autosomal recessive disorder in which mutations in the HFE gene cause increased intestinal iron absorption. The clinical manifestations of this disorder, and of other forms of iron overload, are related to excessive iron deposition in tissues, especially the liver, heart, pancreas, and pituitary (Bacon BR, Adams PC, Kowdley KV, et al. 2011).

Progressive iron deposition is associated with hepatomegaly, elevated liver enzymes, and the eventual development of increasing fibrosis and cirrhosis (Adams PC, Deugnier Y, Moirand R, Brissot P. 1997), (Fracanzani AL, Fargion S, Romano R, et al. 1995).

Wilson disease:

Wilson disease (hepatolenticular degeneration) is due to a genetic abnormality inherited in an autosomal recessive

manner that leads to impairment of cellular copper transport. Impaired biliary copper excretion leads to accumulation of copper in several organs, most notably the liver, brain, and cornea. Over time, the liver is progressively damaged and eventually becomes cirrhotic. In addition, patients may develop neurologic complications, which can be severe (J Hepatol. 2012).

Budd – Chiari syndrome:

The Budd-Chiari syndrome can be defined as any pathophysiologic process that results in an interruption or diminution of the normal flow of blood out of the liver. However, as commonly used, the Budd-Chiari syndrome implies thrombosis of the hepatic veins and/or the intrahepatic or suprahepatic inferior vena cava (Valla DC. 2008). (Menon KV, Shah V, Kamath PS. 2004).

BCS is a rare disease. In Sweden, prevalence rates in 1990 to 2001 were estimated to be 1.4 per million population (Rajani R, Melin T, Bjornsson E, et al. 2009).

There is a slight female predominance. The median age at diagnosis was 37 in one case series (Darwish Murad S, Plessier A, Hernandez-Guerra M, et al. 2009).

The incidence of BCS in Asia may be higher. BCS accounted for 17% of hospital admissions for liver-related disease in Kathmandu, Nepal, from 1990 to 1992 (Shrestha SM, Okuda K, Uchida T, et al. 1996).

Cardiac cirrhosis:

Patients with long-standing right-sided congestive heart failure may develop chronic liver injury and cardiac cirrhosis. This is an increasingly uncommon, if not rare, cause of chronic liver disease given the advances made in the care of patients with heart failure. Patients typically have signs of congestive heart failure and will manifest an enlarged firm liver on physical examination.

Primary sclerosing cholangitis:

As in PBC, the cause of PSC remains unknown. PSC is a chronic cholestatic syndrome that is characterized by diffuse inflammation and fibrosis involving the entire biliary tree, resulting in chronic cholestasis. This pathologic process ultimately results in obliteration of both the intra- and extrahepatic biliary tree, leading to biliary cirrhosis, portal hypertension, and liver failure.

Other types of cirrhosis:

α1AT deficiency results from an inherited disorder that causes abnormal folding of the α1AT protein, resulting in failure of secretion of that protein from the liver. It is unknown how the retained protein leads to liver disease. Patients with α1AT deficiency at greatest risk for developing chronic liver disease have the ZZ phenotype, but only about 10–20% of such individuals will develop chronic liver disease. Diagnosis is made by determining α1AT levels and phenotype. Characteristic periodic acid–Schiff (PAS)-positive, diastase-resistant globules are seen on liver biopsy.

Cryptogenic cirrhosis:

Cryptogenic cirrhosis (CC) is the end stage of a chronic liver disease in which its underlying etiology remains unknown after extensive clinical, serological, and pathological evaluations have been performed.

1.4 Types of Decompensation

At this stage, there are signs of decompensation: **ascites, variceal hemorrhage, jaundice, hepatic encephalopathy**, or any combination of these findings. Ascites, which is the most frequent sign of decompensation, is present in 80% of patients with decompensated cirrhosis (Lee Goldman,Andrew I.Shafer. 2012).

Variceal Hemorrhage

Gastroesophageal varices are present in approximately 50% of patients with newly diagnosed cirrhosis. Large varices, severe liver disease, and red wale markings on varices are independent predictors of variceal hemorrhage. Bleeding from gastroesophageal varices can be manifested as overt hematemesis or melena, or both (Dennis L.Kasper,Anthony S.Fauci,Stephen L.Hauser,Dan L.Longo,J,Larry Jameson,Joseph Loscalzo. 2015).

Ascites:

Ascites is the most common cause of decompensation in cirrhosis and occurs at a rate of 7 to 10% per year. The most frequent symptoms associated with ascites are increased abdominal girth, which is often described by the patient as tightness of the belt or garments around the waist, and recent weight gain. When present in small to moderate amounts, ascites can be identified on examination by bulging flanks, flank dullness, and shifting dullness

(Lee Goldman,Andrew I.Shafer. 2012).

Hepatic Encephalopathy

Hepatic encephalopathy, which is the neuropsychiatric manifestation of cirrhosis, occurs at a rate of approximately 2 to 3% per year. On physical examination, early stages may demonstrate only a distal tremor, but the hallmark of hepatic encephalopathy is the presence of asterixis. Additionally, patients with hepatic encephalopathy may have sweet-smelling breath, a characteristic termed fetor hepaticus ((Lee Goldman,Andrew I.Shafer. 2012).

Jaundice

In cirrhosis is a reflection of the inability of the liver to excrete bilirubin and is therefore the result of liver insufficiency. However, in cholestatic diseases leading to cirrhosis (e.g., primary biliary cirrhosis, primary sclerosing cholangitis, vanishing bile duct syndrome), jaundice is more likely due to biliary damage than liver insufficiency ((Lee Goldman,Andrew I.Shafer. 2012).

Child-pugh score (Dennis L.Kasper,Anthony S.Fauci,Stephen L.Hauser,Dan L.Longo,J,Larry Jameson,Joseph Loscalzo. 2015)**:**

		Points Toward Total Score		
Factor	Units	1	2	3
Serum bilirubin	μmol/L	<34	34–51	>51
	mg/dL	<2.0	2.0–3.0	>3.0
Serum albumin	g/L	>35	30–35	<30
	g/dL	>3.5	3.0–3.5	<3.0
Prothrombin time	seconds prolonged	<4	4–6	>6
	INR[a]	<1.7	1.7–2.3	>2.3
Ascites		None	Easily controlled	Poorly controlled
Hepatic encephalopathy		None	Minimal	Advanced

[a]International normalized ratio.

Note: The Child-Pugh score is calculated by adding the scores for the five factors and can range from 5 to 15. The resulting Child-Pugh class can be A (a score of 5–6), B (7–9), or C (≥10). Decompensation indicates cirrhosis, with a Child-Pugh score of ≥7 (class B). This level has been the accepted criterion for listing a patient for liver transplantation.

2. Patients and Methods

The current study is a cross sectional study, which was conducted from January 2016 to January 2019, 1000 patients were enrolled in the study from Medical wards at Baghdad teaching hospital.

2.1 Selection Criteria

1) Inpatient, admitted with a previous or new diagnosis of Liver cirrhosis.
2) All cases of Liver cirrhosis were taken, including known and unknown cause of cirrhosis
3) All cases that were selected having decompensated liver cirrhosis with different types of decompensation (Encephalopathy, jaundice, Ascites, Bleeding varices)
4) All patients were above 14 years old, with both sexes males and females.
5) Patients that are selected previously diagnosed as liver cirrhosis with or without liver biopsy depending upon clinical and radiological evidence.

The study was approved by Research Ethics Committee at Baghdad teaching hospital, all patients included singed an informed consent form after receiving information about the study. After that the following data were collected from each patient:

1) Age
2) Sex
3) Date of Diagnosis of cirrhosis
4) Clinical presentation (decompensation)
5) Etiology of liver cirrhosis
6) Calculate child – Pugh score for each patient.(Based upon Clinical and Lab data obtained from patient's file).
7) Regarding the diagnosis of NAFLD (without biopsy) depending on:
    a. Exclusion of other causes of liver cirrhosis

Patient fulfill the criteria of diagnosis of metabolic syndrome (BMI>30, waist circumference >102 cm for male

and >88 cm for females, Triglyceride >150 mg/dl, HDL<40 mg/dl for male and <50 mg/dl for female, and all patients were Diabetic) as a NAFLD is significantly associated with obesity DM type 2 and metabolic syndrome.(Ruhl & Everhart, 2003; Miyazaki, Glass, Triplitt, Wajcberg, Mandarino, & DeFronzo, 2002; Clark, Brancati, & Diehl, 2003; Williams et al., 2011).

8) Considering the diagnosis of cryptogenic cirrhosis (without biopsy) depending on:
    a. Exclusion of all other causes
    b. All patients were not diabetic, not obese (normal BMI), no dyslipidemia.
    c. Biopsy was not taken, because all patients taken were in decompensated state, with coagulopathy, small liver. Or uncooperative patient or his relatives.

2.2 Statistical Study

Anderson darling test was done to asses if continuous variables follow normal distribution, if follow normal distribution than mean and standard deviation used, if did not follow normal distribution than median and interquartile range (25% to 75% percentile range) will be used to present the data.

Discrete variables presented using there number and percentage used to present the data, chi square test used to analyze the discrete variable or Fisher exact test used to analyze the distribution between 2 groups (used instead of chi square for 2x2 table, if total sample <20 and if 2 or more with expected frequency less than 5). One way ANOVA used to analyze the differences between more than two groups (if they follow normal distribution with no significant outlier).

Linear regression analysis performed to assess the relationship between different variables, if one or both of them follow normal distribution person regression used but if both did not follow normal distribution spearman correlation will used. Scatter plot used to present the regression analysis, r (correlation coefficient or standardized beta is a representative of magnitude and direction of the relationship), r<0.25 weak, 0.25 – 0.5 mild, 0.5 – 0.75 moderate, >0.75 strong correlation. Negative sign indicate inverse relationship, but positive sign represent direct relationship.

SPSS 20.0.0, Minitab 17.1.0 software package used to make the statistical analysis, p value considered when appropriate to be significant if less than 0.05.

3. Results

1000 Patients were selected, Mean age of patients is 55.6 ± 15.6 years, about 57% of them were males and 43% were females (male to female ratio was 1.3:1) median duration of cirrhosis since diagnosis 15 months (with interquartile range 2.25 – 48 months) as illustrated in Table 1.

Table 1. Demographic data

Variables	Value
Age (years), mean ± SD	55.6 ± 15.6
Sex	
Female	43 (43.0%)
Male	57 (57.0%)
Cirrhosis duration (months), median (IQR)	15 (2.25 – 48)

The most common initial presentation was ascites and encephalopathy followed by bleeding varices and jaundice, while during the course of decompensation 65% had ascites, 57% had jaundice, 38% had encephalopathy and 24% had bleeding varices. The majority of patients presented with two of these symptoms 58% followed by 30% had only one and 10% had three and only 2% presented with all of them, as illustrated in Table 2

Table 2. Signs of liver cirrhosis

Variables	Values
Initial presentation, number (%)	
Ascites	340 (34.0%)
Bleeding varices	210 (21.0%)
Encephalopathy	340 (34.0%)
Jaundice	110 (11.0%)
Clinical signs of cirrhosis during admission	
Ascites	650 (65.0%)
Jaundice	570 (57.0%)
Encephalopathy	380 (38.0%)
Bleeding varices	240 (24.0%)
Number of clinical signs in each patient	
Single	30 (30.0%)
Two	58 (58.0%)
Three	10 (10.0%)
Four	2 (2.0%)

There was no significant difference in child – Pugh score for patients according to their initial presentation, as illustrated in Table 3.

Table 3. Child - Pugh score in each initial presentation

Bleeding varices	Jaundice	Ascites	Encephalopathy	All	p value
10.8 ± 2.0	10.1 ± 2.3	11.2 ± 1.6	9.9 ± 2.4	10.7 ± 2.0	0.108

The most common causes of liver cirrhosis are illustrated in Table 4.

Table 4. Etiology of cirrhosis

Variables	Value
HCV	200 (20.0%)
Alcoholic	200 (20.0%)
HBV	173 (17.3%)
NAFLD	140 (14.0%)
Cryptogenic	130 (13.0%)
Autoimmune	55 (5.5%)
Wilson disease	37 (3.7%)
PBC	35 (3.5%)
Hemochromatosis	30 (3.0%)

HCV associated significantly with encephalopathy and bleeding varices, NASH associated significantly with bleeding varices, cryptogenic associated significantly ascites, Wilson disease associated significantly with jaundice, PBC associated significantly with jaundice Table 5.

Table 5. Association between clinical presentation and etiology of cirrhosis

	Ascites	Bleeding varices	Encephalopathy	Jaundice	P value
HCV					
No HCV	310 (91.2%)	150 (71.4%)	230 (67.6%)	110 (100.0%)	0.022 [Sig.]
HCV	30 (8.8%)	6 0(28.6%)	110 (32.4%)	0 (0.0%)	
HBV					
No HBV	26 0 (76.5%)	19 0(91%)	280 (83%)	90 (82%)	0.630
HBV	80 (23.5%)	20 (9%)	570 (17%)	20 (18%)	
Alcoholic					
Not	260 (76.5%)	170 (81.0%)	28 0(82.4%)	90 (81.8%)	0.937
Alcoholic	8 0(23.5%)	40 (19.0%)	60 (17.6%)	2 0(18.2%)	
NAFLD					
Not	30 0(88.2%)	140 (66.7%)	33 0(97.1%)	90 (81.8%)	0.016 [Sig.]
NAFLD	400 (11.8%)	700 (33.3%)	100 (2.9%)	20 0(18.2%)	
Cryptogenic					
Not	24 0(70.6%)	210 (100.0%)	30 0(88.2%)	110 (100.0%)	0.007 [Sig.]
Cryptogenic	100 (29.4%)	0 (0.0%)	40 (11.8%)	0 (0.0%)	
Wilson disease					
Not	340 (100.0%)	210 (100.0%)	320 (94.1%)	90 (83%)	0.039 [Sig.]
WD	0 (0.0%)	0 (0.0%)	20 (5.9%)	20 (17%)	
Autoimmune					
Not	340(100.0%)	190 (90.5%)	300(88.2%)	110(100.0%)	0.149
Autoimmune	0 (0.0%)	20 (9.5%)	350(14.8%)	0 (0.0%)	
PBC					
Not	330 (97.1%)	210 (100.0%)	340 (100.0%)	80 (72.7%)	<0.001 [Sig.]
PBC	10 (2.9%)	0 (0.0%)	0 (0.0%)	30 (27.3%)	

HCV positive was more with age group > 45 years compared HCV negative as illustrate in Table 6.

Table 6. HCV

Variables		**HCV**		**P value**
		Negative	**Positive**	
Age	≤45 years	220 (27.5%)	0 (0.0%)	0.002 [Sig.]
	46 – 65	410 (51.3%)	90 (45.0%)	
	>65	170 (21.3%)	110 (55.0%)	
Sex	Female	370 (46.3%)	60 (30.0%)	0.189
	Male	430 (53.8%)	140 (70.0%)	
Child – Pugh score	A	10 (1.3%)	10 (5.0%)	0.052
	B	220 (27.5%)	10 (5.0%)	
	C	570 (71.3%)	180 (90.0%)	
Duration since Diagnosis	<1 year	310 (38.8%)	100 (50.0%)	0.613
	1 – 3 year	260 (32.5%)	60 (30.0%)	
	>3 year	230 (28.8%)	40 (20.0%)	

HBV positive associated more with male than female as illustrated in Table 7.

Table 7. HBV

Variables		HBV		P value
		Negative	Positive	
Age	≤45 years	160 (19.5%)	60 (33.3%)	0.432
	46 – 65	420 (51.2%)	80 (44.4%)	
	>65	240 (29.3%)	40 (22.2%)	
Sex	Female	390 (47.6%)	40 (22.2%)	0.049 [Sig.]
	Male	430 (52.4%)	140 (77.8%)	
Child – Pugh score	A	20 (2.4%)	0 (0.0%)	0.414
	B	210 (25.6%)	20 (11.1%)	
	C	590 (72.0%)	160 (88.9%)	
Duration since Diagnosis	<1 year	320 (39.0%)	90(50.0%)	0.518
	1 – 3 year	260 (31.7%)	60 (33.3%)	
	>3 year	240 (29.3%)	30 (16.7%)	

Alcoholic etiology associated more with male compared with female, also alcoholic associated less with child – Pugh group A and more with group B then Group C on comparison with non – alcoholic group as illustrated in Table 8.

Table 8. Alcoholic

Variables		Alcoholic		P value
		Negative	Positive	
Age	≤45 years	180 (22.5%)	40 (20.0%)	0.572
	46 – 65	380 (47.5%)	120 (60.0%)	
	>65	240 (30.0%)	40 (20.0%)	
Sex	Female	430 (53.8%)	0 (0.0%)	<0.001 [Sig.]
	Male	370 (46.3%)	20 (100.0%)	
Child – Pugh score	A	20 (2.5%)	0 (0.0%)	0.008 [Sig.]
	B	130 (16.3%)	100 (50.0%)	
	C	650 (81.3%)	100 (50.0%)	
Duration since Diagnosis	<1 year	340 (42.5%)	70 (35.0%)	0.685
	1 – 3 year	240 (30.0%)	80 (40.0%)	
	>3 year	220 (27.5%)	50 (25.0%)	

NASH significantly associated more with female compared to male as illustrated in Table 9

Table 9. NAFLD

Variables		NAFLD		P value
		Negative	Positive	
Age	≤45 years	200 (23.3%)	20 (14.3%)	0.654
	46 – 65	430 (50.0%)	70(50.0%)	
	>65	230 (26.7%)	50 (35.7%)	
Sex	Female	300 (34.9%)	130 (92.9%)	<0.001 [Sig.]
	Male	560 (65.1%)	10 (7.1%)	
Child – Pugh score	A	20 (2.3%)	0 (0.0%)	0.493
	B	180 (20.9%)	50 (35.7%)	
	C	660 (76.7%)	90 (64.3%)	
Duration since Diagnosis	<1 year	370 (43.0%)	40 (28.6%)	0.335
	1 – 3 year	280 (32.6%)	40 (28.6%)	
	>3 year	210 (24.4%)	60 (42.9%)	

Cryptogenic associated significantly with duration of cirrhosis less than 1 year compared to non – cryptogenic as illustrated in Table 10.

Table 10. cryptogenic

Variables		Cryptogenic		P value
		Negative	Positive	
Age	≤45 years	180 (20.9%)	40 (28.6%)	0.709
	46 – 65	440 (51.2%)	60 (42.9%)	
	>65	240 (27.9%)	40 (28.6%)	
Sex	Female	350 (40.7%)	80 (57.1%)	0.249
	Male	510 (59.3%)	60 (42.9%)	
Child – Pugh score	A	10 (1.2%)	10 (7.1%)	0.114
	B	220 (25.6%)	10 (7.1%)	
	C	630 (73.3%)	110 (84%)	
Duration since Diagnosis	<1 year	310 (36.0%)	100 (71.4%)	0.012 [Sig.]
	1 – 3 year	320 (37.2%)	0 (0.0%)	
	>3 year	230 (26.7%)	30 (27%)	

Wilson disease associated significantly with age group less than 45 years as illustrated in Table 11.

Table 11. Wilson disease

Variables		Wilson disease		P value
		Negative	Positive	
Age	≤45 years	180 (18.8%)	37 (100.0%)	0.003
	46 – 65	500 (52.1%)	0 (0.0%)	
	>65	280 (29.2%)	0 (0.0%)	
Sex	Female	410 (42.7%)	20 (50.0%)	1.0
	Male	550 (57.3%)	20 (50.0%)	
Child – Pugh score	A	200 (2.1%)	0 (0.0%)	NA
	B	210 (21.9%)	20 (52.0%)	
	C	730 (76.0%)	20 (50.0%)	
Duration since Diagnosis	<1 year	410 (42.7%)	0 (0.0%)	NA
	1 – 3 year	300 (31.3%)	20 (52.0%)	
	>3 year	250 (26.0%)	17 (48.0%)	

Autoimmune hepatitis associated significantly with age group 46 – 65 years, and also with female sex as illustrated in Table 12.

Table 12. Autoimmune

Variables		Autoimmune		P value
		Negative	Positive	
Age	≤45 years	220 (23.4%)	0 (0.0%)	0.046 [Sig.]
	46 – 65	440 (46.8%)	60 (100.0%)	
	>65	280 (29.8%)	0 (0.0%)	
Sex	Female	370 (39.4%)	60 (55.0%)	0.005 [Sig.]
	Male	570 (60.6%)	0 (0.0%)	
Child – Pugh score	A	20 (2.1%)	0 (0.0%)	NA
	B	230 (24.5%)	0 (0.0%)	
	C	690 (73.4%)	60 (55.0%)	
Duration since Diagnosis	<1 year	400 (42.6%)	10 (16.7%)	0.337
	1 – 3 year	30 (31.9%)	20 (33.3%)	
	>3 year	24 (25.5%)	15 (49.0%)	

PBC associated significantly with female, and with duration of cirrhosis of 1 – 3 years as illustrated in Table 13.

Table 13. Primary biliary cirrhosis

Variables		PBS		P value
		Negative	Positive	
Age	≤45 years	20 (20.8%)	2 (50.0%)	0.251
	46 – 65	48 (50.0%)	2 (50.0%)	
	>65	28 (29.2%)	0 (0.0%)	
Sex	Female	39 (40.6%)	4 (100.0%)	0.031 [Sig.]
	Male	57 (59.4%)	0 (0.0%)	
Child – Pugh score	A	2 (2.1%)	0 (0.0%)	NA
	B	21 (21.9%)	2 (50.0%)	
	C	73 (76.0%)	2 (50.0%)	
Duration since Diagnosis	<1 year	41 (42.7%)	0 (0.0%)	0.012 [Sig.]

4. Discussion

In this current study, The most common causes of liver cirrhosis are alcoholic liver disease (20%) and HCV (20%) followed by HBV (18%), NAFLD (14%), cryptogenic (14%), AIH (6%), wilson (4%), PBC (4%).

The most common presentation of liver cirrhosis from all causes are ascites (38%) and encephalopathy (38%). followed by bleeding varices (21%), jaundice (11%). Comparing with results from national studies and international studies, Dr. Ashraf et al, in his study published in December 2015, taking 41 patients, showed that the most common cause of liver cirrhosis is alcoholic liver disease and cryptogenic, followed by Wilson, HCV, HBV respectively.

Internationally, Michitaka, K., Nishiguchi, S., Aoyagi, Y. et al published at 2009, National survey study in Japan taking 33,379 patients with liver cirrhosis, showed HCV (60.9%), HBV (13.9%), Alcoholism (13.6%), PBC (2.4%), AIH (1.9%), NASH (2.1%) (Michitaka et al., 2010).

Sang Soo Lee, Young-Sang Byoun et al, At 2010, published a study in Korea showed most common cause of liver cirrhosis is Viral (73.4%)(among them HBV 83.7%, HCV 15.5%, HBV+HCV 0.9%) followed by alcoholism (18.1%), Cryptogenic (6.6%), Budd chiari (1%), AIH (0.9%).(Sang Soo Lee, Young-Sang Byoun, Sook-Hyang Jeong, Yeo Myung Kim, Ho Gil, Bo-Young Min. 2012)

GONCALVES, Patricia Lofego et al., At 2011, published a study in Brazil, taking 1,516 patients with liver cirrhosis, showed that the most common causes of liver cirrhosis are alcoholism (39.7%), Alcoholism with HBV or HCV (16.1%), HCV alone (14.5%), HBV alone (13.1%), cryptogenic (9.8%).(GONCALVES, Patricia Lofego et al. 2013)

Nwokediuko S C, Osuala P C et al. At 2013, published a study in Nigeria, showed the most common causes of liver cirrhosis are Alcoholism followed by HBV, Herbs and lastly HCV (Nwokediuko et al., 2013).

The most common presentation of liver cirrhosis for all causes is Ascites (38%) and Encephalopathy (38%), followed by bleeding varices (21%) and jaundice (11%) respectively. **That means:**

1) Chronic liver disease should be kept at the top of differential diagnosis of Ascites.

2) Decompensated liver cirrhosis should be kept in mind in differential diagnosis of encephalopathy.

For each individual cause of liver cirrhosis and clinical presentation, It was found the HCV was significantly associated with encephalopathy and bleeding varices, comparing with international studies, Benvegnù L, Gios M, Boccato S, et al published a study at 2004 in Italy showed that Hepatocellular carcinoma was the most frequent complication in untreated cases of HCV (24.5%), followed by ascites (20.1%), bleeding (5.7%), and encephalopathy (2.9%). In contrast, treated patients had the same incidence of HCC and ascites (15.6%), followed by bleeding (3.4%) and encephalopathy (0.9%).(Benvegnù et al., 2004) Planas, Ramon et al. Published a study at 2004 in Journal of hepatology showed Ascites was the most frequent first decompensation in HCV(48%), followed by portal hypertensive gastrointestinal bleeding (PHGB) (32.5%), severe bacterial infection (BI) (14.5%) and hepatic encephalopathy (HE) (5%).(Planas, Ramon et al. 2002). Such difference in these results from current study may occur because Our patients usually come late with life threatening situations, they don't pay attention to

abdominal distension that could developed earlier than encephalopathy or bleeding varices.

NAFLD associated significantly with bleeding varices, cryptogenic cirrhosis was associated significantly with Ascites, while Wilson and PBC were significantly associated with Jaundice. No previous international study was found studying specifically which signs of decompensation most likely to develop in these etiologies of liver cirrhosis.

Regarding Age group the study found that HCV was significantly presented in middle age and elderly.That mean still, we can screen for HCV and treat it prior to development of fibrosis and cirrhosis. Same results obtained from other study, in which Pradat et al., noted in a study published at 2007, taking 247 patient with HCV, that most HCV patients, if untreated, are expected to develop cirrhosis at about 65 years, irrespective of the age at infection.(Pradat, Voirin, Tillmann, & Chevallier, 2007). Wilson disease significantly present in Young aged patients. Comparing with other study, Merle, Schaefer, Ferenci, and Stremmel in a study published at 2005, showed that most common age of diagnosis of Wilson is about 15 year old with no treatment developed cirrhosis within young age group (Merle et al., 2007). Autoimmune hepatitis significantly present in middle aged patients. In comparison with an international study, Feld, Dinh et al, published a study at 2005, taking 139 patients with AIH, mean age of diagnosis 43.5 ± 16.6 years (Feld et al., 2005). All other etiologies had no significant relationship to specific age group.

Regarding Sex group Current study shows that HBV significantly present in males Different international studies showed that male gender is predominant in HBV cirrhosis worldwide. There was no substantial difference in the percentage of male gender among different series from different parts of the world, ranging from 86 to 95% (Realdi et al., 1994; de Jongh et al. 1992).

Previous cross-sectional studies have shown that the male-to-female ratio increased proportionally during the course of chronic HBV infection: the ratio was 1.2:1 in the immune-tolerant phase (HBeAg-positive patients with normal aminotransferase), 5-6:1 in chronic hepatitis, and 6-8:1 in cirrhosis (Chu, Liaw, Sheen, Lin, & Huang, 1983). These data suggest that male HBsAg carriers are more likely to have progressive liver disease than carriers of female gender. One recent longitudinal study from Taiwan has confirmed that male patients are significantly more likely to have high aminotransferase activities during the immune clearance phase and more relapse of hepatitis B after HBeAg seroconversion than females (Chu, Hung, Lin, Tai, & Liaw, 2004). These findings may explain the predominance of male gender in HBV cirrhosis.

1) The study also shows significant association between alcoholic cirrhosis and male gender. Comparing with international studies, women are more susceptible than men to the toxic effects of alcohol on the liver for any given dose of alcohol, even though men abuse or depend on alcohol more than women, at A 12-year prospective study of alcohol use in over 13,000 participants in Denmark showed that the risk of development of alcohol-related liver disease increased in women who consumed 7 to 13 beverages per week (84-156 g) compared with men who consumed 14 to 27 beverages per week.(Becker, Deis, Sorensen et al., 1996), Compared with their male counterparts, women with alcoholic liver disease have a more rapid progression to fibrosis that persists even after abstinence from alcohol.(Pares et al., 1986; Poynard et al., 2003). However among Iraqi patients no female cases were reported with alcoholic cirrhosis, most likely related to social and religious reasons prevent women from drinking.
2) In the current study, NAFLD were significantly present in females. Comparing with other international studies, most of the studies reported that NAFLD is significantly more prevalent in men than in women, Ruhl et al. (Ruhl & Everhart, 2003). Reported that NAFLD was more prevalent in men than in women (4.3% vs 1.6%, respectively), a finding essentially explained by the higher waist-to-hip circumference (WHR) ratio in men. WHR is correlated with visceral adipose tissue (VAT) and visceral adiposity is associated with both peripheral and hepatic Insulin resistance. (Falck-Ytter, Younossi, Marchesini, & McCullough, 2001; Miyazaki et al., 2002). In another study using the same database but different cohort size, Clark et al. (Clark, Brancati, & Diehl, 2003), also reported that men have higher prevalence of NAFLD than women (5.7% vs 4.6%, respectively), Moreover, in the Dallas Heart Study, non-Hispanic white men had an approximately 2-fold higher prevalence of hepatic steatosis than white women. Factors, including lifestyle and sex hormone may also influence the gender difference in the prevalence of NAFLD. In one study, individuals with NAFLD had similar degrees of Insulin resistance and obesity to those without, but males with NAFLD consumed more non-diet soda on a weekly basis (54.4% vs 34%, P = 0.037) (Williams et al., 2011).

Difference between these results and current study, may have many causes, could be related to obesity variations, or due to small sample size. More studies are needed concerning this subject with larger sample and more details to work on.

The study also shows a significant association between AIH and female gender, resembling results from other international studies, Feld et al., published a study at 2005, taking 135 patients with AIH, showed a female predominance (75.4%). (Feld et al., 2005), Verma et al. published a study at 2007, taking 157 patient with AIH, also showed female predominance (77.2%) (Verma, Torbenson, & Thuluvath, 2007).

Also the study shows significant association between PBC and female gender, comparing with international studies, Fumio Sakauchi et al, published a study at 2005 in Japan, taking 5,805 patients, showed that PBC most common in females (89%) while in males (11%). (Fumio et al., 2005).

Other etiologies had no significant relationship to specific sex.

Regarding the duration since diagnosis, All cases of different etiologies were presented with different durations since diagnosis of liver cirrhosis ranging from below than 1 year, from 1 to 3 years and more than 3 years with no significant association to specific etiology apart from cryptogenic cases that were significantly associated with less than 1 year group, this can give an idea about rapidity of developing decompensation with cryptogenic liver cirrhosis, and focuses on the importance of aggressive work up to diagnose unknown causes and proper management of compensated cases. No previous study was found to compare with regarding this entity.

5. Conclusions

1) HCV and Alcoholic liver disease are the most common causes of liver cirrhosis.
2) Ascites and encephalopathy are the most common presentation at medical wards from all causes of liver cirrhosis.
3) Most cases of liver cirrhosis due to HCV are within middle and elderly. While Wilson disease should be kept at the top of differential diagnosis of liver cirrhosis among young individuals as it is significantly related to young age group.
4) Alcoholic liver disease should be kept in mind at the top of differential diagnosis of liver cirrhosis in males. While a differential diagnosis of NAFLD, AIH, PBC are significantly among females

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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Perceptions of Occupational Medicine Specialists on Suicide Prevention in the Workplace

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Abstract

Suicide rates have taken on alarming dimensions with catastrophic consequences. This study aims to understand the perceptions of occupational medicine specialists about suicide prevention and describe what actions work organizations are taking to prevent suicide among their workers. This is an exploratory, cross-sectional, descriptive, quantitative study, carried out with 24 occupational medicine specialists with experience in workers' mental health, using online forms. The analyses were performed using Excel and SPSS software. In the results, the indicators that most appeared among specialists as prevalent in the development of controls for suicide risk were: (1) to control the reasons for social security leaves (n = 23, 95.8%); (2) to train leaders for people management (n = 23, 95.8%); and (3) to have an official means of communication within the company to report violence at work (n = 20, 83.3%). There were 42 recommendations described by the specialists. They were grouped into 8 categories and are part of 4 different dimensions of suicide prevention. Suicide is a complex phenomenon of multifactorial nature, which involves all the dimensions of life and influences the people close to it directly and indirectly. Therefore, there is no single way to approach this issue in work organizations, nor a single way to promote prevention, given the fact that the practical experiences of the physicians expand the approach of health services.

Keywords: mental health, health program, suicide, prevention of mental disorders at work

1. Introduction

According to the World Health Organization [WHO] (2014), there were more than 800,000 cases of suicide on the planet in 2012. However, the WHO believes that this figure is underestimated about 20 times due to the lack of notifications and data from countries in the Middle East and Africa. Thus, it is estimated that there is one death by suicide every 40 seconds and one attempted self-harm every two seconds in the world, with consequences that are not restricted only to the victim, but that cause severe emotional, social and economic repercussions in at least six people close to the deceased (WHO, 2014; Junior, 2015).

With the increase of 60% in suicide cases in the last 50 years, the average number of suicides was 10.5 deaths per 100,000 inhabitants worldwide in 2016 (WHO, 2020). In Brazil, the average suicide rate was 5.2 per 100 thousand inhabitants every year between 2010 and 2014 (Dantas et al., 2018).

The French sociologist, philosopher, psychologist Émile Durkheim, in the 19th century, has conceptualized suicide as "all cases of death resulting directly or indirectly from a positive or negative act of the victim himself, which he knows will produce this result", bringing this concept as a social phenomenon provided by a modern pathological society (Durkheim, 1982/2014).

The American psychologist Edwin Shneidman, in the 21st century, brought the conception that suicide was a product of the confluence of the limits of: psychological pain, cognitive perturbation and the pressure from life events, which can be strong indications in the search for suicidal behavior at the collective workplace (Shneidman, 1969).

Christophe Dejours, who is another scholar on this subject, mentions that the transformation of management processes, with the individual assessment of worker productivity, the requirement for total quality and the outsorcing of labor has generated drastic consequences for mental health's workers, opening a field to moral harassment, lack of solidarity and worker despair, which may lead to suicide (Dejours & Bègue, 2010).

WHO studies show a deficiency in case-control, care, and prevention actions by mental health policies. Moreover, there is no adequate relationship between supply and demand for mental disorders treatment (WHO, 2012). In 2018, only 28 of the 194 WHO member states reported maintaining any measure of suicide prevention at a national level (WHO, 2018).

Suicide in the workplace is a complex and multifactorial theme, however it is a predictable cause of death, liable to intervention. The indicators of suicidal behavior are always present and must be identified early. The actions in suicide prevention must be linked to combating the vulnerability of the work organization, and adapted to the place where these actions will be carried out (Benatov et al., 2020; Platt & Niederkrotenthaler, 2020; Yip et al., 2010).

This study aims to understand the perceptions and experiences of occupational medicine specialists about suicide prevention in the workplace and describe what work organizations are doing to prevent suicide.

2. Method

This is an exploratory, cross-sectional, descriptive, quantitative study and is part of a wider research on suicide prevention at work.

An online survey was conducted using the SurveyMonkey® platform, consisting of both objective and open-ended questions. Thirty-two specialists, who were selected considering their fields of work and experiences with the topic, were sent a link to the survey. The sample was composed of working physicians who are from various regions of Brazil and have expertise in mental health and suicide prevention.

The questionnaire was designed to be an objective instrument, composed by similar items that can be related to each other. Therefore, it contributes to the formation of a reliable result, bringing internal consistency to the specialists' answers.

The sample was composed of non-probability technique, snowball sampling. The initial respondents were the manager doctors who are part of the author's contacts. They were selected due to the degree of the specialization required from the respondents. It has known that a saturation of information from a certain number of respondents is a possible outcome (Small, 2009). Ben Baumberg, from the University of Kent at Canterbury, describes that after about 25 interviews, he found the same phenomena repeatedly (Baker & Edwards, 2012). Others authors refer that, in these conditions, sometimes it is difficult to consider more than ten participants (Flick, 2008).

The answers provided by the specialists were transposed and descriptively analyzed using the Microsoft Office Excel® software and Surveymonkey® tabulations. The random variables were analyzed using the SPSS software. The Shapiro-Wilk test showed a non-parametric pattern with $p<0.01$. For the comparative variables, the Cochran Q test and the Wilcoxon test were used.

The inclusion criteria were: (1) being an occupational physician, (2) having knowledge about mental health or suicide prevention programs, and (3) being voluntary and agreeing to sign the free consent form.

The exclusion criteria were the occupational physicians who declared having no experience or contact with mental health programs at work.

This study is part of a wider research on suicide prevention, which was planned and approved by the ethics committee under the CAAE number: 13106719.2.0000.0102.

3. Results

Thirty-two physicians who complied with the inclusion criteria were asked to participate, of which 24 (75%) answered the questionnaire.

Most doctors are internally hired (n = 15, 62.5%), from large (n = 17, 70.8%), multinational companies (n = 13, 54.2%), with a degree of risk three (n = 16, 66.7%) (Table 1).

Table 1. Participants' workplace characteristics

Work characteristics	n	%
Main activity of the Physician		
Occupational physicians hired directly by the company	15	62.5
External occupational physicians, occupational medicine service provider	4	16.7
Public service occupational physicians	2	8.3
Physicians working in clinics hospitals	2	8.3
Professor	1	4.2
Company size		
Microenterprise	0	0.0
Small	1	4.2
Medium	2	8.3
Big	17	70.8
Do not work in companies	4	16.7
Company nationality		
Brazilian	8	33.3
Swedish	2	8.3
North American	4	16.7
Spanish	1	4.2
Australian	1	4.2
German	2	8.3
Japanese	1	4.2
English	1	4.2
European Union	1	4.2
Do not work in companies	3	12.5
Degree of risk of the company		
Grade 1	1	4.2
Grade 2	2	8.3
Grade 3	16	66.7
Grade 4	1	4.2
Does not apply	4	16.7

Source: The author, 2021.

Of the physicians surveyed, twelve (50%) reported that there is currently a mental health or suicide prevention program in the companies they work for or provide some type of occupational medicine service to. Thirteen (54.2%) said that the work organizations they were part of took some specific suicide prevention actions in the past three years. According to the Wilcoxon test ($Z = -1.265$; $p = 0.206$), there is no significant difference between the two variables.

When asked about factors and actions that can help understand and control the risk of suicide among workers, the following indicators were mentioned by the specialists: (a) absenteeism control by ICD (International Classification of Diseases) (n = 21, 87.5%); (b) to control the reasons for illness due to social security leaves (n = 23, 95.8%); (c) to have an official means of communication within the company that can be used by any employee to report moral, sexual or any other type of harassment or violence at work (n = 20, 83.3%); (d) to prepare and train leaders for people management (n = 23, 95.8%); (e) training the medical outpatient clinic team to care for patients at risk of suicide (n = 12, 50%); (f) to promote a pre-determined flow to assist chemical dependent workers (n = 16,

66.7%); and some respondents also reported that they had in their ergonomic assessment of the workplace the presence of cognitive and organizational analysis (in addition to physical ergonomics) (n = 8, 33.3%).

The benefits companies offered to improve workers' quality of life and promote the care for their mental health are presented in Table 2. The chi-square test showed that the offer of the following benefits by companies is statistically lower ($p < 0.001$) in comparison with other benefits provided by the companies described in Table 2: (1) presence of a social worker, (2) an internal psychologist, (3) offering voluntary services, and (4) having an adequate method for "feedback".

Table 2. Benefits of companies that influence workers' quality of life

Benefits	**Yes**	**%**
Clinical Nutritionist for individual employee care	11	45.8
Agreements with gyms or other sports facilities, provided by the company	15	62.5
Incentive for employee instruction	14	58.3
Health insurance plan	21	87.5
Dental insurance plan	18	75
Collective transportation provided by the company	13	54.2
Restaurant in the company	16	66.7
Internal clinical psychologist in the company	8	33.3
The health insurance plan provides a psychologist	16	66.7
There is a social worker as support in the clinic	8	33.3
The worker has the freedom to take breaks when necessary	13	54.2
There is a "feedback" methodology for workers	9	37.5
There is a place for the workers to rest	11	45.8
Voluntary service offer	9	37.5

Source: The author, 2021.

According to the evaluation of specialist physicians, using a scale from 0 to 10, suicide prevention actions or programs in work organizations are of great importance (median of 9 points). However, the doctors with a similar grade evaluation, bordering a median of 6 points, declared difficulties in prioritizing these actions in their routines inside their work organizations. This is probably due to the theme's complexity and subjectivity, the time it takes, and the work organizations' concerns in addressing this issue.

Most physicians (n = 18, 81.8%) had the experience of assisting or having knowledge, in their respective companies, of 30 cases of suicide or attempted suicide by direct employees (Table 3).

Table 3. Doctors' knowledge reports about cases of suicide attempt (SA) or suicide

Assisted or knew of any case of suicide or SA in the company	Yes	%
The employee committed suicide and it occurred inside the company	2	8.3
The employee committed suicide, but it occurred outside the company	9	37.5
The employee attempted suicide and it occurred inside the company	4	16.7
The employee attempted suicide, but it occurred outside the company	15	62.5
A family member of an employee committed suicide	6	25.0
A family member of an employee attempted suicide	3	12.5
I do not know of a suicide case or suicide attempt	3	12.5

Source: The author, 2021

Some companies have security measures that ultimately obstruct access to situations that may cause insult, injury, or death in the work environment. These could become protective actions in the prevention of suicide (Table 4).

Table 4. Protective actions of companies restricting access to means of suicide or self-harm in their facilities

Protective actions of companies	Yes	%
Protection in the access to high open spaces	6	25.0
Prohibition of sharp knives in common areas	4	16.7
Application of window restrictors	0	0.0
Control of hazardous substances	10	41.7
Formal rules against carrying weapons inside the company	12	50.0
I do not know any action in this regard	9	37.5

Source: The author, 2021.

Finally, through an open-ended question, the specialists were asked what variables of influence can help to understand, prevent or reduce the risk of suicide among workers. In addition, they were questioned about possible suggestions for action. There were 42 recommendations. The answers were grouped into four main dimensions.

The first dimension brought 10 suggestions from specialists on ways to act in the prevention of suicide in their respective companies (Chart 1).

Chart 1. Description of the training dimension, which includes training, guidance, clarification of workers

Dimensions		**Categorical subdivisions**	**Quantity**	**Specialists' opinions**
1	Training (training, guidance, clarifications)	Training of health care staff to provide adequate shelter to workers at risk of suicide	1	"to recognize some signs that identify a potential suicide"
		Training leaders on issues related to suicide	5	"leaders' awareness"
				"leaders closer to the people and especially to the operational sector"
				"management training"
				"training leaders to perceive behavior changes"
				"training leaders about harassment"
		Orientative communication actions for employees on the theme	4	"to talk about the topic"
				"employee training"
				"lectures with a mental health professional"
				"lectures and videos on suicide and other mental disorders"

Source: The author, 2021.

The second dimension was the one that received the highest number of intervention recommendations: 21 (50%) of the 42 suggested. This dimension refers to the "care and conduct of the medical team" and are composed of the categories: identification and control of mental disorders, fighting substance dependence, and flow of multidisciplinary care to support patients at risk of suicide (Chart 2).

Chart 2. Description of the dimension of care and conduct of the medical team, which includes control of mental illnesses, chemical dependency and workflow of care

Dimensions		Categorical subdivisions	Quantity	Specialists' opinions
2	Care and conduct of the medical team	Identification and control of mental disorders	10	"knowledge and control of employees' mental disorders"
				"to take care of the mental health of all workers as a way to prevent or diagnose diseases early"
				"to apply questionnaires on behavior, lifestyle and specific mental health"
				"Occupational Medical Examination with questionnaires on the subject"
				"anxiety control program"
				"early diagnosis of mental disorders"
				"early diagnosis and follow-up on mental disorders"
				"guidance and early identification of mental disorder"
				"Mental Health program, with emphasis on suicide prevention"
				"General Program of Mental Health at Work, or a Suicide Risk Program"
		Fighting substance dependence	3	"treatment of drug addicts"
				"program to combat drugs"
				"fighting alcohol and drug addictions"
		Flow of multidisciplinary care to support patients at risk of suicide	8	"facilitating the access to the psychology professional"
				"remote psychological support"
				"offer of psychological and psychiatric services"
				"designate the confirmed cases to professionals specialized in each type of treatment (assertive treatment)"
				"... create effective therapies with continuous and targeted monitoring"
				"screening and referral"
				"systems of psychosocial and health support to workers"
				"psychological support"

Source: The author, 2021.

The third and fourth dimensions were the ones that received the lowest number of recommendations from specialists, with three and eight suggestions, respectively. The descriptions of these dimensions are represented in Chart 3.

Chart 3. Description of dimensions three and four, which include freedom of expression for the worker and the promotion of coping mechanisms

Dimensions		Categorical subdivisions	Quantity	Specialists' opinions
3	Freedom of speech	Confidential communication channel for workplace violence	3	"to offer channels of communication and support"
				"... to expose your personal or professional problems in a confidential and safe way..."
				"a safe space for the employees to express their anxieties"
4	Promotion of workers' coping mechanisms	Personal development	8	"self-awareness and management of emotions"
				"mapping of risk factors for the development of psychosocial pathologies"
				"Cíngulo APP"
				"to stimulate the development of employees' coping mechanisms"
				"stimulus from the company to the workers' coping mechanisms"
				"openness for constructive interpersonal contacts"
				"HR programs for personal motivation and construction"
				"work on prevention through self-care guidelines"

Source: The author, 2021.

The dimensions bring the frequency of the specialists' recommendations of actions and reflect the importance of these actions in their respective work organizations. It represents a direct intervention in the health area, approaching the control, management and treatment of diseases.

4. Discussion

Many actions and perceptions brought by the specialists are part of the WHO recommendations (Botega, 2015). This approximation validates and enriches the results presented in this study because they showed, in more detail, the practical way of acting with these guidelines in the field of work.

The indicators most mentioned by specialists as prevalent in the development of actions to control the risk of suicide were: (1) controlling the reasons for social security leaves; (2) training leaders on people management - 23 of the 24 surveyed, that is, 95.8% cited these items; (3) 20 (83.3%) reported the need to have an official means of communication within the company to report workplace violence. According to the physicians, these were the most important means of identifying suicide risk in the companies.

The control of social security leaves is important in Brazil. These are longer work leaves - when the disability lasts longer than 15 days - that cause significant impacts on both the patient and the work organization. In this scenario, by listing the number of absences due to the disease through the ICD (International Classification of Diseases), especially concerning mental disorders and substance dependence (Group F), one can have the panorama of the mental health of both the individual and the company as a whole. This measure enables the professionals to outline control and follow-up strategies so that disastrous consequences - such as suicide - do not occur.

According to several studies, mental disorders, substance dependence, and history of attempts against one's own life in the past add up as the main risk factors for suicide (Bennett, Coggan, & Addams, 2003; Bertolote & Fleischmann, 2004; Costa et al., 2014; Holmes & Holmes, 2014; Shah, Bhandarkar, & Bhatia, 2010; Silveira, Fidalgo, Di Pietro, Santos, & Oliveira, 2014; Doupnik et al., 2020), making the early identification of this group one of the main actions in the fight against suicide (WHO, 2014).

Tied to the previous point in the perceptions of the specialists, the training of leadership for people management, especially with regard to instruction in the identification of colleagues suffering and in combating bullying, provides the reception and early referral to professionals of competence, reducing the risk of mental disorder and suicide (Suicide Prevention Resource Center, 2013).

The internal communication channel for denouncing violence at work has its strong point in that it allows us to understand the phenomena both quantitatively (by the number of reports per department or locality) and qualitatively (investigating the content of the reports of possible cases of harassment that workers may be suffering). According to Christophe Dejours (2009), harassment at work is an old theme that sometimes results from increased work demands. However, today it occurs because of the lack of solidarity in the work environment (Dejours, 2009; Freitas, 2011; Terpstra et al., 2018; Milner, Page, Witt, & Lamontagne, 2016; Knox et al., 2010; Goldman & Schmalz, 2003; Carreiro, 2007; Soboll & Glima, 2012).

Although the notes of indicators and variables of influence in relation to the mental health and risk of suicide of the workers mentioned by the specialists are not forms of prevention per se, they represent the visible part of a larger problem. In turn, this problem needs to be understood and treated strategically within work organizations so they do not perpetuate ethical deviations or neglect diseases and their consequences (Dejours, 2018).

As previously described, the 42 suggestions of the specialists raised through the survey with a descriptive questioning about the influencing variables that can help to understand, reduce or prevent suicides among workers were grouped into 8 categories that belong to 4 major dimensions of performance. The prevailing ones were: (1) control of mental disorders, with 10 citations (23.8%) and 8 (19%) recommendations each: (2) pre-established flow of multidisciplinary care to support patients in need (3) promotion of workers' coping mechanisms, among others that can be seen in Chart 1.

The control of mental disorders appeared again in the specialists' descriptive responses. This result aligns with the literature since psychiatric disorders increase suicide and suicide attempt cases more than 10 times compared to the general population. According to statistics, between 60% and 98% of suicides are committed by psychiatric patients (Bertolote & Fleischmann, 2002; Bertolote, Fleischmann, De Leo, & Wasserman, 2004; Chang, Gitlin, & Patel, 2011; Ferrari et al., 2014; Röcker & Bachmann, 2015). This data portrays the relevance of addressing this dimension in mental health and suicide prevention programs.

The benefits provided by the work organizations most cited by the interviewed physicians were the presence of a health insurance plan (n = 21, 87.5%), a dental insurance plan (n = 18, 75%), internal restaurant (n = 16, 66.7%), and the possibility of consulting with an external psychologist, among others cited in table 2.

These corporate benefits ultimately improve the worker's quality of life and strengthen their means of coping with adversity, mitigating the psychosocial risk factors of the workers and their families (Wang, Chou, Yeh, Chen, & Tzeng, 2013).

On the other hand, nine (37.5%) physicians were unaware of structural safety actions or rules of conduct adopted by companies. The application of window restrictors, restriction of access to elevated spaces and dangerous chemicals, or prohibition of weapons inside companies may hinder actions of violence or self-aggression within work organizations, also becoming protective actions in the prevention of suicide cited in other studies (houtsma, Butterworth, & Anestis, 2013; Martelli, Awad, & Hardy, 2010).

The WHO (2014) states that suicide is preventable and advises that institutions limit access to firearms and dangerous chemicals - which are the most used methods to execute suicide - as one of the prevention strategies (Platt & Niederkrotenthaler, 2020; WHO, 2014).

According to Botega (2015), one can only evaluate the risk of suicide if this possibility is considered, i.e., when one notices that people close to them may be going through chronic suffering for various reasons, hiding their feelings due to shame or fear of losing their job, and be at risk of suicide (Botega, 2015). The WHO recommends that the prevention of suicide, through known dimensions, be one of the central axes of health care services (WHO, 2014).

5. Conclusion

Suicide is a serious global public health problem, with social, economic, and political consequences. Individualized preventive approaches, such as undergoing psychotherapy, taking medications, and referring workers to specific treatments, are not enough. According to the specialists interviewed, multidisciplinary actions involving the vulnerable people, the risk situations, and the patient's social network are important starting points to encourage managers to intervene and combat self-harm in work organizations.

Finally, as previously described, suicide is a complex multifactorial phenomenon, which involves all dimensions of life and influences people close to it directly and indirectly. Therefore, there is no single way to approach this issue in work organizations, nor a single way to promote prevention. Because it can be preventable, suicide at work is a brutal message to the work community, leaders, colleagues, subordinates, and the company in general, but this

message must be decoded before it happens (Dejours & Bègue, 2010).

This study brings the experiences of occupational physicians with the prevention of self-harm. Even with a small sample, it is able to promote reflections on what medical managers do in their institutions and the degree of importance they bring to their perceptions. Thus, each person, within their reality, the circumstances of their patient, and the company's possibilities, can adapt the content presented here to their daily practice to prevent suicide among workers.

Competing Interests Statement

The authors declare that there are no conflicts of interest in this study and that there were no funding sources for this research.

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Critiquing a Grounded Theory Research Paper: An Educational Guide for Nurses

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Abstract

Critical analysis of research has become a necessary task for nurses who intend to improve the quality of the care they provide by applying robust research evidence to clinical practice. The aims of the present paper are a) to discuss the various stage of critiquing research and b) to illustrate a case example of research critique by discussing a qualitative research paper. A systematic critique of a grounded theory research article, entitled "*How Greek nurses perceive and overcome the barriers in implementing treatment for pressure ulcers: 'Against the odds'*", was performed, using a framework that involves all stages needed in critiquing qualitative research. This framework was chosen because it provides specific guidelines and involves a detailed analysis of how each stage of the research must be accomplished.

This critique process led to the development of an educational guide for students and novice researchers, illustrating the methodological approach and the skills needed for conducting a critical analysis of a published qualitative research study.

This paper provides the necessary knowledge to nurse students about how to critique a published research paper and appraise research evidence that guides clinical practice and decision-making for the nursing care delivered.

Keywords: research critique, qualitative research, grounded theory, evidence-based nursing, nursing students, nursing education.

Abbreviations: PUs: Pressure Ulcers, GT: Grounded Theory

1. Background

Implementation of research evidence in clinical practice has recently become an imperative task for nurses. Developing proficiency in critiquing research and in applying research evidence into clinical practice is considered to be a basic skill in evidence-based nursing (Polit & Beck, 2008). Nurses need to be able to understand, synthesize and critique research to support their clinical practice with current best evidence.

A research critique is a systematic assessment of a published paper that involves a thorough analysis of all stages accomplished by using certain criteria. It focuses on the strengths and weaknesses of the research with a specific emphasis on its validity and reliability (Ryan et al., 2007; Polit & Beck, 2008).

In order to assist nurses to understand how published research can be systematically evaluated, we chose a grounded theory research article as an example to critique and discuss. The reasons for choosing a qualitative research article to criticize are associated with the value of qualitative research, and the knowledge gap that exist in the relevant literature. More specifically, qualitative research is considered one of the most valuable approaches in evidence- based nursing practice, as it explores patients' needs, perceptions and values and enables health care professionals to offer a more personalized care (Addo & Eboh, 2014; Miller, 2010; Gullick & West, 2012). In addition, qualitative studies proved to be most appropriate when interventions regarding changes in lifestyle, behaviors, and attitudes are needed.(Houser, 2018; Mantzoukas, 2007; Perry et al., 2011). Despite the fact that many tools have been developed for evaluating qualitative research, there is no relevant published literature, in which, examples of critiquing qualitative research articles are presented (Munthe-Kaas et al., 2019). Furthermore, when nurse researchers wish to successfully implement research evidence in nursing practice, then knowledge education and guidance is needed for both nurse students and nurse professionals.

This paper attempts to provide an educational guide for nurses on how to critique published research and appraise research evidence that guides clinical practice and decision making for the nursing care delivered. Specifically, the aims of the present paper are a) to explain and discuss various steps of critiquing qualitative research article and b) to illustrate a case example of research critique by discussing a qualitative research article which used a Grounded Theory (GT) approach. The article chosen to be criticized is entitled, *How Greek nurses perceive and overcome the barriers in implementing treatment for pressure ulcers: 'Against the odds'* was been published in *Journal of Wound Care* (Kaba et al., 2017). This particular study was chosen as an example to be criticized as it presents a research study which was designed and conducted by the authors of the critique and published in a prestigious peer-reviewed journal. The team's involvement in the conceptualization and design of the abovementioned study consisted an additional motive for selecting this example article to critique. For critiquing this article, a framework developed by Ryan et al. was used (2007).

2. Methods

2.1 The Critiquing Framework

According to Munthe-Kaas (2019), there are more than 100 tools used for the critical evaluation of qualitative research. It is difficult to decide which critical appraisal tool is the most appropriate since, more or less, the underlying criteria of critiquing qualitative research remain the same.

In this paper, we used a recognized framework developed by Ryan et al. (2007) to demonstrate how to critique a specific research article. This framework was chosen because it provides specific guidelines for critiquing qualitative research, encompasses all the elements influencing believability and robustness of the research and involves an in-depth analysis of how each step of the research must be undertaken (Ryan et al., 2017). The framework divides the critique into two sections:

Section one involves elements influencing the believability of the research, the writing style, the author's qualifications, and the ambiguity of title and abstract.

Section two involves elements influencing the robustness of the research, such as the statement of the phenomenon under investigation, the consistency of the research question and the purpose/significance of the study. Furthermore, in this section, critiquing refers to the literature review, the appropriateness of theoretical framework and philosophical approach used, the sampling strategy, the ethical guidelines, and the process of data collection and analysis. Issues of credibility, dependability, and transferability of the study are also discussed in this section, along with the presentation of findings and discussion. Finally, the importance and implications of the findings and the accurate referencing are appraised.

This framework was applied by the authoring team to critique the qualitative article *"How Greek nurses perceive and overcome the barriers in implementing treatment for pressure ulcers: 'Against the odds'"* as mentioned above. The steps followed to critique our example grounded theory research paper were explicitly demonstrated in Table 1.

Table 1. Steps followed to critique a grounded theory research paper using the Ryan et al. framework [2].

Elements of Critique	**Key Actions to Be Taken**
Writing Style	To be evaluated for clarity, accuracy and consistency.
Researcher's qualifications	To assure appropriate qualifications and knowledge for examining the research topic.
Title	To be evaluated for clarity, accuracy – it is recommended in GT studies the name of the core category to be included.
Abstract	To be evaluated for clarity in demonstrating the objectives, the method, the results and the conclusions of the study.
Statement of the Phenomenon under investigation	To be evaluated for clear identification of the phenomenon under investigation - in GT studies the research question may evolve during the course of the study.
Purpose/Significance of the Study	To be evaluated for clarity and consistency. To assure that contribution to the existing knowledge was demonstrated.
Literature Review	To assure that preliminary literature review was undertaken – in GT studies researcher needs to avoid preconceived ideas.

Conceptual or theoretical framework	To be evaluated for adequate description, appropriateness and justification.
Philosophical approach	To be evaluated for philosophical justification of the research method. To assure that the research design and process were discussed and justified appropriately.
Sample	To assure that relevant information regarding the sampling strategy, the characteristics of the sample and the data saturation were explicitly presented.
Ethical Considerations	To assure that information about informed consent, moral autonomy and confidentiality were presented. To assure that participants protected from potential harm and ethical permission was granted.
Data Collection/Data Analysis	To be evaluated for completeness, adequacy of description, appropriateness and thoroughness.
Trustworthiness of research	To assure that credibility, dependability, transferability and confirmability issues were discussed.
Findings/Discussion	To be evaluated for clarity, consistency and accuracy, including appropriate quotations from the interviews data. To assure that findings were discussed in the context of what is already known, and limitations were presented.
Conclusion/Implications and Recommendations	To assure that reflect the study's findings and offer recommendations for future research directions.
References	To be evaluated for accuracy. To assure that consist a source of further reading.

The results of this process are presented and discussed in the following section.

3. Results and Discussion

A detailed explanation of how we evaluated our example research article, by using the Ryan et al. critique framework (2007), is provided in this section. Accordingly, the evaluation results of each element of the research are presented and supported by relevant literature.

3.1 Section One — Elements Influencing the Believability of the Research

In this first section, of Ryan et al.(2007) critique framework, queries regarding the writing style, the researcher's academic and professional skills and qualifications, the formulation of the title and the abstract, helps thereader to clarify what to expect from the research study and how to ensure the believability of the study (Ryan et al., 2007; Ryan-Wenger, 1992). Questions relating to these elements were applied to our example research article as follows:

Writing Style

Is the report well written — concise, grammatically correct, avoids the use of jargon? Is it well laid out and organized?

To assure that the phenomenon under investigation *"How Greek nurses perceive and overcome the barriers in implementing treatment for pressure ulcers:'Against the odds' "* was explained in a clear and detailed way, our example research article was checked for clarity and consistency. *We found that* jargon was kept to a minimum, grammar was checked for accuracy and appropriate headings were used to clearly define the different sections laid in the article. Also all the criteria and principles on composing and evaluating a good qualitative research study were used, based on the concrete advice for writing and publishing a qualitative scientific article by Stenius et al. (2017).

Author

Do the researcher's qualifications/position indicate a degree of knowledge in this particular field?

The authors' main concern before the commencement of the critiquing study was to formulate a research team which holds the appropriate qualifications and knowledge for examining the research topic. For this purpose, a research team was developed involving academics and nursing scientists, specialized in areas such as qualitative research, treatment and care of wounds and ulcers, quality of care and assessment of educational interventions. This multidisciplinary profile of the research team offered expertise and credibility to the research study by ensuring appropriate knowledge and experience in the field.

Title

Is the title clear, accurate and unambiguous?

The title of our example article, *"How Greek nurses perceive and overcome the barriers in implementing treatment for pressure ulcers: 'Against the odds"*, was checked for clarity and accuracy. According to Stenius et al., (2017) a title that clearly shows the area the authors are interested in will attract more readers and consequently more citations for the paper.

In the same vein, Bavdekar (2016) stated that the title should be written in such a way that readers will understand it and then decide if the paper is interesting to them or not. It should be also in accordance to study aims and questions (Drisko, 2005). Authors should always try to choose an informative, appropriate and catchy title for their research study. A title can be made attractive either by using a famous quote in the title, or by creating probably a new acronym. Generally, it must contain 10-15 words. When the title is too lengthy may divert readers' attention and make them feel bored. On the contrary, when the title is too short, it may fail to provide readers with the appropriate information needed about the article content. As Polit and Beck (2008) state, the title of qualitative studies usually states the central phenomenon under investigation. GT studies often contain something from the findings in the title, for example, the core category or a representative phrase of a quotation. Following this idea the title in our example article included the core category namely *'against the odds'* that indicates how the perceived value of prevention and treatment can overcome the barriers in treating pressure ulcers (PUs).

Abstract

Does the abstract offer a clear overview of the study, including the research problem, sample, methodology, findings and recommendations?

The structure and length of the abstract usually is guided by each journal's instructions to authors. In our example article, the abstract was written according to *the Journal of Wound Care* instruction and it was carefully patterned for clearly demonstrating the objectives, the method, the results and the conclusions of the study, as presented below:

*"**Objective:** Although the occurrence of pressure ulcers (PUs) is now considered as an indicator of poor-quality nursing care, questions and concerns remain regarding situations where PUs were unavoidable, irrespective of the care provided. The aim of this study was to. **Method:** A grounded theory approach was used and semi-structured interviews were conducted with nurses who provided pressure care to clients in a rehabilitation center in Greece. Data were analyzed using the constant comparative method. **Results:** We interviewed seven nurses. Findings revealed one main category entitled 'anarchy' in delivery of care consisted of the following three subcategories: interdisciplinary conflicts; total trust in traditional knowledge; and devaluation of other's work/role and a core category 'Against the odds': the perceived value of prevention and treatment can overcome the barriers in treating PUs. **Conclusion:** This study gives an overview of the views and beliefs of nurses about the problems and barriers involved in PU prevention and treatment. The study reveals that although some barriers to good practice may exist, nurses can hold a positive attitude toward PU prevention and treatment, and their perceived value of prevention and treatment may help nurses to overcome the barriers in managing PUs".*

The abstract of a qualitative paper is usually a short summary of the research report (Polit & Hungler, 2013; Borbasi, 2012; Nieswiadomy, 2012). It should include some information about the aim and the background of the study as well as the methods of data collection and analysis, results and conclusions. The abstract in qualitative studies is written in a more narrative way and less formal in comparison with the abstract in quantitative studies (Borbasi, 2012).

3.2 Section Two — Elements Influencing the Robustness of the Research

In the second section of Ryan et al.'s (2007) critique framework, queries regarding the strengths of the research and its related elements may help the reader to synthesize a concise and integrated view about the quality of the study.

Statement of the Phenomenon of Interest

Is the phenomenon to be studied clearly identified? Are the phenomena of interest and the research question consistent?

In our example article, the phenomenon studied was identified as being "*the nurses' perceptions about the barriers in implementing treatment for leg ulcers".* It was further justified that "*although the occurrence of pressure ulcers (PUs) is now considered as an indicator of poor quality nursing care, questions and concerns remain regarding situations where PUs were unavoidable, irrespective of the care provided." (Kaba et al., 2017).*

In our example article, the research question, was not clearly stated. However, as Streubert and Carpenter (2011) argued, usually the aim of the qualitative research is to explore ideas, and the researcher does not need to have a predetermined research question at the beginning of the study. Even more, Houser (2018) advocated that the research questions, in a qualitative study, arise, evolve and change during the course of the study. In addition, GT studies are rarely undertaken to answer a central research question (Fain, 2014). As the purpose of such a research is to develop theory, the GT study proceeds from a broad area of interest to discover how individuals react and interact with each other, how they experience a problem, what are their main concerns and how they cope with these concerns (Hernandez, 2010).

Purpose/Significance of the Study

Is the purpose of the study/research question clearly identified?

The aims of our example article were explicitly reviewed for clarity and consistency. The authors justified the significance of the study and the expected benefits. This is in accordance with what Connell (1999) stated, that the researchers need to explain the implications of the study and how it will add to the existing body of knowledge. The researchers should always provide a concrete justification of why they will use the specific qualitative methodology (1999). However, the authors of the critiquing paper could have added benefit to the paper by providing a more explicit justification of why they chose a qualitative approach, particularly the GT methodology used to investigate this area. For example, to explain that qualitative research methods including GT attract nurses for several reasons, as they assists them to gain new knowledge and improve their practice in a more meaningful way (Hammarberg et al., 2016; Nathaniel & Andrews; 2007). Furthermore, that GT is useful for investigating areas where there are major gaps in understanding, when little is known about a phenomenon and where a new standpoint might be needed (Schreiber, 2001). Studies using GT methodology can generate new nursing knowledge derived from real interactions with patients as well as by interpreting how participants make sense of their perceptions and actions (Charmaz, 2014).

Literature Review

Has a literature review been undertaken? Does it meet the philosophical underpinnings of the study? Does the review of the literature fulfil its objectives?

A preliminary literature review was undertaken in our example GT study. This was consistent with Hallberg's (2010) idea that an early literature review is necessary in order to check if a similar study with the proposed one has already published. The reason that the literature review was only preliminary, is in line with the view of Glaser (1998) who supports the necessity for GT-researchers to do some preliminary literature review before the commencement of the research in order to put the study into a context. As Hussein (2017) stated, the literature review in GT, should be a multistage, nonlinear approach to the literature. In the first stage, researchers identify gaps in existing research in the field, and explain the reasons for doing the research study. Further to this, Barney Glaser (1998), the originator GT methodology, stated that the GT researcher needs to avoid preconceived ideas and remain open to new ideas that will appear in the research field. Glaser (1998) also believed that an early conducting of the literature review, before the study begins, will be problematic. However, it is difficult to find a researcher who conceptualizes new meanings and notions without having read the professional and disciplinary literature. The researcher cannot put this knowledge and his/her perspectives aside when starting a new study, but can try not to be consciously directed by earlier theories and notions when trying to interpret the data. The golden rule for the GT researcher is to avoid an extensive literature review before the study begins, but on the other hand to be informed enough and focused on the study (Hallberg, 2010; Glaser & Strauss, 1967).

Has a conceptual or theoretical framework been identified? Is the framework adequately described? Is the framework appropriate?

As previously stated, the conceptual/theoretical framework used in our example research study was GT. The steps followed were adequately described by the authors. A more detailed explanation, however, of what GT is and why it is used in this study would be beneficial for the overall quality of the paper. For example, mentioning that GT is a method used to collect and analyze qualitative data that aims to develop theories and theoretical considerations grounded in real world observations would have been appropriate (Polit & Beck, 2006). It would be also beneficial to mention that GT is considered the appropriate research approach in areas where major gaps in the literature exist and where new perspectives might be needed (Schreiber, 2001). In GT studies, the researcher begins to develop an understanding of participants' experiences, interpreting their perceptions and actions (Charmaz, 2014). The researcher needs to mention this, in the study, and explain that this research approach was chosen because there is not enough information about the phenomenon under study, or the existing theories cannot answer the research

problem (Cronin & Rawlings-Anderson, 2003). Although a theoretical framework is the paramount objective for most qualitative approaches, it is not necessary for GT studies. The aim of GT research is not to test an existing theory but to generate theory from real-world data, (Strauss & Corbin, 1990).

Has the philosophical approach been identified? Why was this approach chosen? Has the philosophical underpinnings of the research been explained?

Symbolic Interactionism (SI) is the philosophical approach that is historically linked to GT (Charmaz, 2006). As GT research aims to explain social processes and develop substantive or formal theory (Bernard, 2002; Morse, 1995), the goal of Symbolic Interactionism (SI) tradition is to understand "the complex world of lived experience from the point of view of those who live it (Beauchamp, 2001). An additional advantage for our example research paper would be if the authors had specified that their research design was driven by SI, the philosophical premise of GT (Charmaz, 2006). Despite the lack of a thorough philosophical justification of the research method, the research design and process were discussed and justified appropriately throughout our example article.

Sample

Is the sampling method and sampling size identified? Is the sampling method appropriate? Were the participants suitable for informing research?

In our example research study, the authors declared that;

"*A purposeful sample of seven participants was selected. All were nurses working in a public rehabilitation center in an urban area in Athens, Greece" (Kaba et al., 2017).*

An issue that might be raised here, is that the authors described their sample as "purposeful" by failing to refer to "theoretical sampling" which is fundamental in every GT study. By mentioning the *purposeful sample* the authors intended to emphasize the initial sampling strategy, as the participants who were recruited had appropriate knowledge and experience in the field under investigation (PUs). However, theoretical sampling, in our example research study, occurred as the data collection progressed. This was demonstrated in relevant sections of our GT research article. In GT studies, the researcher initially identifies a small number of participants to interview who have experienced the phenomenon under study and are able to talk about their experiences in a clear, expressive, and thoughtful way (Bernard, 2002). As the interviews and the analysis proceed, the codes and categories developed from the first data set, will guide the theoretical sampling. Depending on the results from the first round of data analysis, the researcher may recruit more participants, to interview, who will confirm or disagree with what the researcher has already found. The process of theoretical sampling stops when data saturation is achieved and when no new information emerges from data analysis (Morse, 1995). The authors in the example article, provided all relevant information regarding the sampling strategy and the data saturation. Specifically, they mentioned that,

"data collection continued until 'theoretical saturation' was achieved, whereby no new or relevant insights seemed to be emerging from the data being collected and when no further information, themes or ideas were forthcoming"

A more explicit description to participants' characteristics and inclusion criteria would be beneficial for our example article. It is to the study's benefit that the researcher explicitly describes the characteristics of the sample. An extensive description of the sample gives the reader the information needed in order to be able to judge the transferability of the findings to other settings and patients (Houser, 2018).

Ethical Considerations

Were the participants fully informed about the nature of the research? Was the autonomy/confidentiality of the participants guaranteed? Were the participants protected from harm? Was ethical permission granted for the study?

Most of the above mentioned questions were addressed in our example research paper. Authors specifically stated,

"*Ethical approval was sought and granted by the research and ethics committee of the rehabilitation center. Participation was voluntary and anonymity of the nurses was ensured. All participants received a statement both verbally and written of what the research involved, the aims and the procedures of the project, and the participants' commitments as they had the right to full disclosure' (Kaba et al., 2017).*

Referring to a signed informed consent form would be an additional merit for the quality of the critiquing article. In every research study, participants should always have the right to give informed consent regarding their participation and also have the right to withdraw from the study at any time. This means that participants should be fully informed about the aim of the study, what sort of information will be collected, how this information will be used and if there are any implications for them as participants in the study. This moral principle is known as

autonomy (Beauchamp, 2001). According to Ryan et al. (2007), in qualitative research, when vulnerable populations are recruited in the study, it is crucial for the researcher to make sure that their rights are protected.

Approval from ethical committees or institutional review boards are necessary before the research begins. The purpose is to determine that the study adheres to the ethical principles and that participants are protected from potential harm (Burns & Grove, 2001). It should be mentioned that, in qualitative research, ethical issues may emerge at every stage in the study and should be discussed when they occur.

In qualitative interviews, participants are encouraged to 'open up' and discuss their experiences. This means that participants can unintentionally discuss personal matters or uncomfortable experiences that they had not intended to uncover. The participants can communicate to reveal whether they are comfortable continuing with the interview or would prefer to discontinue their participation (Polit & Beck, 2006). However, discontinuing participation alone can be insufficient to meet the principle of non-maleficence (doing no harm), so psychological support should be offered to help the participant cope with any emotional distress caused by the interview (Smith, 1992).

Data Collection/Data Analysis

Are the data collection strategies described? Are the strategies used to analyze the data described? Did the researcher follow the steps of data analysis method identified? Was data saturation achieved?

Data collection process and strategies were carefully evaluated in our example article by the authoring team for completeness and adequacy of description. The authors mentioned that,

"Data were collected by audio-taped interviews using open-ended questions, skilled observation and documentation. During the interview process, participants were asked to share their perceptions of the barriers involved in PU prevention and treatment. Data gathering involved asking the participants to describe what they do for the management of PUs and how they believe that care should be delivered. Other areas were explored as they arose, for example, when participants talked about why they were unable to provide quality care, the reasons why they believed this to be the case and any barriers involved were examined." (Kaba et al., 2017)

This is in accordance with GT approach, in which the initial opening question of the unstructured interview should be presented and clearly linked to the purpose of the study (Ryan, 2007). The authors also stated that they used the process of constant comparative analysis until data saturation was reached, according to the GT principles (Strauss & Corbin, 1998). Specifically, in our example research article, the process of data analysis was clearly presented and justified:

"An ongoing and simultaneous collection and analysis of the data led to the formulation of hypotheses and guided further data collection. The constant comparative method was used in data collection and analysis. Constant comparative analysis involves relating data to ideas, then ideas to other ideas. This is done through 'coding' the data. Data collection continued until 'theoretical saturation' was achieved, whereby no new or relevant insights seemed to be emerging from the data being collected and when no further information, themes or ideas were forthcoming. The constant comparative method together with theoretical sampling constitute the core of qualitative analysis in the grounded theory approach (Glaser & Strauss, 1967). The method of comparing and contrasting is used for practically all intellectual tasks during analysis: forming categories, establishing the boundaries of the categories, assigning the segments to categories, summarizing the content of each category and finding negative evidence. The interviews were analyzed word by word, line by line, and sentence by sentence. Codes were allocated for each word or phrase and labels were given to emerging themes and then coded. Codes were then sorted into categories and redefined into further categories. Then the core category had been identified and other connected categories, properties and connections between categories". (Kaba et al., 2017)

The presentation of a framework or a table, explaining the coding process, would significantly add to the value of our example GT study. This is supported by Ryan et al. (2007), who suggested that the researcher in a GT study should present how the concurrent data collection, analysis and coding were performed.

Does the research discuss how rigor was assured? Were credibility, dependability, transferability and goodness discussed?

According to Houser (2018), in qualitative research, the purpose is to interpret a phenomenon, rather than to test a hypothesis. Generalization of the results is not its intention. Internal and external validity is not a concern in qualitative research. Qualitative researchers are concerned with representing real-world phenomena in an accurate way and eliminating bias in researchers' interpretations (Glaser & Strauss, 1967). There is a strong and ongoing debate, between qualitative researchers, about the concepts of validity and reliability in qualitative research. Some

believe that the philosophy of qualitative research opposes to the notion of validity, whereas others argue that efforts to produce validity enhance the credibility of the findings (Koch & Harrington, 1998; Tobin & Begley, 2004; Hoye & Severinsson, 2007). The challenge, in qualitative research, is to produce reliable and credible evidence that demonstrates rigor and integrity of the research process (Ryan et al., 2007; Koch, 2006). The seminal work of Guba and Lincoln (1989) proposed the idea that qualitative research is based on trustworthiness rather than reliability and validity. The most common categories of quality criteria, applied to assess the key elements of trustworthiness, are credibility, dependability, transferability and confirmability (Schou et al., 2012; Lincoln & Guba, 1985).

In our example research article, we did not use specific tools or frameworks to appraise the trustworthiness of the study. However, the authors discussed how they ensured the trustworthiness of their study. For example, regarding credibility, it was stated that,

"In order to improve the credibility and establish the trustworthiness the researcher had prolonged engagement by investing sufficient time in the data collection activities to learn the culture of the group under study, to test for misinformation and distortions, and to build trust with informants. For this purpose the researcher-interviewer in this study was involved in the area of investigation long before the data collection commencement; by visiting the rehabilitation center, being introduced to nurses and talking to them. Most participants had been introduced to the interviewer long before the interview and this added familiarity to the interview atmosphere as participants felt comfortable and seemed to trust the interviewer" (Kaba et al., 2017).

Relevant literature stresses that credibility exists when there is a consistency between the participants' views and the researchers' representation of them. When the researcher describes and interprets his/her experiences, and gives the participants to read and discuss the research results, credibility can be enhanced. Credibility can be achieved by prolonged engagement, observation and audit trails (Bekhet & Zauszniewski, 2012). Furthermore, analyst triangulation, an additional method of ensuring trustworthiness in qualitative research, was mentioned in our example article:

"Continued improvements, including rereading the transcripts, redrawing the concepts and the categories, and reviewing the literature completed the process of analysis. To test the consistency in open coding of the researcher, a second researcher also coded all the interviews" (Kaba et al., 2017).

Triangulation is a common method that qualitative researchers use to establish trustworthiness of research. Credibility of the results can be enhanced when the researcher use multiple researchers to cross-check the results and the researcher's interpretations (Korstjens & Moser, 2018). In most qualitative studies, trustworthiness is confirmed by applying selected strategies such as audit trails, detailed description of sample and setting, data triangulation and peer checking, participant feedback or member checking, reflexivity, or bracketing the researcher's bias. These strategies of ensuring trustworthiness enable the researchers to support the validity and usefulness of their findings and to promote dependability, transferability and confirmability of research (Houser, 2018; Korstjens & Moser, 2018).

Findings/Discussion

Are the findings presented appropriately? Has the report been placed in the context of what was already known of the phenomenon? Has the original purpose for the study been adequately addressed?

The findings in our example research article were presented in a consistent way, including appropriate quotations from the interviews data and providing thus evidence for relevant interpretations. Houser (2018) stated that qualitative researchers should avoid making inferences by carefully keeping accurate field notes and reporting the results as accurate quotes. Descriptions should use the participants' words. This accurate reporting ensures that the content, that is given, is the participant's view and not the researcher's interpretation of it. A popular way to illustrate and support the themes derived from the data, is to use "low-inference descriptors", that is, examples of participants' verbatim accounts. Integrating quotations from participants, when writing the findings, demonstrates that the report is grounded in the data.

All the categories in our example article were presented focusing specifically on the core category of *"against the odds"*, and the authors showed how the categories of their analysis were related:

"The results of the analysis showed that the perceived problems of the interviewees with regard to PU treatment and the barriers in delivery of efficient health care could be categorized into one main category entitled 'anarchy' in delivery of care followed by three subcategories: interdisciplinary conflicts; total trust in traditional knowledge, devaluation of other's work/role. Further analysis lead to the formulation of a core category namely 'against the odds': the perceived value of prevention and treatment can overcome the barriers in treating PUs. 'Anarchy' in

delivery of care consisted of the subcategories that constitute the problems and the barriers involved in delivery of best practice and efficient health care.

Nurses interviewed managed to beat all the problems and barriers caused by the 'anarchy' in delivery of care and the PUs tend to have a good outcome. Their perceived value of prevention and treatment can overcome the barriers in treating PUs. A positive attitude towards prevention and awareness about the significance of the problem are the basis to effective prevention. These positive views and beliefs can be used as a starting point for effective implementation of guidelines regarding the treatment of Pus" (Kaba et al., 2017).

The aims of the study have been adequately addressed and the authors discussed the findings in the context of what is already known by reviewing the relevant literature. However, at this point a limitation was recognized by the authors recognized since, *"this was one of few studies conducted on nurses' perceptions of prevention and treatment of PUs in Greece, thus there is not enough literature available to discuss in national context (Kaba et al., 2017).*

Further limitations were also discussed, such as the restricted number of participants and the lack of triangulation of the qualitative data with other quantitative data.

Conclusion/Implications and Recommendations

Are the importance and implications of the findings identified? Are recommendations made to suggest how the research findings can be developed?

In our example article, the significance and implications of the findings were identified, and recommendations of how these findings can be developed, were made. According to Ryan et al. (2017), the researcher should write the findings in such a way that readers will accept its implications to nursing practice. The conclusions of the study should reflect the study's findings and should offer recommendations for future research. Accordingly, in our example research article, the authors presented the recommendations and implications to practice of their study:

"This study reveals that although some barriers to good practice may exist, nurses can hold a positive attitude toward PU prevention and treatment. Positive attitude is the paramount leader in preventing PU. The attitude could constitute a milestone for enhancing practice in PU prevention and treatment. Understanding the value that nurses place on PU prevention and treatment and given that education has been shown to change a person's values, a program of education can be established for nurses to ensure that they place an appropriate value on PU prevention and deliver a high standard of skin care to their patients. Future research must focus on nurses' education about the roles and responsibilities regarding the maintenance of skin integrity in clinical practice and raising awareness of PU preventive and treatment interventions. Also more research is needed to focus on the adequate dissemination of prevention and treatment guidelines".

This final part of the study is usually an effort explain the results. It includes an interpretation of the results, the study limitations and possible implications for future research to raise new knowledge on the phenomenon under study (Polit & Hungler, 2013). The conclusions may be very broad, purely highlighting an issue by raising awareness or further understanding of a human experience. The research study should persuade the readers of the research, such as nurses, that the findings of the qualitative research are credible and trustworthy (Borbasi, 2012).

References

Were all the books, journals and other media alluded to in the study accurately referenced?

References were checked for accuracy. Scientific writing requires an accurate list of all bibliographic sources that were included in the study (Polit & Beck, 2003). A meticulous engagement of the researchers with the reference listing demonstrates soundness and rigor of the research study. In addition, an explicit and scholarly cited reference list may provide an important source for further reading for those who are interested in the specific research topic (Ryan et al., 2017).

4. Conclusions

Within the frame of a critical analysis of the grounded theory research article, entitled "*How Greek nurses perceive and overcome the barriers in implementing treatment for pressure ulcers: 'Against the odds'"*, we aimed to offer the necessary knowledge to nursing students and nurse professionals to critically review qualitative research literature by explicitly explaining how each step of a qualitative research is undertaken. Informing student nurses and novice researchers about how to critique qualitative research, in an organized and systematic manner by providing a real example, is one of the strengths of the present paper. Furthermore, this critique study served as an in-depth critical analysis of the authors' work that enhanced evaluative and critical thinking skills. That was a challenging issue which enabled further understanding of research critique through disciplinary teamwork. The

most important benefit, however, was that the authors had to reflect on their own work, not only from the teachers', but also from the students' point of view in order to achieve a successful outcome. At the same time, that was one of the difficulties faced throughout the course of critiquing the research article. In addition, the inherent subjectivity of qualitative research, and its holistic and unique nature that makes it difficult to critique, consist an additional limitation in this paper. Despite that, nursing students and young researchers must be able to determine the strengths and limitations of studies when reviewing the available literature on a topic, thus justifying clinical decision making with best research evidence.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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TNF-Alpha Serum Level as Prognostic Factor in Pediatric Sepsis Patients

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Abstract

Objective: The study aimed to investigate the role of TNFα-308 genetic polymorphism, association between TNF-α serum level and prognostic factor of mortality in pediatric sepsis.

Methods: This was a prospective cohort study. Consecutive sampling method was used and samples were obtained from septic patients diagnosed based on the IPSC 2005 criteria. Serum TNF-α and genetic polymorphism were measuread and analyzed with ELISA and PCR plus sequencing, respectively.

Result: One hundred and seventeen samples were included, 62 were in survivor grioup and 55 in non survivor group. A very significant association was found between TNF-α serum level and mortality ($p<0.001$). The optimal cut off point of TNFα serum level as prognostic factor for mortality was ≥ 500 pg/mL ($p<0.001$ and OR 16.6) sensitivity 78.1%, specificity 82%, Positive Predictive Value (PPV) 79.6%, Negative Predictive Value (NPV) 80.9%, Area Under Curve (AUC) 0.811. Two samples showed TNFα-308A polymorphism and mutation of GG allele to heterozygote GA allele. Neither TNFα polymorphism and TNFα serum level showed any association with mortality. There was no significant association between TNFα-308 polymorphism and TNF-α serum level $p=0.461(p>0.05)$ and mortality $p=0.219$ ($p>0.05$), all sample who had TNFα-308 genetic polymorphism were in non survivor group and had TNF-α serum level ≥ 500 pg/mL.

Conclusion: Genetic polymorphism of TNF-α-308 showed no statistic significant on mortality, but all subjects with TNFα-308 polymorphism had higher TNF-α serum and were all in non-survivor group.

Keywords: Sepsis, TNF-α, TNFα-308 genetic polymorphism

1. Introduction

Sepsis, which is usually caused by infection can lead to severe systemic inflammation. Severe sepsis and shock sepsis are associated with high mortality rate in intensive care unit. Sepsis related mortality remains as high as 30-50%. Sepsis, severe sepsis, and septic shock are major healthcare problems worldwide; they affect millions of people each year (Feng et al., 2015; Song et al., 2012; Wang et al., 2017; Wu et al., 2019; Zhang et al., 2017).

Sepsis is a clinical syndrome triggered by infection. Clinical manifestations including fever or hypothermia, increased or decreased white blood cell, tachycardia and tachypnea. Bacterial infections are the most common cause of sepsis. It can also caused by fungal, parasitic or viral infections. Several internal and external factors play important role in sepsis. Internal factors such as immune and genetic predisposition could determine the severity of sepsis (Mira et al., 1999; Nasronudin, 2011).

Excessive production of proinflammatory cytokines together with unbalanced production of anti-inlamatory mediators in acute systemic respon is the major pathogenesis of sepsis. The most critical pro-inflamatory cytokines that has important role in pathogenesis of acute inflamatory response is Tumor Necrosis Factor-Alpha (TNF-α). Tumor necrosis factor-α gene is located at chromosom 6p21.3 spanning approximately 3 kb and have 4 exons to produce 212 amino acid. Polymorphic change of TNF-α is associated with increase secretion of TNF-α from macrophage following lipopolisacharide stimulation. Major genetic polymorphism within the regulatory regions of the gene coding for TNF-α gene has been identified -308 (G→ A). This transition of guanine to adenin at TNF-α

at the-308 base pair from transcriptional start site was observed in several in-vitro studies. This genetic polymorphism mainly observed in Caucasian population. Genetic polymorphism variation varies between ethnic groups. (Feng et al., 2015; Song et al., 2012; Wang et al., 2017; Wu et al., 2019; Zhang et al., 2017) Our study was conducted on Southeast Asian population in Indonesia, to evaluate the association between TNF-α-308 polymorphism and the risk of mortality in pediatric sepsis patients.

2. Method

2.1 Patients and Controls

This cohort prospective study was conducted in Wahidin Sudirohusodo Hospital, Makassar, Indonesia from December 2018 to Mei 2019. Eligible patients aged 1 month – 18 years with sepsis and shock sepsis admitted to pediatric intensive care unit and emergency room were the inclusion criteria for sampling. Sepsis group was defined by criteria of The International Pediatric Sepsis Consensus (IPSC). Exclusion criteria were trauma, burn, malnourished, longterm corticosteroid use, malignancy and patients with immune deficiency. Septic shock was defined as having systolic blood pressure less than 90 mmHg and CRT > 2 second. Survivor and – non survivor were defined as septic patients discharge from PICU and those who died in PICU, respectively.

Blood sample was used to analyze TNF-α serum level and TNF-α -308 genetic polymorphism. The laboratory test was performed within the first 24 hours after diagnosis was established. All patients were observed until discharged from PICU and the clinical outcome was survivor or non-survivor in PICU.

This study was approved by the internal review board and ethics committee of Hasanuddin University, Makassar, Indonesia. Informed consents were obtained from case and control subjects and/or their parents or guardians

2.2 Cytokine Serum Consentration

Cytokine serum consentration TNF-α was determined. Blood was taken by venapuncture and sampled on vacutainers. The blood was then centrifuged and the serum had been frozen (-70^0C) until the time of analysis. Tumour Necrosis Factor-α serum consentration was examined using enzyme-linked immunosorbent assay (ELISA).

2.3 Analysis of Gene Polymorpism TNF-α -308

To analyze gene polymorphism, a 5 ml sample of EDTA anti-coagulated blood was extracted. The polymerase chain reaction restriction fragment length polymorphism method. The TNF-α gene promoter was amplified by using a modified protocol previously described: TNF-α forward primer (5'- AGG CAA TAG GTT TTG AGG GCC AT - 3') and TNF-α reverse primer (5'- ACA AGC ATC AAG GAT ACC CCT - 3'). The volume for the PCR mixture 50 uL, 10X PCR buffer 5uL, 25 mM $MgCl_2$ 2 uL, 5 mM dNTP 1 uL, Reverse primer (20pmol) 1uL, Forward primer (20pmol) 1 uL, Hotstart DNA pol. 0.25 uL, DNA sample 5 uL, ddH2O 34.75 uL.

Amplification was performed with PCR machine (DNA thermal Cycler). Initial steps were denaturation at 95 ºC for 15 minutes, continued at 94 ºC for 1 minute, annealing at 55 ºC for 30 seconds, extention at 72 ºC for 1.5 minute at 45 cycles, followed by final extention at 72 ºC for 10 minutes and at 12 ºC for approximately 30 minutes before storage.

Digested PCR fragments were analyzed by electrophoresis in a 3% agarose gel, visualized by ethidium bromide staining.

2.4 Sequencing

Mutation was analysed with direct sequencing in Laboratorium 1st Base Malaysia. To detect mutation in TNF-α gene from the sequencing PCR product, 'Bioedit" software was used. The results were then compared with data from "Gene Bank" at NCBI data base with Basic Local Alignment Search Tool (BLAST) method

2.5 Data Analysis

Result from DNA sequencing in form of electropherogram was then aligned with normal sequence from Gene Bank and was analysed with Bioedit software Sequence Alignment Editor version 7.0.5.1.

2.5 Statistics Analysis

Univariate analysis was used for descriptive data such as frequency, mean, range and standar deviation. Student t test and Mann Whitney test for bivariate analysis were used to compare continous variables with normal- and not normal distribution, respectively. Correlation studies between different groups were analyzed using chi-square test. Receiver Operator Curve (ROC) was used to determine the prognostic cut off point of TNF-α serum level followed by sensitivity and specificity calculation. A p-value of less than 0.05 was considered statistically significant. The

risk of mortality was estimated by odds ratio with 95% confidence intervalResult from DNA sequencing in form of elektrophenogram and than aligned with normal sequence from Gene Bank and than analysed with Bioedit software Sequence Alignment Editor versi 7.0.5.1.

3. Results

Between December 2018 and Mei 2019, 117 sepsis patients aged 1 month to 18 years were included. Of this number, 68 and 49 were sepsis and shock sepsis patients, respectively. There were 62 (53%) survivor and 55 (47%) non-survivor. Male and female subjects were 75 (64.1%) and 42 (35.9%), respectively.

3.1 Characteristics of the Subjects

Table 1. Characteristic of the Subject

Characteristics	**Survivor (n=62)**	**Non-survivor (n=55)**	**P**
Gender			0.628*
Male	41 (54.7 %)	34 (45.3 %)	
Female	21 (50%)	21 (50%)	
Age (year)			
Mean	6.26	4.45	0.087**
Median	4.25	2.00	
Standard Deviation	5.69	5.26	
Min-max	0.08-16.33	0.08-17.91	
Primary site of infection (n)			
Respiratory tract	33	34	
Neurologic system	18	17	
Gastrointestinal tract	3	2	
Renal disease	2	2	
Dengue infection	4		
Metabolic	1		
Skin infection	1		
Culture			
Positive	6 (50 %)	6 (50 %)	
Negative	49 (47%)	56 (53 %)	0.827*

*Chi-square test.

** Mann-Whitney Test.

There were no significant differences in gender, age, and culture with $p>0.05$. Only 12 patients showed growth in culture. Gram negative bacteria growth were observed in most of the cultures.

Table 2. Culture result in survivor and non survivor group

No	Culture	Bacteria	*Survivor*	*Non-Survivor*
1.	Burkholderia Cepacia	Neg	3	0
2.	Klebsiella Pneumonie	Neg	2	
3.	E.Coli	Neg	1	1
4.	Acinetobacter Baumanii	Neg		2
5.	Staphylococcus Hominis	Pos		2
6.	Enterobacter	Neg		1
	Total		6	6

Burkholderia Cepacia was the most common bacteria in survivor group but acinetobacter baumanii and staphylococcus Hominis were the most common bacteria in non survivor group

3.2 Parameters and Biomarker in Survive and Non-Survive Sepsis Patients

Table 3. Parameters and biomarker value in survivor and non survivor sepsis patients

Parameter	Sepsis		P Value
	Survivor	Non-Survivor	
	n =62	n =55	
WBC (mg/dL)			
Mean	9,808	22,050	
Median	16,550	21,250	0.264*
Standard Deviation	12,876	11,243	
Minimum-maximum	3640-61,730	3100- 55,200	
CRP (mg/dL)			
Mean	44.47	68.70	
Median	21.70	40.00	0.056*
Standard Deviation	57.44	79.43	
Minimum-maximum	0-238	0-289	
Procalcitonin(ng/ml)			
Mean	15.78	43.64	
Median	2.41	16.60	0.007*
Standard Deviation	36.79	66.21	
Minimum-maximum	0.01-210	0.19-210	
TNF-α (pg/ml)			
Mean	427.25	848.92	
Median	413.49	825.07	<0.001*
Standard Deviation	111.49	358.06	
Minimum-maximum	195.26-1009.17	231.11-1784.68	

*Mann Whitney Test.

There were significant difference in procalcitonin ($p=0.007$) and TNF-α ($p<0.001$) between sepsis survivor and non survivor with $p< 0.05$.

3.3 Multivariat Analysis of Parameters and Biomarker in Survivor and Non-Survivor Sepsis Patients

Table 4. Multiple Logistic Regression Analysis of parameters and biomarker in survivor and non-survivor group

No	Variable	B	S.E	p	AOR	95%(CI)
1.	Procalcitonin	0.009	0.005	0.072	1.009	0.99-1.019
2.	TNF-α	0.008	0.002	<0.001	1.008	1.005 – 1.012

The result of multiple logistic regression analysis, only 1 variable which is TNF-α as independent factor for outcome of sepsis with p < 0.001 AOR 1.008 (1.005-1.012)

3.4 Mortality Cutt off Point of TNF-α in Sepsis Patients

Receiver operating characteristic curve evaluate the level of TNF-α in predicting mortality in pediatric sepsis. The ROC curve showed the optimal cut off point of TNF-α level for mortality prediction in pediatric sepsis was 500 pg/ml with the largest area under curve (AUC) 0.811.

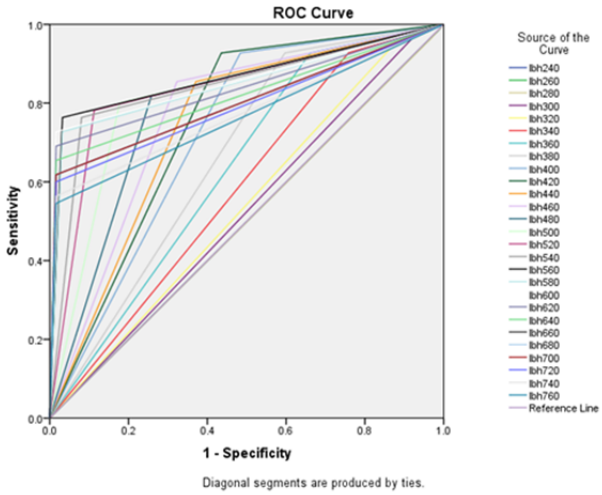

Figure 1. ROC Curve

Table 5. Prognostic value of TNF- α serum ≥ 500 pg/mL

TNFα (pg/mL)	Sepsis				Total	
	Non-Survivor		Survivor			
	n	%	n	%	n	%
≥ 500	43	79.6%	11	20.4%	54	100%
< 500	12	19%	51	81%	63	100%
Total	55	47%	62	53%	117	100%

Chi-square, X^2; OR=16.6, df = 1; p <0.001.

The sensitivity of TNF- α serum level ≥ 500 pg/mL was 78.1%, with 82% specificity. Positive predictive value was 79.6%, and negative predictive value was 80.9% with 95 % CI (p<0.001), area under curve (AUC) 0.811 and OR=16.6.

3.5 Association between TNFα-308 Genetic Polymorphism and TNF-α Serum Level

There were 2 patients with G/A allele TNFα-308 genetic polymorphism but no patient with A/A allele genetic polymorphism was observed. Mean serum level of TNF-α in sepsis patient with TNFα-308 genetic polymorphism was 788.88 (767.54-810.23) pg/mL and in patiens with no genetic polymorphism was 612.67 pg/mL

(195.26-1784.68) pg/mL. The student t test showed no significance different in two groups with p= 0.461 (p>0.05).

Table 6. Mean TNF-α serum level between sepsis patients with TNF-α 308 (G/A) genetic polymorphism and without genetic polymorphism

TNF-α-308 (G/A) (pg/mL)	Sepsis	
	Without Polimorphysm	Polimorphysm
	n =115	n = 2
Mean	612.67	788.88
Median	485.80	788.88
Standard deviation	335.72	30.18
Minimum-maximum	195.26-1784.68	767.54-810.23

Student T-Test; p = 0.461 (p>0.05).

3.6 Association between TNFα- 308 Genetic Polymorphism and Sepsis Outcome

There was no patient detected of having TNFα-308 genetic polymorphism in the survivor group. In non-survivor group two (100%) patients was observed to have genetic polymorphism. In group with no TNFα-308 genetic polymorphism, there were 62 (53.9%) survivor and 53 (47%) non-survivor. Statistical analysis showed no significant difference between two groups with p= 0.219 (p>0.05).

Table 7. Relation Genetic polymorphism TNFα-308 with sepsis outcome

Polimorphysm TNFα-308 (G/A)	Sepsis		Total
	Survivor	Non-Survivor	
	N=62	n=55	
Polimorphysm	0 (0 %)	2 (100 %)	2 (100%)
Without Polimorphysm	62 (53.9%)	53 (46.1 %)	115 (100%)
Total	62 (53 %)	55 (47 %)	117 (100%)

Fisher exact test; p = 0.219 (p >0.05).

4. Discussion

Culture results showed mainly negative bacteria growth. Acinetobacter baumanii and staphylococcus Hominis were the most common cause of mortality in this study. There was no significant difference between positive culture and negative culture related to sepsis outcome with p= 0.827 (p>0.05). The gram-negative bacteria, highly resistence to antibiotic, were the most common bacteria in PICU. Resistance mechanism of gram-negative bacteria from β lactam antibiotics, because gram-negative bacteria produce β lactamase enzyme. The small sample with growth in culture can cause no significance difference in patients outcome.

Two parameters appear to satistically significant on sepsis outcome were procalcitonin (p=0.007) and TNF-α (p=0.000). However, in multivariate analysis only TNF-α showed significance difference. Procalcitonin known as a marker to establish bacterial infection, but the number of positive growth culture in this study is very few.

After multivariate logistic regression analysis was performed, only TNF-α acts as independent factor related to sepsis outcome p<0.001, AOR 1.008 (1.005-1.012). The mean value of TNF-α in survivor group was 416.66 and in non-survivor group was 835.25. (Tables 3-4)

Invasion from pathogenic microorganism and their product will stimulate proinflammatory cytokine. Major proinlamatory cytokine that has important role in sepsis pathogenesis are TNF-α, IL-1, IL-6 and IL-8. Sepsis indicates that the profound proinflammatory response is counteracted by certain anti-inflammatory cytokines, including IL-10, transforming growth factor (TGF)-β, and IL-4, which attempt to restore immunological

equilibrium. Uncontrolled activation of the inflammatory system in response to an invading pathogen can result in multiorgan failure and eventually death. (Sabelnikovs et al., 2012)

ROC curve showed optimal cut off point with the biggest AUC for TNF-α level as prognostic factor for mortality in pediatric sepsis was ≥ 500 pg/mL and AUC 0.811 With this cut off point the sensitivity was 78.1%, specificity was 82%, positive predictive value and negative predictive value were 79.6% and 80.9%, respectively; with 95 % CI ($p<0.001$), area under curve (AUC) 0.811 and OR 16.6. This cut off point level were depended on duration of disease, severity of disease and the frequency of exposure to infection.

Genetic polymorphism -308 in TNF-α means that the transition of guanin to adenin located the -308 base pair at promoter gene in transcription phase. Allele at promoter gene -308 is GG, in case of polymorphism, allele can change to heterozygote GA or homozygote AA. The -308 A/G polymorphism in the TNF-α gene has been shown to up regulated the gene transcription, leading to higher levels of expressed protein in serum. Elevated TNF-α levels enhance the inflamatory response and lead to multiple phenotypic and induce apoptosis and decrease immune respons and cell function (Teuffel et al., 2010)

Genetic polymorphism is related to ethnic. Mainly observed in Caucasian population. In this study, only 2 patients showed TNF-α -308 genetic polymorphism G/A allele and none with A/A allele. A Thailand study conducted by Phumeetham et al. represented Southeast Asian population. The study observed that TNF-α-308 genetic polymorphism, found in 8 patients from 66 sepsis/septic shock patients, had no association with the risk and severity of sepsis or septic shock in Thai population (Phumeetham et al., 2012)

In this study patient with TNFα-308 genetic polymorphism had mean TNFα level of 788.88 (767.54-810.23) pg/ml and those with no genetic polymorphism had mean TNFα level of 612.67 (195.26-1784.68) pg/ml. Statistical analysis with X^2 test showed no significant difference in these two groups with $p= 0.461$ ($p>0.05$). Although statistical analysis showed no significancy but the two patients with TNFα-308 genetic polymorphism both had TNFα level more than 500 pg/ml (the cut off point for mortality in pediatric sepsis.)

Outcome from sepsis patients with TNFα-308 genetic polymorphism are survive 0 (0%) and non-survivor 2 (100%). In patients without TNFα-308 genetic polymorphism, there were 62 (53.9%) and 53 (47%) survivor and non-survivor, respectively. Statistical analysis showed no significant difference between the 2 groups with $p=0.219$ ($p>0.05$). Incidence of polymorphism in population is about 1%. In this study, from 117 samples only 2 patients have TNFα-308 genetic polymorphism, and all has heterozygote GA, none has AA allele, so the influence is very small or sublethal.

The limitation of this study are the method was not multi centre study along with small sample size with various kind of diseases. Studies with large samples, as well as more specified disease, are needed to demonstrate the results of this study more clearly and definitively.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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