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INFORMATION

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STATUS OF IODINE NUTRITION AMONG SCHOOL-AGE CHILDREN (6-12 YEARS) IN EGOR LOCAL GOVERNMENT AREA, EDO STATE, NIGERIA

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ABSTRACT:
Iodine deficiency continues to pose a global public health problem despite international efforts to eliminate it. Spot-urine iodine concentrations collected from a population are currently the internationally accepted criteria for determining and monitoring the iodine status of that population. The objective of this study was to assess the prevalence of iodine deficiency and some of the associated factors among school-age children in Egor Local Government Area (LGA) of Edo State, Nigeria, using urinary iodine concentration in spot urine sample. The study was a school-based descriptive cross-sectional study conducted over a period of 6 weeks (November to December 2022). The study involved a total of 429 school-age children (6-12 years) recruited via a multi-stage random sampling method. The urinary iodine concentration determinations were performed by the Sandell-Kolthoff method, after sample digestion with ammonium persulfate. A total of 429 children were enrolled in the study. The median urinary iodine concentration (mUIC) of all the children was 84µg/L(IQR52.0-110.0), which indicates prevalence of mild iodine deficiency and suboptimal status of iodine nutrition. Over half (66.2%) of the children had mild to moderate iodine deficiency. Iodine nutrition was adequate in one-third of the children. The prevalence of iodine deficiency varied significantly with type of school being attended by the children and the socioeconomic class of their families.

Keywords: Iodine nutrition status, iodine deficiency, school-age children, urinary iodine concentration, Nigeria

INTRODUCTION:

Dietary iodine is an essential micronutrient for the synthesis of thyroid hormones. In humans, iodine nutrition status is mainly dependent on dietary consumption of iodine. However, the iodine content of most foodstuffs is low, especially in mountainous area. One of the major natural sources of iodine is seawater fish and other marine products [1]. Inadequate dietary consumption of iodine and the resultant thyroid hormone deficiencies cause a spectrum of health problems collectively referred to as Iodine Deficiency Disorders (IDDs), the severe forms include endemic goitre, cretinism, intellectual disability, linear growth impairment, congenital hypothyroidism and increased perinatal mortality and morbidity [2]. Worldwide surveys indicate that IDDs can return anytime even after elimination, if the iodine deficiency control programmes are not sustained [3]. In addition, IDDs can occur among vulnerable population groups (women of reproductive age and children) in areas such as large cities, coastal areas and regions prone to flooding and erosion. Thus, emphasizing the need for continued vigilance despite the existence of iodine deficiency control programmes [3]. In Nigeria, Universal Salt Iodization (USI) was established by Law in 1993 to ensure effective iodization of salts for human consumption [4]. Its implementation is regulated by two bodies, Standard Organisation of Nigeria (SON) and National Food and Drug Administration Council (NAFDAC) [5,6].

School-age children (6-12 years) represent a useful group for the assessment of status of iodine nutrition in a population because of their high vulnerability to iodine deficiency and easy accessibility in the community. This is in keeping with the recommendations of the World Health Organisation (WHO), United Nation Children's Fund (UNICEF) and International Council for Control of Iodine Deficiency Disorders (ICCIDD) and Iodine Global Network [3]. In addition, school-based approach takes advantage of high enrolment and attendance of both boys and girls in primary schools in Egor LGA, Nigeria.

The concentration of iodine in the urine (urinary iodine concentration, UIC) is the prime indicator of an individual's nutritional iodine status and it is the primary variable used to measure the success of iodine supplementation in a population [7]. Median urinary iodine concentrations (mUIC) of 100-199µg/L are accepted as indicative of adequate iodine intake and optimal iodine nutrition in school-age children [3,7]. In most studies, iodine nutrition status (designated as deficient or sufficient) is defined based on mUIC cut-off at 100µg/L, as recommended by WHO/UNICEF/ICCIDD and other experts [3,7]. Globally, the estimated frequency of mUIC below 50µg/L is 2.6% in school-age children [3]. Worldwide, it is estimated that the iodine intake of 36.5% (285 million) school-age children is insufficient [8].

Applying this definition in school-age children (6 to 12 years old), the prevalence rates of iodine deficiency reported in literature varied from 25.2% in China to 32.9% in Papua New Guinea [9,10]. Using the same cut-off, Rawal and Kedia [11], reported a prevalence rate of 21.43% in India. To the best of our knowledge, there is no report of iodine nutrition status among school-age children (based on urinary iodine levels) in Edo State, which includes Egor LGA. We, therefore, decided to conduct this study because environmental factors such flooding, deforestation and erosions which increase the risk of iodine deficiency due to depletion of iodine content of the soil are common in Edo State, including Egor LGA [12,13]. The purpose of this study is to determine the current iodine nutrition status of Nigerian school-age children by measuring urinary iodine concentrations.

METHODOLOGY:

This was a school-based descriptive cross-sectional study involving 429 children aged 6 to 12 years in Egor LGA, Edo State, Nigeria. The study was conducted over a period of 6 weeks (November to December 2022). The children were recruited using a multistage random sampling method. Those with known thyroid disorders, chronic diseases or history of taking any iodine-containing drug were excluded. The socio-demographic data of the children were obtained, using a questionnaire. Socioeconomic class (SEC) of the child's family was determined, using a scoring system based on mother's level of education and father's occupation as proposed by Olusanya et al [14].

All the children recruited for the study submitted 5ml of spot urine sample in clean universal bottles with the lid tightly screwed. The children were asked to void urine at the school's lavatory, while accompanied by a research assistant (a male assistant for the boys and a female assistant for the girls). The urine sample bottles were properly labeled and then transported in a cold-box containing icepacks and kept at 4 to 10^{o}C till arriving to the research biochemistry laboratory of the University of Benin Teaching Hospital, Benin City, where the urine samples were stored in a freezer at -20^{O}C until analysis. The Urinary Iodine Concentration (UIC) were determined, using the ICCIDD, UNICEF and WHO standard Sandell-Kolthoff colorimetric method after sample digestion with ammonium persulfate in a water-bath. at 100^{o}C as suggested by Pino et al [15]. The absorbance was read at 405nm, after incubating at room temperature (approx. 25^{o}C) and the urinary iodine concentrations were determined, using standard curves constructed for each plate. For the Internal bench quality control, we applied Levy-Jennings Chart and the Westgard Rules. The external quality control monitoring of the assay procedure was via "Ensuring the Quality of Urinary Iodine Procedures" (EQUIP) of the Center for Disease Control and Prevention, USA. In this study, we applied the WHO

criterion, which defined iodine deficiency as mUIC less than 100µg/L [3].

Ethical approval for the study was obtained from the Research and Ethics Committee of University of Benin Teaching Hospital. A written permission was sought and obtained from the Edo State Universal Basic Education Board (SUBEB) and Egor LGA Education Authority. Verbal permission was obtained from the Heads of the selected schools. Written informed consent was obtained from parents/guardians all the selected children. Assent was obtained from children above 6 years of age.

RESULTS:

The study population was 429 children, aged 6 to 12 years and consisted of 289 (67.4%) from public schools and 140 (32.6%) from private schools. There were 210 (49.0%) boys and 219 (51.0%) girls, giving male to female ratio of 1:1 (χ^2 = 0.092; p=0.76). The mean age of children from the private schools was 9.02±2.01 years while that of their counterpart in the public schools was 9.05±2.03 years (χ^2 = 0.36; P=0.972). The distribution of socioeconomic class (SEC) of the families of the children was as follows: low SEC 277(64.5%); middle SEC 42(9.8%) and high SEC 110 (25.6%). All the 277 subjects in low SEC were pupils from public schools. There was a statistically significant difference between SEC of pupils from public and private schools (χ^2 =390.011; p = 0.000).

Distribution of iodine nutrition status among the children: The median urinary iodine concentration (mUIC) of the children was 84µg/L (IQR 52.0-110.0). As shown in table 1, over half (66.2%) of the children had iodine deficiency (mild and moderate) but none had severe iodine deficiency. Iodine nutrition was adequate in one-third of the children.

Median urinary iodine concentration according to socio-demographic characteristics of the children.

The median urinary iodine concentration (mUIC) of males was 80.0ug/L ((IQR 52.0-110.0) compared to 86ug/ L in females. As shown in table 2, there was no statistically significant difference in mUIC in relation to gender (Mann W = 1.077; p=0.282). The children from public schools had significantly higher mUIC compared to their counterparts from private schools (Mann W= 9.484; p=0.000). With regard to socio-economic class, the mUIC was significantly higher in children from families of low SEC compared to their counterparts from high and middle SEC (Mann W= 84.976ug/L; p=0.000). The influence of age on mUIC was not significant.

Iodine nutrition status according to socio-demographic characteristics of the children

Table 3 shows the distribution of the prevalence of iodine deficiency according to socio-demographic characteristics of the children. Although the prevalence of iodine deficiency

was slightly higher among the male children (68.0%) than the female children (64.8%), the difference was not statistically significant (χ^2 = 0.370; p =0.543). Comparing the prevalence of iodine deficiency in children in private and public schools, more children in private schools had iodine deficiency compared to their counterparts in public schools (χ^2 = 73.261; p=0.000). The prevalence of iodine deficiency was significantly higher among children from families in high SEC compared to their counterparts in middle or low SEC (χ^2 =3.098; p=0.000). The influence of age and gender on prevalence of iodine deficiency were not statistically significant.

Table 1: Distribution (%) of the iodine nutrition status of study participants

Median Urinary Iodine Concentration µg/L	Iodine Status	Frequency (%)
< 20	Severe Iodine Deficiency	0
20-49	Moderate Iodine Deficiency	96 (22.4%)
50 – 99	Mild Iodine Deficiency	188 (43.8%)
100 – 199	Optimal	145 (33.8%)
200 – 299	More than adequate (At risk of 1IH)	0
≥300	Excessive intake (At risk of adverse health consequences)	0

Table 2: Median urinary iodine concentration according to socio-demographic characteristics of family

	Median UIC (µg/L)	Iodine status	IQR	Test statistic	p-value
School type					
Public	96.00	Mild	67.5-118.0	9.484+	0.000*
Private	54.50	Mild	42.0-80.8		
Gender					
Male	80.00	Mild	51.0-108.0	1.007+	0.283
Female	86.00	Mild	51.0-112.0		
Age groups (years)					
6 - 9	85.00	Mild	54.0-108.0	0.235+	0.814
10 - 12	81.00	Mild	51.0-112.0		
SEC.					
High	54.00	Mild	41.5-78.0	84.976++	0.000*
Middle	57.00	Mild	47.3-98.8		
Low	96.00	Mild	67.5-117.0		

*P< 0.05= Statistically significant; +Mann Whitney; ++Kruskal Wallis
UIC = Urinary Iodine Concentration; SEC = Socio-economic class; IQR=Interquartile Range

Table 3: Distribution (%) of iodine nutrition status according to socio-demographic characteristics of children

Socio-demographic Parameter	Adequate iodine nutrition No (%)	Median UIC (µg/L)	χ^2	p-value
Gender				
Male	68(32.4)	96.00	0.370	0.543
Female	77(35.2)	54.50		
Age groups (years)				
6-9	82(34.5)	80.00	0.102	0.749
10-12	63(33.0)	86.00		
School type				
Private	8(5.7)	85.00	73.261	0.000*
Public	137(47.4)	81.00		
Socio-Economic Class				
High	3(2.7)	54.00	73.098	0.000*
Middle	10(23.8)	56.00		
Low	132(47.7)	96.00		

*P<0.05 = statistically significant;

DISCUSSION:

We found a low median urinary iodine concentration ((84µg/L) among the school-age children which according to World Health Organisation (WHO) criteria, suggest mild iodine deficiency and suboptimal iodine nutrition at the time of the study [3]. This is despite the existence of universal salt iodization programme in Nigeria since 1995. The low mUIC observed in the present study is noteworthy because Egor LGA is traditionally not regarded as iodine deficiency zone in Nigeria. Therefore, there might be the need to re-draw the map of iodine deficiency belt in Nigeria [16]. In addition, mandatory iodization of bread might be beneficial in improving iodine nutrition status of these children. The quality as well as the iodine content of table salt consumed in Egor LGA needs to be assessed to determine the cause of low mUIC in this LGA. A similar finding of low mUIC (65ug/L) was reported by Abua et al [17] in Cross River State, Nigeria. On the other hand, two previous Nigerian studies reported higher values (124.7µg/L and 117.0µg/L, respectively) [18,19]. In contrast, the mUIC found in the present study was higher than 39.8µg/L and 51.2µg/L reported from Dhakar, Bangladesh and Southern Tajikistan, respectively [20,21]. In a study in Papua New Guinea, Temple et al [22], reported a low mUIC 48 µg/L. Lomutopa et al

[10], in Papua New Guinea and Katongo et al [23], in Zambia reported mUIC higher than that found in our study. The result of a study in Saudi Arabia revealed mUIC that is 5-fold higher than that found in the present study [24]. The reason for the wide variations in mUIC reported from different studies is not clear but may be related to differences in iodine content of food items consumed daily by the children in the various locations and iodine content of ground water used for drinking purposes. This view is supported by the results of a study in Nepal which found that consumption of uncooked instant noodles has been associated with higher urine iodine concentration [25]. In addition, absorption of iodine from the intestinal tract can be reduced by the presence of goitrogens (such as cassava, cabbage and lima beans) present in some food items. The results of some studies indicate that deficiency of other micronutrients, such as selenium and iron, respectively impairs the metabolism of iodine [26,27]. Indeed, it is estimated that globally, over 2 billion people suffer from hidden hunger, which is a chronic deficiency of micronutrient [28]. In addition, environmental factors such flooding, deforestation and erosions increase the risk of iodine deficiency due to depletion of iodine content of the soil. Such environmental risk factors are known to be common in Egor LGA, Edo State, Nigeria [12,13]. Furthermore, the results of a study by Macedo et al [29] showed that the method of storage of table salt, duration of storage and environmental factors affect its iodine content, thereby influencing median urinary iodine concentration in different communities, even within the same region.

In the present study, the mUIC varied significantly according to type of school being attended by the children, being higher in children from public schools compared to their counterparts from private schools. Similarly, we found that children from families in the low socioeconomic class (SEC) had a higher mUIC than their counterparts from either middle or high socioeconomic class. In Dhakar, Bangladesh, Atiqur-Rahman et al [20], observed similar higher mUIC in children from families in low SEC. The reason for this finding may be that children from private schools are more likely to come from families in high SEC and hence are more likely to consume fast food which are known to be poor in iodine content. In this regard, Ozdemir et al [30] reported that iodine content and quality in fast foods varied widely. In that study they reported a decrease in iodate content and conversion to other iodine species which is influenced by acidity, moisture content, heating during cooking process, type of cooking spicies and raw materials used. On the other hand, children from families in low SEC being more likely to consume natural food with higher iodine content. In keeping with previous studies in Papua New Guinea [10] and Bangladesh [20], we did not observe significant difference in mUIC with regards to gender.

We observed that over half (66.2%) of the children had mild to moderate iodine deficiency,

despite decades of implementation of salt iodization programme in Nigeria. The prevalence rate of iodine deficiency found in the present study is much higher than 3.8% reported by Nwamarah et al [18], in Okpuje, Nsukka LGA, Nigeria. The observed prevalence of mild to moderate iodine deficiency in this study is comparable to that found in Dhakar, Bangladesh [20]. We found that nearly one-quarter (22.4%) of the participants had mUIC below 50µg/L, indicating moderate iodine deficiency. This finding is comparable to 17.9% reported from Papua New Guinea [10] but much higher than 3.0% observed in Saudi Arabia [24]. In contrast to the observation in Papua New Guinea [10], none of the children in the present study had severe iodine deficiency as indicated by mUIC below 20µg/L. On the other hand, a study from Saudi Arabia found that nearly three-quarter of the children had mUIC ≥300 µg/L, indicative of excess iodine nutrition [24]. None of the children in our study had such high mUIC. In contrast to the results of a study in Ethiopia [31], the influence of age and gender on prevalence of iodine deficiency was not statistically significant in the present study.

CONCLUSIONS:

The iodine nutrition status of the children in this study is unsatisfactory, indicating the need for iodine supplementation as well as continuous surveillance to prevent iodine deficiency disorders (IDD). There is the need to pay more attention to school-age children from private schools as well as those from families in high socioeconomic class. Further studies to assess pattern of iodine consumption in these groups of school-age children is worthwhile.

Limitation of the study.

One limitation of the study is that we did not assess the quality and iodine content of table salt being consumed by the children's families.

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AWARENESS AND PREVALENCE OF COMPUTER VISION SYNDROME (CVS) AMONG STUDENTS IN THE UNIVERSITY OF PAPUA NEW GUINEA

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ABSTRACT:
The use of computers, smartphones, mobile phones, and similar digital devices is among the daily routine of students worldwide. However, frequent use of these devices can lead to a complex set of ocular and non-ocular symptoms collectively known as Computer Vision Syndrome (CVS) or Digital Eye Strain (DES). Prolonged use, along with factors such as improper sitting positions, incorrect viewing distances, and a lack of protective practices, are associated with CVS, which can vary in frequency and intensity. Currently, there is a lack of published data on the awareness and prevalence of CVS-associated risk factors among students at the University of Papua New Guinea (UPNG). The objectives of this study were to assess the level of awareness and prevalence of CVS among undergraduate students at UPNG. This institution-based, non-clinical, cross-sectional quantitative study was conducted at the Taurama and Waigani campuses of UPNG. The study population included registered students for the 2024 academic session at both campuses. Simple random sampling was used to select participants. Data were collected using a modified and validated version of the "Computer Vision Syndrome Questionnaire" (CVS-Q). Statistical analysis was performed using Excel MS Data Pack software. In Taurama campus, 55.1% of participating students were CVS positive, compared to 82.0% in the Waigani campus. Gender distribution showed that 51.2% of male students in Taurama were CVS positive, compared to 77.8% in Waigani campus. Among female students, 77.8% in Taurama and 87.0% in Waigani were CVS positive. It is possible that the female students are using their digital screen devices, such as, mobile phones and computers more frequently that the male students. In conclusion, Computer Vision Syndrome is present among the male and female students on both campuses. It is a growing problem that requires attention and action. Students should be encouraged to take frequent breaks, ensure proper lighting in the surroundings, using the correct posture and correct viewing angles to reduce the possibility of developing CVS.

Keywords: Computer, Digital devices, Vision, Students, Eyes, Awareness, Prevalence

INTRODUCTION:

Digital devices are among the technological advances readily available to people of all ages, both in developed and resource-limited countries. This is evident in the widespread use of devices equipped with Video Display Terminals (VDT), which include tabletop computers, laptops, tablets, smartphones, e-readers, and others [1, 2]. These devices are integral to daily life at work, home, schools, and universities. Over the past decades, the frequent use of these devices has led to a set of symptoms collectively referred to as Computer Vision Syndrome (CVS), also known as Digital Eye Strain (DES) [1, 2, 3]. CVS describes a range of eye- and vision-related problems resulting from prolonged use of VDTs. Given that students often engage in extensive screen time for academic, social, and recreational activities, they are at increased risk for developing CVS symptoms, which encompasses a variety of ocular, musculoskeletal, and behavioral conditions. Some common causes of CVS also include poor lighting, glare from screens, improper viewing distance, inadequate sitting posture, uncorrected vision problems, and a combination of these factors [3, 4, 5]. Symptoms associated with CVS can be categorized as [3, 6, 7]:

Visual symptoms: *slowness of focus change, double vision, blurred vision*.

Ocular surface-related symptoms: *irritated eyes, watery eyes, dry eyes, and contact lens discomfort*.

Asthenopia symptoms: *eye strain, tired eyes, glare sensitivity, and sore eyes*.

Extra-ocular symptoms: *headaches, neck pain, shoulder pain*.

CVS can be diagnosed through clinical and non-clinical methods. A clinical diagnosis involves a comprehensive eye examination conducted by a qualified medical professional, specifically an optometrist [6, 7, 8]. This process typically includes taking the individual's medical history and assessing their general health, drug use, and environmental factors to ensure symptoms are attributable to VDT usage [6, 7]. Visual acuity measurements, as well as evaluations for refractive errors such as myopia, hypermetropia, or astigmatism, may also be performed. More detailed examinations can assess eye focus and movement to identify issues affecting visual performance, allowing clinicians to rule out more serious eye conditions that mimic CVS [6, 7, 8].

In non-clinical settings, CVS has been diagnosed by various researchers using a modified version of the "Computer Vision Syndrome Questionnaire" (CVS-Q), developed and validated by Seguí et al. [9]. This questionnaire assesses the frequency and intensity of 16 symptoms experienced by VDT

users, including burning eyes, tearing, redness, and headaches.

Symptoms are quantified based on Frequency (Never = 0; Occasionally = 1; Often/Always = 2) and Intensity (Moderate = 1; Intense/Severe = 2).
Severity scores are calculated from these metrics, with individuals scoring 6 or higher considered to have CVS [4, 6 – 9].

A recent study in 2021 found that approximately 90% of computer users who spent over three hours per day in front of screens suffered from CVS [10]. Recommendations suggest positioning digital screens 50 to 100 cm from the eyes, indicating that smartphone use can negatively impact eye health more than computer use. Research shows smartphone usage is significantly linked to increased intraocular pressure (IOP), particularly under low-light conditions [11].

Further studies have indicated that excessive smartphone use among college students correlates with reduced physical activity, a sedentary lifestyle, mood disturbances, and poor sleep quality [12]. Additionally, participants using VDTs for more than four hours a day are at greater risk for dry eye syndrome [3, 13]. Factors such as poor screen resolution, inadequate brightness, and glare from older screens exacerbate CVS symptoms. Findings indicate that the highest severity of CVS is associated with inappropriate smartphone use, while desktop computers yield lower severity scores [3, 14].

One of the key risk factors for dry eyes includes using VDTs for over eight hours daily. Implementing work-rest schedules—taking breaks every 15 minutes or micro-breaks every 30 minutes—can significantly enhance work efficiency while reducing eye and musculoskeletal discomfort [3, 11]. Research has also shown that lighting conditions, such as overhead sources, can diminish text contrast on VDTs, leading to visual fatigue [11]. Benefits to visual comfort and posture have been noted when using adjustable lighting [12].

Prolonged screen time leads to excessive tear film evaporation, which results in ocular discomfort [15, 16]. To alleviate visual fatigue, individuals may blink more frequently, but this can lead to increased dryness if not managed properly.
One study reported that evaporative dry eye disease (DED) can result from long-term computer use [17]. Preventive measures for DED among digital device users include, short rest periods for the eyes, conscious blinking techniques, and environmental adjustments. The "20-20-20 rule" is a widely recommended strategy, encouraging users to take a break every 20 minutes to look at an object 20 feet away for at least 20 seconds [3, 5]. Headaches are particularly common when devices are used

at distances less than 50 cm from the eyes, especially with smartphones [3, 8].

Over 50% of participants in recent studies reported frequent shoulder, neck, and back pain as musculoskeletal symptoms [18, 19]. Factors contributing to back pain include screen and keyboard positioning as well as desk design [20]. Poor screen placement can lead to abnormal postures and back pain [20]. Excessive VDT usage also affects wrists, arms, and hands, leading to conditions such as carpal tunnel syndrome, characterized by numbness, pain, and tingling due to median nerve compression in the wrist [21].

A recent study highlighted the pervasive use of computers and smartphones among university students for both academic and non-academic activities, leading to significant concerns regarding Computer Vision Syndrome (CVS) [8]. Notably, the study found that 75% of medical students experienced CVS, with symptoms such as headaches (81.5%) and eye pain (63.8%) being most common. The prevalence was higher among female students (78.7%) compared to males (71%), and those wearing contact lenses (92.9%) experienced more symptoms than non-users (72.8%) [8].

A systematic review and meta-analysis sought to address inconsistencies in CVS findings across various studies [22]. It included 49 out of 725 studies, revealing a pooled CVS prevalence of 66% (95% Confidence Interval: 59, 74). Factors associated with increased CVS risk included being female (Odds Ratio = 1.74), improper body posture (Odds Ratio = 2.65), using devices outside work hours (Odds Ratio = 1.66), not taking breaks (Odds Ratio = 2.24), prolonged VDT use (Odds Ratio = 2.02), short distance from the screen (Odds Ratio = 4.24), and poor ergonomic practices (Odds Ratio = 3.87). Conversely, good knowledge about CVS was linked to decreased odds of developing the syndrome (Odds Ratio = 4.04) [22]. These findings underscore the importance of preventive measures to reduce CVS prevalence among students, particularly in resource-limited countries. In addition, the increasing number of publications about the impact of CVS on different population groups in various countries indicates that it is becoming one of the major public health problems.

In Papua New Guinea (PNG), the use of digital devices has surged over the past decade across all age groups for educational, business, and recreational purposes. The use of laptops, smartphones, tablets, and other digital devices increased significantly among university students especially during the COVID-19 pandemic.

A review of available literature reveals several studies on eye health in PNG [23 -30]. However, there is a significant lack of published data concerning the awareness and prevalence of

CVS among students at the University of Papua New Guinea (UPNG). Most students are known to utilize computers and smartphones for academic assignments and related activities, often spending excessive hours online for leisure activities such as chatting, streaming, and gaming.

Many students are unaware of the connections between incorrect posture and the resulting musculoskeletal discomfort or visual abnormalities they may experience. Good knowledge and awareness of healthy habits are always associated with satisfactory behaviors and good health outcomes. Thus, the need to assess the awareness and prevalence of CVS among students cannot be overemphasized.

This study was motivated by the apparent absence of published data regarding the effects of frequent use of VDTs among students in the UPNG.

The major objectives of this study were to assess the level of awareness and prevalence of CVS among undergraduate students in the UPNG.

METHODOLOGY:

Study sites and subjects:

This study was carried out in both Waigani and Taurama campuses of the University of Papua New Guinea (UPNG), located in Port Moresby, the Capital city of Papua New Guinea (PNG).

The UPNG is made up of five schools. Four of the schools are situated at the Waigani Campus. The School of Medicine and Health Sciences (SMHS) is located at the Taurama Campus, adjacent to Port Moresby General Hospital (PMGH). Students on Taurama campus completed their foundation year at Waigani campus UPNG before moving over to Taurama to pursue their degrees in medicine, dentistry or the health sciences. Post-basic nurses from various hospitals around the country are also enrolled in the Taurama campus to complete their nursing degrees.

The study subjects include students that were registered in the SMHS in Taurama campus and the four Schools in the Waigani campus for the 2024 academic session.

Study design and sampling:

This was an institution-based non-clinical, cross-sectional quantitative study. The targeted population consisted of registered students, both residential and non-residential, in the UPNG. All registered students were eligible to participate in the study. Simple random sampling was used in the selection of participants.

Calculation of Sample Size:

Calculation of sample size was based on a design effect of one, a relative precision of 10% and a confidence level (CL) of 95%. As there was no available information on the likely

prevalence rate CVS in UPNG, an assumed prevalence rate of 25% and a predicted non-response rate of 20% was used. The calculated sample size of about 200 participants in each of the campuses was obtained. This was considered appropriate for a study with limited resources. The questionnaires were distributed randomly to students on both campuses.

Data collection using a questionnaire and assessment criteria:

Data for this non-clinical study was collected using a modified version of the "Computer Vision Syndrome Questionnaire" (CVS-Q), developed and validated by Seguí et al. [9]. The modified questionnaire contained three sections (A, B, C) and a total of 49 questions, both open and closed-ended questions.

Section-A:

contained eight questions (Q 1 to Q 8) to probe the respondents' socio-demographic profile.

Section-B:

contained 25 questions (Q 9 to Q 33). The questions in this section seek to elicit information about the respondent's daily practices when using a computer, smart phone, mobile phones, or similar devices. The response options were either "Yes", "No", or "Don't know". For assessment, each correct answer was given a score of "1", each incorrect answer or "don't know" was given zero.

Section-C the CVS-Q questionnaire:

This section consisted of two parts: 1. Frequency and 2. Intensity. Respondents were required to indicate if they ever felt any of the symptoms when using the computer / cell phone or other digital devices. The CVS-Q assessed the "Frequency" and "Intensity" of the **16 Symptoms** (Q 34 to Q 49) which may be experienced by individuals using VDTs. The symptoms are, *burning eyes, itching, foreign body sensation, tearing, excessive blinking, eye redness, eye pain, eyelid heaviness, dry eye, blurred vision, double vision, difficulty focusing on near vision, increased sensitivity to light, colored halos around objects, feelings of worsening eyesight and headache* [9].

Study variables and Data analysis:

The dependent variable of this study was the presence of CVS (dichotomous). The independent variables included age (continuous), gender (dichotomous), duration of computer use (categorical), frequent blinking of eyelids (dichotomous), viewing distance of the screen (dichotomous), level of top of the computer screen (ordinal), sitting position (dichotomous), glare on the computer screen (dichotomous), brightness of the surroundings (categorical), CVS awareness (dichotomous), taking breaks (categorical), wearing eyeglasses (dichotomous), screen brightness adjustment (dichotomous).

Excel MS data pack software and the Statistical Package for Social Sciences (SPSS) version 20 were used for statistical analysis of the data.

Exclusion criteria:
Students that did not give consent were excluded from the study.

Ethical Clearance**:**
Ethical clearance and approval for this project were obtained from the Ethical and Research Grant Committee of the SMHS UPNG, and informed consent was obtained from each of the participants.

RESULTS:
This non-clinical questionnaire-based study with three major sections (A, B, C) was carried out between June and September 2024. Of the 200 questionnaires distributed to students on the Taurama campus only 138 were completed and found suitable for analysis. The response rate was 69.0%. For the Waigani campus, only 50 of the 200 questionnaires were completed and found suitable for analysis. The response rate was 25.0%. The low response rates obtained in the present study have been reported by other researchers involved in medical related research projects in the UPNG [31].

SECTION A:
Sociodemographic and use of digital devices:
A total of 188 students in both campuses participated in the study. Of these 138 (73.4%) were in Taurama campus and 50 (26.6%) were in Waigani campus. The mean age of the 188 students was 23.9 ± 4.6 years.

Gender distribution of the 138 students in Taurama campus shows that 59.4% (82/138) were males and 40.6% (56/138) were females. For students in the Waigani campus 54.0% (27/50) were males and 46.0% (23/50) were females.

The mean age of the students in Taurama campus was 25.4 ± 5.6 years. The mean age for the male students was 23.6 ± 2.2 years, mean age for female students was 28.1 ± 7.7 years. For students in Waigani campus the mean age was 22.3 ± 3.6 years. Mean age for male students was 21.9 ±1.76 years; mean age for female students was 22.9 ± 5.1 years.

Of the 138 students on Taurama campus, 80.4% (111/138) were single, 19.6% (27/138) were married. For the 50 students on the Waigani campus, 98.0% (49/50) were single and 2.0% (1/50) were married.
The students on both campuses were not separated into gender and marital status for further analysis of the data.

Table 1 shows the responses to general questions regarding the use of digital devices.
In response to question No 5 (Q 5) "*Do you use a laptop computer regularly?*" A total of 91.3% of the students in Taurama campus said "Yes"

compared to 82.0% in Waigani campus. The follow up question, Q 6, was, "*Do you use a Tabletop computer regularly?*" 87.7% of the students in Taurama campus answered in the negative compared to 84.0% of students in Waigani campus with a similar answer. The next question Q 7, was, "*Do you use a smart / mobile phone?*" Most of the students in Taurama (95.7%) and Waigani (94.0%) answered in affirmative. When the students were asked Q 8 "*Do you know about the condition called computer vision syndrome (CVS) also called digital eye strain (DES)*? Only 15.9% of the students in Taurama said Yes, compared to 20.0% of the students in Waigani campus.

Table 1: General questions on use of digital devices

			TAURAMA	WAIGANI
Q 5	Do you use a laptop computer regularly?	Yes	91.3%	82.0%
		No	8.0%	18.0%
		Don't know	0.7%	0
Q 6	Do you use a Tabletop computer regularly?	Yes	10.1 %	14.0%
		No	87.7%	84.0%
		Don't know	2.2%	2.0%
Q 7	Do you use a smart / mobile phone regularly?	Yes	95.7 %	94.0%
		No	4.3%	6.0%
		Don't know	0	0
Q 8	Do you know about the condition called computer vision syndrome (CVS) also called digital eye strain (DES)?	Yes	15.9 %	20.0%
		No	83.3%	60.0%
		Don't know	0.7%	20.0%

SECTION B:

The questions (Q 9 to Q 33) in this section were to assess the daily practice of students while using a computer, smart phone, mobile phones, or other similar devices. This section also assessed the knowledge and awareness of students about the sitting position, screen distance and device-related factors and the associated problems. The questions and responses are presented in Table 2.

To assess the awareness about their sitting position when using a tabletop computer, the students were asked Q 9 "What is your sitting position while you are using a tabletop computer?" In response, 53.6% of students in Taurama compared to 34.0% in Waigani stated

that "my face is just at the level of the computer screen". In Taurama, 24.6% of students compared to 48.0% said that "my face is not at the level of the computer screen". The follow up question, Q 10 was about the sitting position when using a laptop computer. Most of the students in Taurama (65.9%) and in Waigani (52.0%) said that their face is just at the level of the computer screen.

When asked about the distance from the computer screen (Q 11), almost equal percent of students in Taurama (52.2%) and Waigani (50.0%) reported the length of the forearm.

In response to Q 12, about the top of the computer screen, 52.2% of students in Taurama and 38.0% in Waigani responded correctly – "at the level of your eyes".

Q 13 was to determine the type of electronic devices with screen commonly used by the students. The results are presented in Figure 1.

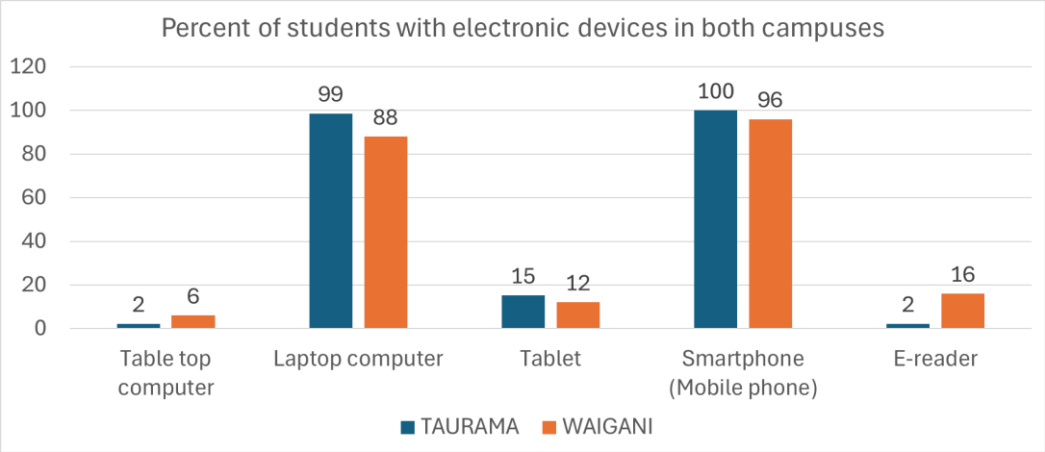

Figure 1: Response to Q 13: % of students with electronic devices with screen

In response to Q 14, 52.2% of students in Taurama campus compared to 70.0% in the Waigani campus reported the presence of bright lights that disturbs their vision when using their computer. Majority of the students in Taurama (60.2%) and Waigani (66.0%) responded yes to Q 15 that computer vision syndrome (CVS) causes eye problems. However, 36.2% of students in Taurama compared to 44.0% in Waigani campus, in response to Q 16 spent more than 8 hours a day using electronic devices. These answers agreed with the responses to Q 17 by students in both campuses. In addition, in response to Q 18, only a limited percent of students in Taurama (12.3%) and Waigani (20.0%) campuses are

aware of the "20-20-20 Rule". When asked Q 19, "*Do you use eyeglasses?*", most of the students in Taurama (92.0%) and Waigani (88.0%) campuses do not use eyeglasses. The students were asked Q 22, "*Do you use contact lenses?*" only 2.2% and 4.0% of students in Taurama and Waigani campus respectively answered in the affirmative.

In response to Q 24, "*Have you had eye surgery in the past"*? The majority of the students in both campuses answered in the negative. The follow up question Q 25, "*Do you have a habit of frequent voluntary blinking*"? Among the students in Taurama campus 20.3% answered in the affirmative compared to 34.0% of the students in the Waigani campus.

When asked Q 26, about the lighting conditions when using the computer, 58.7% of students in Taurama and 54.0% in Waigani said bright light. In response to Q 27, most of the students in Taurama (78.3%) and Waigani (72.0%) usually adjusted the contract of their computer with the surrounding brightness. Only a few of the students, 19.6% in Taurama and 18.0% in Waigani campuses use anti-glare filter on their computer. When asked Q 29, if they have ever used lubricant eye drops after working on the computer, 5.0% in Taurama and 18.0% in Waigani campuses answered in the affirmative.

In Q 30, students were asked if they sometimes have neck pain because of working on the computer, 73.9% of students in Taurama compared to 4.0% in Waigani said Yes. The next question was, Q 31, if they sometimes have shoulder pain because of working on the computer, 67.4% of students in Taurama and 90.0% of students in Waigani said Yes. In response to Q 32 about back pain when working on the computer, 80.4% of students in Taurama and 82.0% in Waigani answered Yes. When asked Q 33, if they sometimes feel numbness in the hands or fingers, 61.6% of students in Taurama and 92.0% in Waigani said Yes. All the results for section B are presented in Table 2.

Table 2: Sitting position, Screen distance, and Device-related factors

Q 9	**What is your sitting position while you are using a tabletop computer?**			**TAURAMA**	**WAIGANI**
	(i)	My face is just at the level of the computer screen	Yes	53.6%	34.0%
			No	31.2%	50.0%
			Don't know	15.2%	16.0%
	(ii)	My face is not at the level of the computer screen	YES	24.6%	48.0%
			No	59.4%	36.0%
			Don't know	15.9%	16.0%

				TAURAMA	WAIGANI
Q 10	**What is your sitting position while you are using a laptop computer?**				
	(i)	My face is just at the level of the computer screen	Yes	65.9%	52.0%
			No	31.2%	46.0%
			Don't know	2.9%	2.0%
	(ii)	My face is not at the level of the computer screen	Yes	30.4%	44.0%
			No	65.9%	54.0%
			Don't know	3.6%	2.0%
Q 11	**What is your distance from the screen when using the computer?**			**TAURAMA**	**WAIGANI**
	(i)	Longer than my forearm + wrist (> 75 cm)	Yes	26.8%	32.0%
			No	68.4%	68.0%
			Don't know	4.4%	0
	(ii)	About the length of your forearm (about 40 cm -75 cm)	Yes	52.2%	50.0%
			No	46.4%	50.0%
			Don't know	1.4%	0
	(iii)	Shorter than my forearm (< 40 cm)	Yes	26.1%	24.0%
			No	70.3%	76.0%
			Don't know	3.6%	0
Q 12	**Where is the top of your computer screen?**			**TAURAMA**	**WAIGANI**
	(i)	Above the level of your eyes	Yes	17.4%	22.0%
			No	81.2%	78.0%
			Don't know	1.4%	0
	(ii)	At the level of your eyes	Yes	52.2%	38.0%
			No	45.7%	62.0%
			Don't know	2.2%	0
	(iii)	Below the level of your eyes	Yes	34.8%	44.0%
			No	62.3%	56.0%
			Don't know	2.9%	0
Q 13	**What type of electronic devices with screen do you have? (Tick all that apply)**			**TAURAMA**	**WAIGANI**
	(i)	Tabletop computer	Yes	2.2%	6%
			No	97.8%	94%
			Don't know	0	0
	(ii)	Laptop computer	Yes	98.6%	88.0%
			No	1.4%	12.0%
			Don't know	0	0
	(iii)	Tablet	Yes	15.2%	12.0%
			No	84.8%	88.0%
			Don't know	0	0
	(iv)	Smartphone (Mobile phone)	Yes	100%	96.0%
			No	0	4.0%
			Don't know	0	0
	(v)	E-reader	Yes	2.2%	16.0%
			No	97.8%	84.0%
			Don't know	0	0
Q 14	**Is there any glare** ("presence of bright light that disturbs the vision due to direct or reflected sunlight or overhead lamps") **on the computer screen?**		Yes	52.2%	70.0%
			No	29.7%	16.0%
			Don't know	18.1%	14.0%
Q 15	Can Computer Vision Syndrome (CVS) causes eye problems?		Yes	60.2%	66.0%
			No	4.3%	2.0

			Don't know	35.5%	32.0%
Q 16	**How many hours a day do you spend using electronic devices? (Choose only one option)**			**TAURAMA**	**WAIGANI**
	(i)	Less than 2 hours	Yes	2.2%	0
			No		
			Don't know	0	0
	(ii)	Between 2 to 4 hours	Yes	15.9%	10.0%
			No		
			Don't know		
	(iii)	Between 4 to 6 hours	Yes	22.5%	24.0%
			No		
			Don't know		
	(iv)	Between 6 to 8 hours	Yes	23.2%	24.0
			No		
			Don't know		
	(v)	More than 8 hours	Yes	36.2%	42.0
			No		
			Don't know		
Q 17	**How often do you take a break while using the computer? (Choose only one option)**			**TAURAMA**	**WAIGANI**
	(i)	Every 20 minutes of work	Yes	24.6%	32.0%
			No		
	(ii)	Every 60 minutes of work	Yes	36.2%	22.0%
			No		
	(iii)	Every 2 hours of work	Yes	15.9%	12.0%
			No		
	(iv)	More than every 2 hours	Yes	23.3%	34.0%
			No		
Q 18	**Do you know about the 20-20-20 Rule** (*Take a 20-second break every 20 minutes and focus your gaze on an object 20 feet away*)**?**		Yes	12.3%	20.0%
			No	67.4%	62.0%
			Don't know	20.3%	18.0%
Q 19	**Do you use eyeglasses?** (If you answer **No**, jump to **Q 22**)		Yes	8.0%	12.0%
			No	92.0%	88.0%
			Don't know	0	0
Q 20	**If you answer YES to Q 19; Do you know the purpose of your eyeglasses?**			**TAURAMA**	**WAIGANI**
	(i)	For computer use only	Yes	0	16.7
			No	100.0	0
			Don't know	0	0
	(ii)	For vision use only	Yes	36.4	83.3
			No	0	0
			Don't know	0	0
	(iii)	For both computer and vision use	Yes	63.6	100
			No	0	0
			Don't know	0	0
Q 21	**If you answer YES to Q 19; Do your eyeglasses have anti-reflecting and/or blue light filter coating?**		Yes	72.7%	83.3%
			No	18.2%	16.7%
			Don't know	9.1%	0
Q 22	**Do you use contact lenses?** (If you answer **No**, jump to **Q 23**)		Yes	2.2%	4.0%
			No	97.8%	96.0%
			Don't know	0	0

Q 23	**If you answer YES to Q 22; Do you know the purpose of your contact lenses?** (Choose only one of the options)			**TAURAMA**	**WAIGANI**
	(i)	For computer use only	Yes	0	50%
			No	100	0
	(ii)	For vision use only	Yes	0	50%
			No	100	0
	(iii)	For both computer and vision use	Yes	100.0	0
			No	0	0
Q 24	**Have you had eye surgery in the past?**		Yes	1.4%	2.0%
			No	98.6%	98.0%
			Don't know	0	0
Q 25	**Do you have a habit of frequent voluntary blinking?**		Yes	20.3%	34.0%
			No	64.5%	58.0%
			Don't know	15.2%	8.0%
Q 26	**What are the usual lighting conditions when you are using the computer?** (Choose only one of the options)			**TAURAMA**	**WAIGANI**
	(i)	Very bright	Yes	5.8%	6.0%
			No	0	0
			Don't know	0	0
	(ii)	Bright	Yes	58.7%	54.0%
			No	0	0
			Don't know	0	0
	(iii)	Dark	Yes	17.4%	20.0%
			No	0	0
			Don't know	0	0
	(iv)	Dull	Yes	18.1%	20.0%
			No	0	0
			Don't know	0	0
Q 27	**Do you usually adjust the contrast of your computer with the surrounding brightness?**		Yes	78.3%	72.0%
			No	20.3%	28.0%
			Don't know	1.4%	0
Q 28	**Do you usually use an anti-glare /filter / blue light filter for your computer screen?**		Yes	19.6%	18.0%
			No	73.2%	82.0%
			Don't know	7.2%	0
Q 29	**Have you ever used lubricant eye drops after working on the computer?**		Yes	5.0%	18.0%
			No	92.8%	74.0%
			Don't Know	2.2%	8.0%
Q 30	**Do you sometimes have neck pain because of working on the computer?**		Yes	73.9%	4.0%
			No	22.5%	96.0%
			Don't know	3.6%	0
Q 31	**Do you sometimes have shoulder pain because of working on the computer?**		Yes	67.4%	90.0%
			No	27.5%	10.0%
			Don't know	5.1%	0
Q 32	**Do you sometimes have back pain because of working on the computer?**		Yes	80.4%	82.0%
			No	16.7%	12.0%
			Don't know	2.9%	6.0%
Q 33	**Do you sometimes feel numbness in your hands or fingers?**		Yes	61.6%	92.0%
			No	32.6%	8.0%
			Don't know	5.8%	0

SECTION C: COMPUTER VISION SYNDROME (CVS):

This section focuses on the non-clinical method for the diagnosis of CVS, which has been made by several authors using the modified versions of the "Computer Vision Syndrome Questionnaire" (CVS-Q), developed and validated by Seguí et al. [9].

The CVS-Q assesses the frequency and intensity of 16 symptoms which are experienced by individuals using VDT [9]. The results obtained in this study using the 16 symptoms (Q 34 to Q 49) are presented in **Table 3** for students in the Taurama campus and **Table 4** for students in the Waigani campus.

The percentage frequency of the symptoms that occur occasionally were higher among students in Waigani compared to those in Taurama campus. The intensity of the symptoms was also higher among students in Waigani compared to those in Taurama.

To assess the prevalence of CVS the guidelines proposed by Segui et al [9] was used.

According to the guidelines, the frequency was quantified as: Never = 0; Occasionally = 1; Often or always = 2.

The Intensity of the symptoms was rated as: Moderate = 1; Intense (severe) = 2.

The Severity was determined by the Product of Frequency and Intensity.

Later, the Product was recorded as 0 = 0; 1 or 2 = 1; and 4 = 2.

For the final score of the CVS, the Sum of the Recorded Severity Scores was used.

Individuals with Scores of 6 or higher were considered to have CVS [4, 6, 7, 8, 9].

Table 3:
SECTION C: COMPUTER VISION SYNDROME AMONG STUDENTS IN TAURAMA CAMPUS UPNG

		FREQUENCY			INTENSITY	
Symptoms of CVS		**Never**	**Occasionally**	**Often /Always**	**Moderate**	**Severe**
34	Tearing eyes	47.1 %	45.7 %	7.2 %	90.4 %	9.6 %
35	Eye redness	45.7 %	44.9 %	9.4 %	88 %	12 %
36	Eye pain (ocular pain)	46.4 %	44. 9 %	8.7 %	91.9 %	8.1 %
37	Burning sensation in eyes	65.2 %	31.2 %	3.6 %	91.7 %	9.1 %
38	Dryness in eyes (dry eyes)	78.3%	19.6 %	2.2 %	96.7 %	3.3 %
39	Itching eyes	50.0 %	46.4 %	3.6 %	92.8 %	7.2 %
40	Feeling of foreign body in the eyes	68.1%	29.0 %	2.9 %	86.4 %	13.6 %
41	Blurred vision	55.1 %	36.2 %	8.7 %	90.3 %	9.7 %

42	Increased sensitivity to light	43.5 %	41.3 %	15.2 %	76.9 %	23.1%
43	Double vision	78.3 %	15.9 %	5.8 %	83.3 %	16.7 %
44	Excessive blinking	79.0 %	15.2 %	5.8 %	72.4 %	27.6 %
45	Heavy eyelids	66.7 %	29.7 %	3.6 %	87.0 %	13 %
46	Difficulty focusing for near vision	73.%	17.4 %	18.7 %	75 %	25 %
47	Color halos around objects	80.4 %	17. 4%	2.2 %	92. 6 %	7.4 %
48	Feeling that sight is worsening	5.4 %	21 %	3.6 %	88.2 %	11.8 %
49	Headache	35.5 %	54.3 %	10.1 %	86.5 %	13.5 %

Table 4:
SECTION C: COMPUTER VISION SYNDROME AMONG STUDENTS IN WAIGANI CAMPUS UPNG

		FREQUENCY			INTENSITY	
Symptoms of CVS		**Never**	**Occasionally**	**Often /Always**	**Moderate**	**Severe**
34	Tearing eyes	38 %	58 %	4 %	93.5 %	6.5 %
35	Eye redness	30 %	60 %	10 %	94.3%	5.7 %
36	Eye pain (ocular pain)	32 %	54 %	14 %	73.5 %	8.8 %
37	Burning sensation in eyes	44 %	50 %	6 %	89.3 %	10.7 %
38	Dryness in eyes (dry eyes)	64 %	36 %	0	100 %	0
39	Itching eyes	28 %	64 %	8 %	88.9 %	11.1 %
40	Feeling of foreign body in the eyes	74 %	20 %	6 %	76.9 %	23.1 %
41	Blurred vision	36 %	48 %	16%	87.5%	12.5 %
42	Increased sensitivity to light	28 %	54 %	18 %	80.6 %	19.4 %
43	Double vision	66%	32 %	2 %	100 %	0
44	Excessive blinking	52 %	36 %	8 %	81.8 %	18.2 %
45	Heavy eyelids	56 %	52 %	12 %	87.5 %	12.5 %
46	Difficulty focusing for near vision	64 %	28 %	8 %	8.9 %	11. 1 %
47	Color halos around objects	72 %	24 %	4 %	92.9 %	7.1 %
48	Feeling that sight is worsening	64 %	32 %	4 %	88.9 %	11.1 %
49	Headache	14 %	68 %	18 %	81.4 %	18.6 %

Results of the analysis are presented in Table 5. In Taurama campus 55.1% of the students that participated in this study were CVS positive compared to 82.0% of the students in the Waigani campus. Gender distribution of the results show that 51.2% of the students in

Taurama compared to 77.8% of the students in Waigani were CVS positive. Among the female students 77.8% in Taurama and 87.0% in Waigani were CVS negative.

This seems to indicate that in both campuses the female students are more vulnerable to developing digital eye injury later. It is possible that the female students are using their digital screen devices like mobile phones and computers more frequently that the male students.

Table 5: Prevalence of CVS among students in Taurama and Waigani campuses

	Taurama campus	Waigani campus
CVS negative (Product < 6)	44.9% (63/138)	18.0% (9/50)
CVS positive	55.1% (76/138)	82.0% (41/50)
Highest CVS Score	24	23
Males (CVS positive)	51.2% (42/82)	77.8% (21/27)
Females (CVS positive)	60.7% (34/56)	87.0% (20/23)

DISCUSSION:

The findings in Section A show that laptop computers, mobile and smartphones are very popular among students on both campuses compared to tabletop computers. These findings are consistent with report by other authors [8, 32], that the use of these digital devices is popular among university students worldwide. The lack of knowledge of students about the CVS also called DES has been reported by other researchers in different countries worldwide [8, 32]. To the best of our knowledge this is the first study among students in the university of Papua New Guinea (UPNG). The recommended sitting position in from of the computer is for the face to be at the level of the tabletop computer screen as reported by 53.6% of students in Taurama and 34.0% in Waigani. The correct answer was given by most of the students in Taurama campus. The distance from the computer screen was similar among about half of the students in both Taurama and Waigani. The results indicated that the students in Taurama campus are more aware of the sitting position and

distance of the computer from the user compared to those in the Waigani campus. The difference in knowledge, however, was not statistically significant ($p > 0.5$). Laptop computers and Smartphones (Mobile phones) were the most popular digital devices with screens among the students in both campuses. These findings are similar to those reported by other researchers in different universities around the world [8, 32].

The responses of students to Q 16 seem to indicate that they have some knowledge about the negative impact of computers on their vision. However, their responses to Q 17 and Q 18 show very limited knowledge about the basic concepts to protect the eyes from damage using digital devices with screens. Most of the students in the present study do not use eyeglasses or contact lenses. One of the major reasons is because the age range of the students in the present study was 18 to 30 years, which is the age range of youths and young adults with relatively good eyesight compared to older adults.

Most of the students on both campuses correctly adjusted the contrast of their computers with the surrounding brightness. The use of anti-glare filter was not popular among the students in both campuses. The use of lubricant eye drops after working on their computers was also not popular among the students in both campuses. Neck pain was common among students in Taurama campus compared to their colleagues in Waigani. One of the reasons might be because of the posture and sitting position of the students. Although shoulder pain was common among both groups of students, it was significantly higher among students in Waigani campus. Back pain was a common occurrence among students in both campuses. This may be due to improper posture when working on their laptop computers. Although students in both campuses reported having numbness of hands and fingers, the conditions were more common among students in Waigani campus.

The findings of the present study show that the CVS scores for students in Taurama ranges from 0 to 24 compared to those in Waigani with a maximum range of 23. These scores are within the range 0 to 27 reported for university students by other authors [32, 33, 34].

Our results show that 55.1% of students in Taurama campus and 82.0% in Waigani campus were positive for CVS. The result for Taurama campus was lower than the 70% reported for students in Ethiopia [33]. The 82% for students in Waigani was higher than the 70% reported for the study in Ethiopia [33]. Other studies among students in some universities in Malaysia reported that 89.9% of the students had CVS [35]. This score is higher than the CVS scores for students in both Taurama and Waigani campuses.

In another study among university students in Colombo [36], most (76.7%) of the students suffered from CVS. This value is higher than the 55.1% among students in Taurama, but lower than the 82.0% among students in Waigani campus. According to the authors 76.1% of the CVS sufferers had poor head posture; a vast majority reported dull environmental illumination, leaning forward during device usage. In addition, the top line of the screen above eye level was reported by 80.9% of students who suffered from CVS [36]. These values are not significantly different from the values obtained in our present study.

We agree with the authors [32, 33, 36] that taking short breaks, proper posture, less duration using the computer, adequate illumination, and correct viewing angle may alleviate symptoms of CVS. These findings underline the importance of preventing CVS among university students and encouraging the use of computers in an ergonomic way to get the advantage of posture-related health risks. Suitable preventive measures must be adopted, giving special importance to those presenting risk factors.

CONCLUSION:

The findings of this study highlight the prevalence of Computer Vision Syndrome (CVS) among undergraduate students at the UPNG, with 55.1% of students on the Taurama campus and 82.0% on the Waigani campus exhibiting symptoms associated with CVS. The high prevalence rates in both campuses, particularly in Waigani, indicate a pressing need for increased awareness and preventive measures among students regarding the potential ocular impacts of prolonged digital device usage.

Despite the popularity of laptops and smartphones among students, there is a concerning lack of knowledge regarding CVS and effective protective practices. While some students demonstrated awareness of proper sitting positions and screen distances, many reported limited understanding of how to mitigate eye strain, underscoring the necessity for educational interventions.

Additionally, the study reveals that posture-related issues, such as neck and shoulder pain, are prevalent, which may be linked to the overall ergonomic awareness of students. These findings suggest that the appropriate authorities in the UPNG should consider implementing awareness programs and ergonomic assessments to promote healthier habits among students. Regardless of the low sample size in this study, the results clearly show that a significant proportion of the students that participated suffer from symptoms of CVS.

Overall, this study serves as an important initial assessment of CVS among students at UPNG, paving the way for future research and the development of strategies to address this growing health concern.

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EVALUATION OF EFFICACY AND TOLERABILITY OF FIXED DOSE COMBINATION OF RIFAXIMIN AND METRONIDAZOLE IN THE MANAGEMENT OF IRRITABLE BOWEL SYNDROME WITH DIARRHEA

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ABSTRACT:

Irritable bowel syndrome, a prevalent functional bowel disorder, significantly affects patients' everyday lives and imposes a substantial economic burden on society. However, treatments options for managing diarrhea-predominant irritable bowel syndrome are limited. Rifaximin along with metronidazole is proposed as a treatment option for irritable bowel syndrome with diarrhea. The aim of this study was to evaluate the efficacy and tolerability of a fixed dose combination of rifaximin and metronidazole in the management of irritable bowel syndrome with diarrhea. An open-label, non-comparative, non-randomized, multicentre trial was conducted in 25 subjects presenting with acute diarrheal episodes associated with irritable bowel syndrome. The study was approved by institutional research ethics committee and participants provided signed informed consent. Patients were given fixed dose combination tablet containing rifaximin 200mg and metronidazole 400mg twice daily for 5 days. Primary outcomes were change from baseline in number of soft or watery stools, abdominal pain and gas/flatulence at day 5. Efficacy and tolerability was evaluated based on the global assessment by the investigators on a 3 point scale marked as Excellent/Good/Poor. Adverse drug reaction was assessed throughout the study period. After 5 days of therapy, mean number of watery stool per day were reduced from 7.6 ± 2.958 to 0.96 ± 1.098 ($P<0.0001$). None of the patients reported abdominal pain or gas/flatulence at end of study. As per investigators assessment all patients reported good to excellent efficacy and tolerability. Minor incidences of gastritis, nausea and metallic taste were reported in 12%, 12% and 8% patients respectively. In conclusion, combination of rifaximin and metronidazole significantly reduces number of watery stools and associated symptoms and is a clinically effective and safe option in the management of acute diarrhea associated with irritable bowel syndrome.

Keywords: Acute diarrhea, irritable bowel syndrome, rifaximin, metronidazole

INTRODUCTION:

Irritable bowel syndrome (IBS) is a type of functional bowel disorder that is characterized by recurring abdominal pain and a change in bowel habits, often accompanied by abdominal bloating [1]. It affects about 20% of the general population, mainly women. The diagnosis of IBS is based on the Rome IV criteria, which requires the presence of recurrent abdominal pain at least once per week during the previous three months and associated with at least two of the following: defecation, alterations in stool frequency, and changes in stool form [2]. IBS is further classified into different types based on the predominant bowel habit, which includes constipation-predominant IBS, diarrhea-predominant IBS (IBS-D), or mixed-form IBS. IBS and IBS-D in particular are known to negatively impact a person's quality of life and increase healthcare costs [2].

Irritable bowel syndrome (IBS) is a complex disorder with a multifactorial etiology, involving alterations in gut microbiota, gastrointestinal motility, microscopic inflammation, bile acid malabsorption, and alterations in the enteric nervous system. There is no gold standard of treatment, and a personalized approach is necessary [1].

Management includes patient education, stress reduction, and dietary advice. In patients with IBS-D, therapeutic options include antibiotics, peripheral opioid agonists, mixed opioid agonists/antagonists, bile acid sequestrants and antagonists of serotonin 5-hydroxytryptamine type 3 receptors [2].

Loperamide may reduce the frequency of bowel movements and improve stool consistency, but it does not improve global IBS symptoms or abdominal pain and can cause constipation. A strong physician-patient relationship is essential in managing IBS. Eluxadoline is a mixed μ-opioid agonist and δ-opioid antagonist used to slow bowel motility and reduce visceral pain in IBS-D patients. However, it can cause constipation and nausea and is contraindicated in patients with a history of pancreatitis, bile duct obstruction, sphincter of Oddi dysfunction or alcohol abuse. Bile acid sequestrants, such as cholestyramine, colestipol, and colesevelam, can also be effective in improving stool consistency and decreasing bowel movements, particularly in patients with bile acid malabsorption, but can cause constipation and interfere with drug absorption.

Antagonists of serotonin 5-HT3 receptors, such as alosetron, ondansetron, and ramosetron, can be effective in reducing abdominal pain and improving stool frequency and consistency in selected patients with IBS-D, but can cause

constipation and ischemic colitis, and should be used with caution [2].

Rifaximin is a non-absorbable rifamycin that has been shown to be effective in reducing IBS symptoms, bloating, and loose or watery stools after 2 weeks of treatment, and is well-tolerated with no significant adverse events [3]. It has also been found to be safe and effective in repeated treatments of recurrent symptoms [4]. Moreover, rifaximin eradicates small intestinal bacterial overgrowth (SIBO) in patients with IBS, with results sustained up to 10 weeks post-treatment [5]. Metronidazole is an antimicrobial agent that has been used in clinical medicine for more than 45 years [6]. It has shown to provide symptom relief in irritable bowel syndrome, without affecting rectosigmoid motility [7] in addition to anti-protozoal and broad-spectrum anti-bacteria activity [6]. Metronidazole therapy also results in sustained improvement in pain, stool and total score in post-infectious irritable bowel syndrome (PIIBS) and diarrhoea-predominant IBS subgroups [8]. Considering the above evidence, the current study proposes fixed dose combination (FDC) of rifaximin and metronidazole as a useful treatment option in the management of acute diarrhea associated with irritable bowel syndrome.

METHODOLOGY:

Study design and patients

This study was an open-label, non-comparative, non-randomized, multicentre trial in 25 patients conducted in 10 clinics located at various parts of India. Patients (men and non-pregnant women having age >18 years) providing signed informed consent were eligible for this study based on following inclusion and exclusion criteria. The study was approved by the institutional research ethics committee.

Inclusion criteria

Patients fits Rome IV criteria for IBS with diarrhea (IBS-D), which is defined by >25% of abnormal bowel movements with Bristol stool form types 6 or 7 (loose, watery stool) and <25% of abnormal bowel movements with Bristol stool form types 1 or 2 (hard, lumpy stool).

Patients suffering from abdominal pain, on average, ≥1 day per week in previous 3 months, associated with ≥2 of the following: (1) Related to defecation, (2) Associated with a change in stool frequency, or (3) Associated with a change in form (appearance) of stool.

Colonoscopy must have been completed within the past 10 years.

Exclusion criteria

Patients with known/suspected history of hypersensitivity to any of the trial related drug, dysentery, colitis, gastrointestinal bleeding.

Taking rifaximin or any other antibiotic within past 60 days.

Known cases of renal or hepatic insufficiency, cardiac diseases or diabetes.

Pregnant or lactating women.

History of GI surgery.

Treatment and duration of treatment

Patients were given 1 tablet of Rifaxigyl-M containing Rifaximin 200 mg and Metronidazole 400 mg twice daily for 5 days.

Assessment of Primary Outcome Measure

Following parameters were evaluated at baseline, day 3 and day 5 of the study.

Number of soft or watery stools

Abdominal pain and

Gas/flatulence

Assessment of Secondary Outcome Measure

Efficacy and tolerability were evaluated based on the global assessment by the Investigators on a 3-point scale marked as Excellent/Good/Poor. Adverse event was recorded on a scale of scores 1 to 3 (1=mild, 2=moderate, 3=severe) and the action taken was documented.

Statistical analysis

Statistical analysis was done by "paired t-test" for each parameter compared with change from baseline to day 5. The minimum level of significance was fixed at 95% confidence limit and P <0.05 was considered as significant. All the statistical analysis was performed by using Graph Pad Prism 9 version 9.5.1.

RESULTS:

A total of 25 patients were included for final analysis. The recruited patients were in the age range of 18 to 71 years (mean age 45.88 ± 10.84).

Number of soft or watery stools:

Number of stools per day was recorded at the start and end of the trial.

Statistically significant reduction in number of bowel movement was reported with rifaximin + metronidazole fixed dose combination as compared to baseline. Number of stools per day reduced from 7.6 ± 2.958 to 0.96 ± 1.098 (P<0.0001). The results are presented in Table 1 and illustrated in Figure 1

Table 1: Baseline and Post-treatment Clinical Characteristics

Clinical symptoms	Number (%)		
	Baseline	Day 3	Day 5
Number of soft or watery stools	7.6 ± 2.958	2.56 ± 1.685	0.96 ± 1.098
Abdominal Pain	22 (88%)	3 (12%)	0 (0%)
Gas/Flatulence	12 (48%)	2 (8%)	0 (0%)

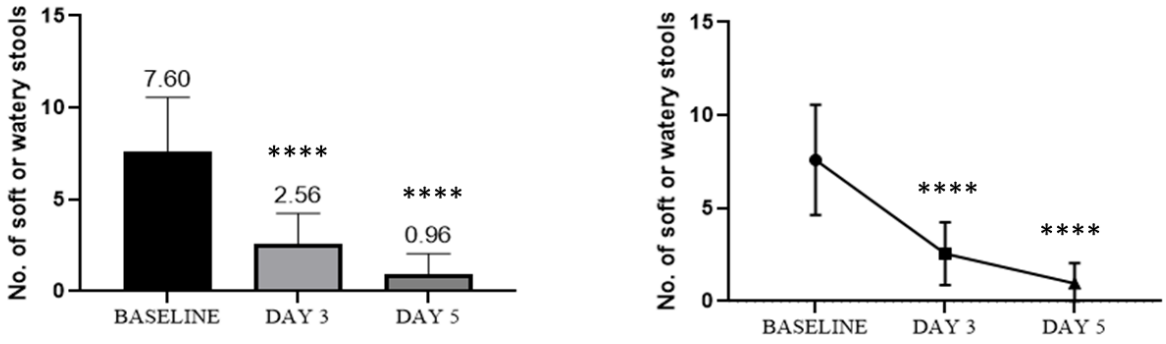

Figure 1: Mean reduction in number of watery stools. ****P<0.0001

Other Parameters

Out of 25 patients, 88% reported abdominal pain and 48% reported gas/flatulence at baseline. All the patients reported no symptoms at the end of the trial.

Safety Evaluation

Incidences of gastritis, nausea and metallic taste were reported in 12%, 12%, and 8% of patients respectively. No serious adverse events were reported which led to withdrawal of patient from study.

Global assessment of efficacy and tolerability

As per investigators assessment about efficacy of rifaximin + metronidazole fixed dose combination, 72% patients reported excellent, 28% patients reported good and none of the patients reported poor efficacy. As per investigators assessment about tolerability, 60% patients reported excellent, 40% patients reported good and none of the patients reported poor tolerability.

DISCUSSION:

IBS-D is a chronic condition characterized by a complex interplay between the gut and brain without an identifiable structural pathology. The condition is heterogeneous and has a multifactorial, evolving pathophysiology involving alterations in visceral sensitivity, gut microbial changes, increased intestinal permeability, disrupted motility, and immune and neural-hormonal system involvement. GI-related infections may predispose individuals to post infectious IBS, which occurs after resolution of a GI-related infection and meets the diagnostic criteria for IBS, even without a prior history of IBS symptoms [9].

Rifaximin is a non-systemic antibiotic used to treat IBS-D, administered as short-course therapy. It has been shown to significantly improve global IBS symptoms, including bloating and loose or watery stools with good tolerability and a favorable safety profile [9]. In

two randomized, double-blind, clinical studies of patients with non-constipation IBS (n = 1260), a pooled analysis revealed a significantly larger percentage of patients treated with rifaximin to achieve adequate relief of global IBS symptoms versus placebo for at least two of the first 4 weeks post-treatment (40.7% vs 31.7%, respectively; P < 0.001) [5]. In a repeat treatment trial, 44.1% of 2579 patients were open-label responders to rifaximin (patients with at least a 50% reduction in frequency of loose stools for at least two of the first 4 weeks post-treatment plus at least a 30% decrease from baseline in abdominal pain). Initial responders with symptom recurrence entered a randomized, double-blind, placebo-controlled repeat treatment phase where a significantly higher percentage of responders were observed with rifaximin (n = 328) versus placebo (n = 308) for 2 weeks (38.1% vs 31.5%, respectively; P = 0.03) [4]. According to the ACG guideline for managing IBS, rifaximin is recommended as a treatment for global IBS-D symptoms [10]. Rifaximin was also found to be effective and safe in eradicating SIBO, in a systematic review and meta-analysis that analyzed a total of 21 observational studies and 5 RCTs involving 874 patients [11]. Because rifaximin is non-absorbed, there is an absence of systemic drug–drug interactions and the drug possess an excellent safety profile due to limited potential for side effects. Therefore, this gut-selective antibiotic appears to be a promising agent for the treatment of acute diarrhea associated with IBS-D [5].

Metronidazole is frequently used in community practice in India to treat episodes of diarrhoea in patients with IBS and as an anti-protozoal and broad spectrum anti-bacterial. Most patients report relief of symptoms in the short-term treatment with this drug. Post-infectious irritable bowel syndrome accounts for 6%-17% of patients with IBS. Metronidazole therapy results in sustained improvement in pain, stool and total score in PIIBS and diarrhoea-predominant IBS subgroups [6, 7]. As metronidazole is an effective and safe treatment option for IBS-D it should complement rifaximin not only for a greater associated symptoms relief but also for post-infectious irritable bowel syndrome.

In the present study, combination of rifaximin and metronidazole in patients with IBS-D significantly reduced number of soft or watery stools. Symptoms associated such as abdominal pain and gas/flatulence were also significantly reduced. None of the patient withdrew from the study due to adverse events. Minor incidence of gastritis, nausea and metallic taste were reported. Thus, based on available clinical studies and present clinical data, rifaximin in combination with metronidazole is a safe and effective option for the management of acute diarrhea in patients with IBS-D.

CONCLUSION:

Acute diarrhea associated with IBS-D is a serious concern in India. In a quest for effective

and safer combination, FDC of rifaximin and metronidazole can be a new armamentarium in the management of IBS-D symptoms. Combination of rifaximin and metronidazole significantly reduced frequency of diarrhea and other associated symptoms with excellent efficacy and tolerability. Therefore, FDC of rifaximin and metronidazole is an innovative safe and effective option for the management of acute diarrheal episodes associated with IBS-D.

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BUILDING AWARENESS AND SUSTAINABLE PALLIATIVE CARE: A PERSPECTIVE ON KEY CHALLENGES AND OPPORTUNITIES FROM BRUNEI

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ABSTRACT:
Palliative care improves the quality of life for patients with life-limiting illnesses and their families. However, integrating these services into healthcare systems remains challenging, particularly in resource-limited settings. This paper provides a perspective on challenges and opportunities from Brunei in building awareness and sustainable palliative care. Key challenges include limited access to trained specialists, fragmented care systems, low health and death literacy, and the need for culturally adapted approaches. Potential solutions to address these barriers include training community leaders such as village heads, establishing multidisciplinary interest groups, and piloting palliative care in high-need areas such as intensive care units. Integrating palliative care into medical education and healthy ageing initiatives may foster a long-term cultural shift in supporting palliative care. Proposed community awareness strategies emphasize the empowerment of informal caregivers and communities, using public libraries as information hubs, and storytelling from care recipients to destigmatize palliative care. To ensure sustainability, fundraising is critical, which may be achieved through organizing conferences and getting support from governments and corporate social responsibility programs. It is hoped that these reflections will provide useful insights for other countries aiming to develop palliative care.

Keywords: Community; fundraising; palliative care, participation

INTRODUCTION:

Palliative care is an approach aimed at improving the quality of life of patients with life-limiting illnesses and their families. Palliative care encompasses care at any stage of a serious illness and is not limited to end-of-life care. In contrast, hospice care specifically focuses on providing comfort and support during the terminal phase of an illness, usually when curative treatment is no longer pursued. The complexity of care for these patients requires a multidisciplinary approach [1]. A systematic review found that the elements of effective palliative care models include communication and coordination between providers including primary care, improved skills, and the ability to

respond quickly to the person's changing needs and preferences over time [2]. Palliative care can be delivered across multiple settings, ranging from hospital or hospice based, as well as home-based palliative care [3].

Regardless of setting or patient characteristics, a systematic review found that all models of palliative care provided benefits to the patient and was associated with reduced total healthcare costs [4].

Despite these significant benefits, it is difficult to integrate palliative care into healthcare systems in the disease trajectory of those with serious illnesses. In the United States, there were several key barriers related to education, implementation and policies. There was lack of adequate education or training, inadequate palliative trained clinicians, difficulty identifying patients who require palliative care, fragmented healthcare systems, and inadequate reimbursement for palliative care provision [5].

These difficulties in establishing palliative care services occur worldwide. In 2011, globally, 58% of the countries had at least one palliative care service, but integration of palliative care was only achieved in 8.5% [6]. This increased to 70% and 14% respectively when the global survey was repeated in 2017 [7]. The World Health Organization non-communicable disease country capacity survey in 2015 showed that only 37% of countries included palliative care in their operational national policy for non-communicable diseases, with palliative care least likely to have funding available [8]. Projections of the global burden of serious health-related suffering that need palliative care by 2060 suggest that there will be an 87% increase in people dying with serious health-related suffering. This will increase significantly for low-income countries, among older people, cancer deaths and dementia [9]. Thus, it is important that countries take immediate action to integrate palliative care into health systems as an ethical and economic imperative.

A global initiative to provide palliative care leadership training is a six-month online course, the Fellowship in Palliative Care, jointly organized by the Institute of Palliative Medicine in India, St Christopher's Hospice in London, United Kingdom, Sanjeevan Palliative Care Project in Pondicherry, India and Bangabandhu Sheikh Mujib Medical University in Bangladesh. The curriculum covers palliative care concepts, skills and practical applications to enable participants to organize and start palliative care in their localities and is designed for clinical staff, program managers, coordinators, social workers, government agencies and professionals interested in establishing palliative care services [10].

In 2022, participants of the course were required to reflect on the following questions:

- *What were the five main barriers slowing down or blocking the establishment and/or*

expansion of palliative care services in your locality?

- *What are five possible ideas to help start or establish palliative care services in your locality?*
- *What are five possible interventions to improve the awareness and participation of the local community for palliative care?*
- *What are five possible options for fundraising towards palliative care?*

These questions are relevant, as it is important to identify barriers at the start of any program and find solutions to overcome them. Effective palliative care requires strong community advocacy and awareness [11].

Palliative care also tends to be short-changed when it comes to accessing funding through traditional mechanisms such as health budget allocations, hence a need to identify options for fundraising [12].

In this paper, the reflections on barriers and enablers for palliative care services, community awareness and fundraising ideas are described as it applies to Brunei, a small country in Southeast Asia with a population of 440000 people [13]. It is hoped that these considerations will form a useful case study that will seed ideas to initiate palliative care services in other countries.

Barriers to establishment or expansion of palliative care services in Brunei:

1. *Limited palliative care specialists and healthcare professionals with palliative care skills or expertise*:

The palliative care specialty is currently led by Consultant Oncologists instead of a palliative care physician. There are limited palliative specialists in the region and recruitment attempts have been unsuccessful. As of 2024, there are two nurses who completed postgraduate training in palliative care, but they are also involved in nursing management duties. There are no other doctors or allied health professionals with formal training or expertise in palliative care.

The Australian and New Zealand Society of Palliative Medicine recommends one full time equivalent (FTE) palliative medicine specialist per 100000 population [14], while the European Association for Palliative Care recommends two specialized palliative care services per 100000 people (one home care team and one hospital team) [15]. Thus, in an ideal situation, Brunei requires 4.5 FTE palliative specialists, with eight palliative teams in total. While recruitment is ongoing, currently, there are initiatives to teach the palliative care approach to other clinicians, focusing on pain management and advance care planning [16].

2. *Limited access to palliative care services*:

Palliative care services are predominantly Oncology-based at the Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, the main tertiary

hospital and The Brunei Cancer Centre (TBCC). These are hospital-based specialty services mainly for oncology patients who develop complications or require symptomatic treatment. Patients are unable to access these services unless there is a referral from primary care or another treating clinician, and must travel to the main hospital for a consultation. Primary care and regional hospitals do not have developed palliative services. Community nurses based in hospital may offer outreach visits but only for patients known to the service.

3. *Lack of integrated palliative care*:

Working in silos affects care coordination, especially for those requiring palliative care. Oncology services are based in TBCC, and neurology services are also based in a different hospital, while acutely unwell patients, those who require other specialty input or radiological interventions need to present at RIPAS Hospital. On discharge, the follow-up remains with specialty services. Primary care is under-developed and caters for minor illness only. Patients with chronic diseases may be seen by multiple doctors, affecting continuity of care and limits advance care planning discussions.

There are several areas of potential collaboration between different specialties and allied health professionals that may be led by palliative care. For example, patients with chronic obstructive pulmonary disease and heart failure require an interdisciplinary approach [17]. Palliative patients require significant allied health professional input, such as for malnutrition and rehabilitation [18,19].

4. *Low health and death literacy*:

Despite the high rate of non-communicable diseases (NCDs), patients often have poor health literacy, health maintenance or illness prevention behaviors and limited self-management skills for chronic diseases, including asthma management and self-monitoring of glucose in diabetes [20]. A delay in seeking medical review may also result in faster health decline and an increased need for palliative and supportive care. In advanced terminal illness, family members occasionally bring patients to hospital unaware of the disease trajectory. This may lead to poor acceptance that there is limited medical intervention or treatment available to reverse the condition. For example, when those with advanced dementia or imminently dying patients stop eating, there may be requests for intravenous fluids, nasogastric feeding or oxygen. Further effort is required to improve health literacy among the public, particularly the NCDs and death literacy to improve awareness and acceptance of end-of-life care [21].

5. *Need to tailor palliative care approach to local and cultural views or practices*:

There is also a need to tailor the palliative care approach to local and cultural views or practices. For example, pain assessment requires a good history and descriptions of pain, which the Short

Form McGill Pain Questionnaire 2 (SF-MPQ-2) had to be adapted for use in older people in Brunei [22].

Similarly, tools from Western countries such as the Gold Standards Framework to identify palliative patients [23], and advance care planning discussions require cross-cultural adaptation and localised training for these tools to be implemented in our settings [24].

Ideas to establish palliative care services in healthcare institutions or country:

- *Palliative Care Basic Training for village heads*:

In Brunei, village heads are elected officials carrying multiple responsibilities, including ensuring efficient distribution of the monthly old age pensions, monitoring the social welfare of vulnerable people, such as poverty and social isolation, as well as assist in formalities and paperwork for community deaths. They are strategically placed to offer basic palliative care services and would benefit from basic palliative care training.

Permission is required from the Ministry of Home Affairs, which is supportive of initiatives for skill development. The training session can be held over a weekend, which includes case discussions and practical application of these concepts with the palliative care team.

- *Palliative Medicine interest group for healthcare workers*:

Before the COVID-19 pandemic, a palliative medicine interest group was held monthly. Topics and sessions were coordinated by a nursing lecturer in palliative care from Universiti Brunei Darussalam (UBD). Sessions consisted of a lecture followed by a workshop. These were well received and attended by healthcare professionals from different specialties, ranging from doctors, nurses, allied health professionals and academics.

The interest group should be resurrected and adapted to an online format. Lists of previous attendees can be used to invite people to participate. The online option also offers an opportunity to access experts or guest speakers from abroad and increase the number of participants.

The COVID-19 pandemic taught healthcare professionals and communities about the importance of palliative care, and the need to adapt services in hospital and the community during a pandemic [25-27].

In addition, some groups of patients were found to be vulnerable during a pandemic, such as those with NCDs or dementia, which can be identified to increase their awareness of palliative care services [28]. This requires healthcare workers to be trained first.

- *Incorporate palliative care into healthy ageing regional initiatives*:

Brunei has a rapidly increasing ageing population, which require services to be developed to improve the well-being and

resilience of older people [29,30]. In the Asia-Pacific region, there are regional healthy ageing initiatives and policy discussions to manage this demographic change.

Brunei has developed Information Education Communication (IEC) messages for healthy ageing, which are the basis of health promotion materials. Several aspects of palliative care, such as advance care planning, rehabilitation to maintain function, mental well-being, quality of life (and death) can be introduced into the healthy ageing IEC materials in Brunei. This can be evaluated locally, and adapted for use in the region.

- *Introduce palliative care in areas of need*:

While the tertiary palliative care services in Brunei covers mainly cancer-related complications, there are other conditions that require palliative care, especially end-stage organ failures (cardiac, pulmonary, renal, hepatic and brain or advanced dementia). Unfortunately, these patients progressively decline and without advance care planning, may end up in the intensive care unit (ICU). A palliative service could be piloted in the ICU, offering outreach consultative services and palliative nursing support [31]. Patients can be proactively identified at ICU handover meetings for those who require palliative input and discharge planning. This pilot project will offer insights on how to subsequently introduce palliative care to other services.

- *Introduce palliative care into undergraduate and postgraduate medical education*:

When Geriatric Medicine was introduced in Brunei, core competencies related to the care of older people were introduced into the UBD medical and nursing curriculum. Lectures and tutorials were delivered by geriatricians from RIPAS hospital, with a geriatrics module incorporated into the undergraduate and postgraduate medical and nursing programs. A similar process can be done for palliative care so that palliative care concepts will be taught to medical, nursing and paramedic students, as well as Masters of Health students (consisting of Basic Specialty Trainees for Emergency Medicine, Internal Medicine, Surgery, Public Health, Primary Care, Intensive Care, Pediatrics, Obstetrics & Gynecology). After the pandemic, blended learning and the use of online modules opens further options for medical education, which can be applied to palliative care [32].

Ideas to improve awareness and participation of the local community in palliative care:

- *Empower village heads and 'death doulas'*:

Engaging and empowering communities through awareness raising is an essential cornerstone to develop palliative care [33]. Informal palliative care providers include village

heads and 'death doulas', who assist with the logistics of dying arrangements [34]. They can advocate for the importance of palliative care and bereavement support for families of the deceased. Information regarding these services should be available and disseminated via community centers and public spaces. Training and education may increase empowerment of village heads and death doulas, such as an understanding of the expected trajectory of illness, advance care planning and bereavement counselling [35,36].

- *Community libraries as hubs for palliative care information*:

The public library network in Brunei can serve as hubs for palliative care information. Books on palliative care can be requested for libraries to purchase, which can be displayed in the front for a period of time. The libraries have meeting rooms to organize conversations and forums regarding palliative care.

- *National study of palliative care needs in Brunei*:

Collaborating with the local university to carry out this study will help identify and prioritize palliative care needs for the country. Participant information sheets distributed for subject recruitment contains information regarding palliative care. The study may also facilitate members of the public getting involved in giving opinions and feedback to shape palliative service development.

- *Socialize action plan for non-communicable diseases (NCDs) with an emphasis on palliative care*:

The Brunei National Multi-Sectoral Action Plan for the prevention and control of NCDs (BruMAP-NCD 2021-2025) includes developing and strengthening palliative care services [37]. This guidance should be socialized to healthcare professionals and the public, with information on palliative care available for all the sectors involved.

- *Share testimonials and stories from recipients of geriatrics and palliative services*:

Geriatrics and Palliative Medicine, RIPAS Hospital carries out satisfaction surveys of patients and relatives to identify potential areas of improvement. Feedback and stories on how the team helped them through difficult times may be shared anonymously with their permission as part of awareness raising activities.

Ideas to raise funds for palliative care:

- *Government support for associations*:

A palliative association may be set up to advocate for the need of palliative care in Brunei. The government supports non-governmental organizations (NGOs) that have a cause which contributes towards sustainable development goals. This support includes annual funding, provided Key Performance Indicators are met.

- *Research funds or grants*:

UBD offers research funds or grants, with a call for research proposal submissions each year. The selection committee is interested in novel research and ageing-related topics, in which palliative care fits well. Funds can be used to recruit staff, print information leaflets and equipment for palliative care, provided they are related to research.

- *Regional and international funding opportunities*:

There are also annual calls for project proposals for regional funding opportunities, which may be relevant for palliative care projects. The World Health Organization (WHO) and Association of the South East Asian Nations (ASEAN) have funding opportunities for ageing related projects, while the Organization of the Islamic Conference (OIC) supports health, social and development projects. These organizations may also provide technical expertise for the proposed project but a project evaluation report and deliverables are usually expected.

- *Approach banks and companies to support palliative care*:

Large companies and banks contribute funding support as part of their corporate social responsibility (CSR) to charitable causes. These companies have regular staff training sessions that NGOs may be invited to present. A sensitization program for palliative care falls within the remit of their staff development program, as palliative care and death affects everyone.

- *Annual conference on palliative care*:

A hybrid conference could be organized to update healthcare professionals on palliative care. Registration fees will contribute towards fundraising. Presenters may be invited from different specialties. Costs can be minimized through using hospital facilities and online meeting access, while printing and refreshment expenses will be offset by registration fees.

CONCLUSION:

Developing palliative services in Brunei must address systemic barriers, improve community awareness, and secure sustainable funding. A foundation for comprehensive palliative care services can be laid by leveraging existing resources, fostering cross-sectoral collaboration, and integrating culturally sensitive practices. It is hoped that these reflections will provide useful insights for other countries aiming to develop palliative care.

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STAFF DISSATISFACTION AND REASONS LEADING TO EXIT: A STUDY OF EXIT INTERVIEW FORMS FROM 2017 - 2021 AT THE MINISTRY OF HEALTH AND MEDICAL SERVICES, FIJI

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ABSTRACT:
In the Pacific Island countries, including Fiji, staff attrition in the healthcare sector, particularly at the Ministry of Health & Medical Services (MOHMS), became a pressing issue from 2017 to 2021. This study examines the reasons for staff dissatisfaction and departure from MOHMS during this period. Using a quantitative descriptive cross-sectional approach, data from 249 exit interview survey forms were analysed. The primary causes of staff exit were migration, better job opportunities, pursuing further studies, and family-related factors. Dissatisfaction leading to some of the staff departures was mainly attributed to pay issues, working conditions, and supervisor-related concerns. The findings emphasize the need to address these factors to mitigate the increasing staff attrition trend. Given the recent challenges faced by the healthcare workforce, proactive measures are essential to retain healthcare professionals and prevent a worsening attrition problem. This study underscores the urgency of addressing these issues within MOHMS to maintain a stable and competent healthcare workforce.

Keywords: Staff dissatisfaction, Exit, Attrition, Fiji

INTRODUCTION:

Staff attrition, the phenomenon of employees leaving an organization, is a critical concern across various industries worldwide [1]. In the healthcare sector, particularly in the Pacific Island countries, the issue of staff attrition has become increasingly prevalent and concerning. Healthcare workers, including doctors, nurses, and other medical professionals, play a vital role in providing essential care and services to the population [2,3]. However, the high attrition rate among healthcare workers in the Pacific Island countries poses significant challenges to the delivery of quality healthcare and negatively impacts the overall healthcare system [4].

The Pacific Island countries, encompassing a diverse group of nations such as Fiji, Samoa, Tonga, Vanuatu, and others, face unique healthcare challenges due to their geographic isolation, limited resources, and relatively small populations. Despite these challenges, these countries strive to provide accessible and

equitable healthcare services to their communities. However, the persistent and escalating attrition of healthcare staff poses a major obstacle to achieving this goal [5].

Several factors contribute to the high attrition rate among healthcare workers in the Pacific Island countries [6,7,8]. Firstly, limited career development opportunities and a lack of professional growth prospects can demotivate healthcare professionals, leading them to seek better prospects elsewhere. Inadequate infrastructure, limited access to modern medical equipment, and a scarcity of essential supplies further compound the challenges faced by healthcare workers, making their work environment less conducive to effective patient care [9,10].

Additionally, the pull factors from developed countries with higher wages and better working conditions can tempt healthcare professionals from the Pacific Island countries to migrate in search of better opportunities. The brain-drain resulting from the migration of skilled healthcare workers exacerbates the shortage of qualified professionals in the region, intensifying the strain on the remaining staff and compromising the overall quality of healthcare services [11,12]. Furthermore, the demanding nature of healthcare work, including long working hours, high patient loads, and limited support systems, contributes to burnout and stress among healthcare workers. The physical and emotional toll of the profession can lead to exhaustion and decreased job satisfaction, ultimately leading to attrition [13].

Addressing the issue of staff attrition among healthcare workers in the Pacific Island countries requires a multifaceted approach. It involves efforts to improve working conditions, provide adequate resources and support systems, enhance career development opportunities, and implement strategies to retain skilled healthcare professionals within the region. By addressing these challenges, the Pacific Island countries can strengthen their healthcare systems, ensure the delivery of quality care, and promote the well-being of their populations [14,15].

This study explores the Staff Dissatisfaction and Reasons Leading to Exit from the Ministry of Health & Medical Services (MOHMS) from 2017 to 2021 by analysing the Exit Interview Forms that were filled as part of the procedure for the resignation of these staff.

METHODOLOGY:

Study Design & Setting:

The study used a quantitative descriptive cross-sectional approach to investigate the number of staff that have left the Ministry of Health & Medical Services (MOHMS) from January 2017 to December 2021. The study examined the exit interview survey forms that staff had filled during their exit from the service. The exit survey was used to analyse and identify major factors that resulted in staff turnover and the underlying factors for staff departure from 2017 to 2021.

Exit interviews, provide information about the overall management style in the MOHMS. The total number of staff who had left the MOHMS from 2017 to 2021 was analysed quantitatively. The study was primarily conducted at the headquarters of the MOHMS based at Dinem house in Suva, Fiji and relied on the exit interview forms that had already been filled out by the staff during their exit from the service.

Study Population & Sample:

The participants of this study included all the health professionals that have permanently left the MOHMS from January 2017 to December 2021. The data was retrieved during the survey of the completed exit forms of the staff.

Inclusion Criteria: Data of the health Professionals that have permanently left the MOHMS between January 2017 to December 2021 was accessed from the personnel unit of the MOHMS.

Exclusion Criteria: General Wage Earners and administrative staff.

Study Setting:

The study was conducted at the Headquarters of the Ministry of Health & Medical Services, based at Dinem house, Suva for the exit interview data collection from the exit survey forms.

Sampling:

All data was collected retrospectively from the staff exit surveys between January 2017 to December 2021 using the convenience sampling method. Out of the 826 staff who had left the Ministry permanently during the study period, only 249 (30.1%) staff had filled out the Exit Interview Survey forms.

Ethical clearance and permission:

The study commenced after obtaining ethical approvals from the College Health Research & Ethics Committee (CHREC) at Fiji National University (FNU). Permission was also obtained from the Permanent Secretary for Health and Medical Services as well as the Director for Human Resources through the Health Research Unit of the MOHMS.

RESULTS:

Data was extracted from 249 filled Exit Interview Surveys.

Oral Health Cadre:

During the study period, a total of 55 staff members from the Oral Health section exited the Ministry of Health. Of these, only 18 (32.7%) completed the Exit Interview Template. Among the 18 respondents, the most common reason for leaving was pursuing further studies (6 staff, 33%), followed by migration (4 staff, 22%), better job opportunities (4 staff, 22%), personal reasons (2 staff, 11%), compulsory retirement (1 staff, 6%), and family reasons (1 staff, 6%).

Dietetics Cadre:

During the study period, a total of 20 staff members from the Dietetics section left the Ministry of Health. Of these, only 3 (15%) completed the Exit Interview Template. Among the respondents, one staff member (33%) left for better job opportunities, another (33%) left due to family reasons, and the remaining one (33%) left for migration.

Health Inspector:

During the study period, 26 Health Inspectors exited the Ministry of Health. Of these, only 2 (7.7%) completed the Exit Interview Template. Among the respondents, one staff member (50%) left due to family reasons, while the other (50%) migrated. Similar to the Dietetics cadre, there appears to be a lack of motivation among staff to complete the Exit Interview template.

Laboratory Staff:

During the study period, a total of 51 Laboratory Staff members exited the Ministry of Health. Of these, 24 (47%) completed the Exit Interview Template. Among the respondents, 8 staff members (33%) left due to migration, 7 (29%) for better job opportunities, 5 (21%) for family reasons, 3 (13%) to pursue further studies, and 1 (4%) due to retirement.

Medical Officers:

During the study period, a total of 86 Medical Officers exited the Ministry of Health. Of these, only 15 (17%) completed the Exit Interview Template. Among the respondents, 6 staff members (40%) left due to migration, 3 (20%) for better job opportunities, 3 (20%) due to retirement, 1 (7%) for further studies, and 2 (13%) due to family reasons.

Nursing Cadre:

During the study period, a total of 496 Nursing Cadre staff exited the Ministry of Health. Of these, 163 (33%) completed the Exit Interview Template. Among the respondents, 67 staff members (41%) left due to migration, 41 (25%) for better job opportunities, 36 (22%) due to retirement, 8 (5%) to pursue further studies, 6 (4%) for family reasons, 4 (2%) for personal reasons, and 1 (1%) due to medical reasons.

Pharmacy Staff:

During the study period, a total of 54 Pharmacy Staff members exited the Ministry of Health. Of these, only 13 (24%) completed the Exit Interview Template. Among the respondents, 4 staff members (31%) left due to migration, 8 (62%) for better job opportunities, and 1 (8%) due to family reasons.

Physiotherapy cadre:

During the study period, a total of 7 staff members from the Physiotherapy Cadre exited the Ministry of Health. Of these, only 1 (14%) completed the Exit Interview Template. The sole respondent (100%) indicated migration as the reason for leaving.

Radiography Cadre:

During the study period, a total of 31 staff members from the Radiography Cadre exited the Ministry of Health. Of these, 10 (32%) completed the Exit Interview Template. Among the respondents, 4 staff members (40%) left due to migration, 3 (30%) for family reasons, 2 (20%) for better job opportunities, and 1 (10%) to pursue further studies.

The results are summarised in Table 1.

Table 1: Shows the reasons for exit of staff from the MOHMS

	Oral Health	Dietetics	Health Inspectors	Laboratory Staff	Medical Officers	Nursing	Pharmacy	Radiography	Physiotherapy
Further Studies	6 (33%)	0	0	3 (13%)	1 (7%)	8 (5%)	0	1 (10%)	0
Migration	4 (22%)	1 (33%)	1 (50%)	8 (33%)	6 (40%)	67 (41%)	4 (31%	4 (40%)	1 (100%)
Personal Reasons	2 11%)	0	0	0	0	4 (2%)	0	0	
Compulsory Retirement	1 (6%)	0	0	1 (4%)	3 (20%)	36 (22%)	0	0	0
Family Reasons	1 (6%)	1 (33%)	1 (50%)	5 (21%)	2 (13%)	6 (4%)	1 (8%)	3 (30%)	0
Better Job Opportunities	4 (22%)	1 (33%)	0	7 (29%)	3 (20%)	41 (25%)	8 (62%)	2 (20%)	0
Medical Reasons	0	0	0	0	0	1 (1%)	0	0	0

Furthermore, staff dissatisfaction caused by many factors were also found in the exit forms. The causes of dissatisfaction ranged from discrimination, pay issues, supervisor issues, working conditions and type of work being done. The results of these are summarised in Table 2.

Table 2: Shows the causes of dissatisfaction of staff leading to Exit within the MOHMS

	Oral Health Cadre			Dietetics Cadre			Health Inspectors			Laboratory Staff		
	Yes	No	No response	Yes	No	No response	Yes	No	No response	Yes	No	No response
Was a singles event responsible for your decision to leave	1	6	11	0	0	3	0	0	2	2	9	13
Did anyone in the Organisation discriminate against you, harass you, or cause hostile working conditions	0	7	11	0	0	3	0	0	2	3	8	13
Location	1	6	11	0	0	3	0	0	2	3	8	13
Supervisor	2	5	11	0	0	3	0	0	2	3	8	13
Pay	5	2	11	0	0	3	0	0	2	9	2	13
Working Conditions	4	3	11	0	0	3	0	0	2	6	5	13
Type of Work	4	3	11	0	0	3	0	0	2	6	5	13

	Medical Officers			Nursing Cadre			Pharmacy Staff			Physiotherapy Cadre			Radiology Cadre		
	Yes	No	No response	Yes	No	No response	Yes	No	No response	Yes	No	No response	Yes	No	No response
Was a singles event responsible for your decision to leave	0	3	13	5	40	118	1	6	6	1	0	0	1	3	5
Did anyone in the Organisation discriminate against you, harass you, or cause hostile working conditions	0	3	13	5	40	118	1	6	6	1	0	0	1	3	5
Location	0	3	13	5	40	118	1	6	6	1	0	0	1	3	5
Supervisor	0	3	13	5	40	118	2	5	6	1	0	0	1	3	5
Pay	0	3	13	13	32	118	4	3	6	1	0	0	1	3	5
Working Conditions	1	2	13	8	37	118	2	5	6	1	0	0	1	3	5
Type of Work	1	2	13	8	37	118	0	7	6	1	0	0	1	3	5

DISCUSSION:

The apparent shortage of healthcare professionals in developing countries, as well as the potential effects this shortfall may have on such nations' capacity to combat disease and deliver necessary, life-saving services, have recently received a great deal of attention [16]. This study investigated some of factors which influenced the staff to permanently leave the health Ministry. Two of the most common reasons cited during the Exit Interview was noted to be migration and better job offers. Although medical professionals and nurses only make up a small part of professional migrants, the loss of human resources for the health sector in developing nations typically leads to a loss of the ability of the health system to provide equitable access to healthcare. However, evidence to back up statements about the scope and effects of migration in poor nations is uneven and frequently anecdotal, relying on small databases with wildly divergent definitions of education and skill sets [13]. Skilled professionals have continually moved abroad in search of new and better chances for their personal and professional lives. The ease of international travel, access to information and communications brought about by globalisation, as well as the greater harmonisation and interdependence of various countries' economic and employment systems, all considerably assist shifting patterns of migration [18].

Every nation in the world is concerned with increasing the workforce's retention in rural and remote areas. As competencies are developed, team dynamics are improved, and relationships between health workers and local populations are strengthened, increased retention of health professionals helps to ensure the delivery of high-quality healthcare. Contrastingly, low staff retention or high staff turnover harms the health care sector by raising burden, depleting team morale, producing delays and inefficiencies in work processes, and wiping out institutional knowledge [19]. Health professionals' decisions to remain in or quit their positions are influenced by a variety of circumstances. Low remuneration, unsatisfactory career paths, a shortage of postgraduate training options, and subpar living and working conditions are a few of these. The difficulty in retaining health professionals is greatest in rural and remote areas because they frequently have higher workloads, unsustainable work environments, and inadequate infrastructure, which leads to their departure from the workplace in search of better living and working conditions in cities or abroad [20,21,22,23].

Healthcare workers' burnout and low wellbeing are becoming a bigger issue. Three factors—emotional tiredness with work, depersonalization or disengagement from patients, and low personal accomplishment—are combined to characterise the negative job-related attitudes known as burnout. Well-being

is a more holistic concept that encompasses facets of mental health, physical health, and stress. Higher levels of burnout are closely associated with lower levels of well-being in healthcare staff, and both states have a negative impact on patient care [24,25]. Concerns about high levels of burnout and poor well-being in healthcare staff are an international phenomenon. A study of 61168 nurses across 12 countries found that in nine countries, a quarter or more of the nursing workforce was burnt-out, with rates as high as 78% in Greek nurses [26]. These rates may be rising; in a survey of 6880 USA physicians, burnout prevalence increased from 46% in 2011 to 54% in 2014 [26].

CONCLUSION:

Healthcare workers are the backbone of any health sector as they are in the forefront when it comes to disease prevention, control as well as care for patients. The findings of this study highlighted the importance of acknowledging and addressing the factors that lead to staff dissatisfaction and exit from the workforce to prevent further aggravation of the attrition issue, which shows an increasing trend. This turnover may worsen because of the intense challenges that the health workforce has faced over the past two years, so pre-emptive efforts should be implemented to retain healthcare workers. During the study, it was seen that the exit interviews were being conducted in the Ministry of Health, however, the response rate was poor. It also seemed like most of the times the staff may have filled the forms as a requirement just to get through their exit and most of the times the forms were partially filled or not filled at all and the information that were provided might not be true. This factor on its own entails the much-needed information for the reasons of staff exits which can become a vital tool for MOHMS in preventing staff exit if done well.

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CASE REPORT:

SNAKE SEA CUCUMBER ENVENOMATION IN THE PACIFIC – A CASE REPORT.

Running title: Sea cucumber envenomation

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ABSTRACT:

Envenomation with the snake sea cucumber is rare, mild and needs to be excluded from envenomation by the banded sea krait which is much more serious and potentially lethal.

Keywords: Envenomation, Pacific, snake sea cucumber, banded sea krait

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An 8-year-old boy was playing in shallow water on the Coral Coast, Viti Levu, Fiji. He felt sudden severe pain on his arm and noticed what was initially thought to be a sea snake. The banded or yellow-lipped sea krait (*Laticauda colubrina*) is commonly seen around reefs in the Pacific, is highly venomous with a neuromuscular toxin which is potentially lethal if immediate resuscitation is not available. However, envenomation by the banded sea krait is extremely rare compared with land snakes and it is very timid and not aggressive [1].

Envenomation with sea snakes produces clinical effects in 20% of bites with death in 3%. It occurs most commonly in fishermen emptying nets or handling fish [1].

In this case, the boy had no onset of ptosis, blurred vision, dizziness, vomiting, dyspnoea or neuromuscular dysfunction but had severe pain over the arm, hand and foot which had been in contact, and quickly developed a localised erythematous rash. Pain was worse with washing with vinegar and clean water but settled over one hour with washing with salt water, and oral paracetamol 750mg and oral cetirizine 10mg. The rash settled within several hours and there were no skin changes the next day. There was no change to urine colour.

Immediate identification showed this envenomation was a 1m snake sea cucumber (*Synapta maculata*) which can be up to 2.5m

long (see Figure 1). These are commonly found throughout the Indo-Pacific and envenomation is very rare. These are a holothuroid and are an important group of detritivores in coral reef eco-systems. They have 15-16 perioral tentacles and feed almost continuously. Each tentacle is approximately 2.5cm in length and have vesicular cells in the epidermis but their function is unknown, and it could be a defensive toxin [2]. *Synapta maculata* also contain glycosides which have been shown to be cytotoxic against tumour cells [3].

The painful sting of the snake sea cucumber is similar to what is experienced with a bluebottle (*Physalia physalis*) sting in terms of duration and treatment. Correct identification that the bite is not a sea snake is extremely important as to immediate treatment and resuscitation. Diagnosis of sea snake bite can be difficult with bite marks being very small, with symptoms taking 1-2 hours to develop and may require tracheal intubation and mechanical ventilation, often in remote areas. There is a noticeable geographical venom variation in the sea krait throughout the western Pacific, Indonesia and Indian ocean [4].

Current snake venom detection kits do not include sea snake venom [1].

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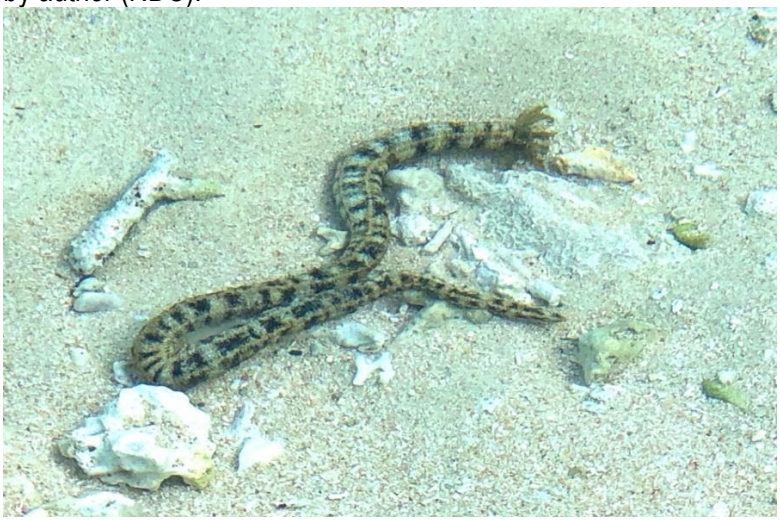
Competing interest: No relevant disclosures

Figure 1. Snake sea cucumber (Synapta maculata) – photograph by author (NDC).



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PRESSURE INJURY PREVENTION AUDIT FOR GERIATRICS AND PALLIATIVE INPATIENTS IN RIPAS HOSPITAL (RESEARCH LETTER)

Short Running Title*: Pressure Injury Prevention Audit*

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ABSTRACT:
Pressure injuries are areas of localised damage to skin and underlying tissue, usually over bony prominences. Pressure injuries are painful, worsen quality of life, increases hospital length of stay and risk of morbidity and mortality. In Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, there were previous concerns regarding pressure injuries, prompting service initiatives to improve prevention measures. However, after the COVID-19 pandemic, these concerns recurred warranting an audit of pressure injury prevention measures. The audit of routine pressure injury prevention forms in Geriatrics and Palliative Medicine inpatients was performed for 2 weeks. The completion rate of forms was 89.8% and 50% for Geriatrics and Palliative patients respectively. Among the Geriatrics and Palliative inpatients, one-third had pressure injuries before admission, while one-eighth developed them in hospital. The most prevalent risk factors were limited mobility, reduced physical activity and malnutrition. Wound charts and advice for barrier creams were performed in only two-thirds of the patients with pressure injuries. There was a high prevalence of risk factors to develop pressure injuries in Geriatric and Palliative Medicine inpatients. However, while pressure injury risk assessment is considered routine for inpatients, especially older people, there was a poor compliance rate of completing pressure injury risk assessment forms, particularly among palliative patients.

Keywords: Braden Scale, inpatients, pressure ulcer, prevalence, risk assessment

INTRODUCTION:

Pressure injuries are areas of localised damage to skin and underlying tissue, usually over bony prominences. Pressure injuries are painful, worsen quality of life, increases hospital length of stay and risk of morbidity and mortality [1]. In Brunei, the main tertiary hospital is Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, which has 1260 beds. The Geriatrics and Palliative Medicine specialty in the hospital manages a large number of dependent patients. In 2015, a descriptive study of Geriatrics patients found

that two-thirds had severe functional impairment, with almost half being bedbound or transfers only, hence were high risk of developing pressure injuries [2]. An audit of medical inpatients at that time found a prevalence of pressure injuries of 20.4%, with a poor compliance rate of completing risk assessment forms of 39.1% [3]. There was also a reported case of a pressure injury complicated by hip osteomyelitis at that time [4], prompting service initiatives to improve pressure injury prevention [1].

During the COVID-19 pandemic, there was a resurgence in pressure injuries, with an observed increase in dependent older people admitted from the community with Stage 4 pressure injuries complicated by osteomyelitis [5]. While this may be a consequence of social restrictions, an audit of pressure injury prevention measures in hospitals and the community was warranted [6]. This paper describes an audit of pressure injury prevention measures for inpatients admitted under Geriatrics and Palliative Medicine in RIPAS Hospital.

METHODOLOGY:

The prospective audit was conducted for a period of 2 weeks, from 27th May 2024 to 9th June 2024. Pressure injury risk assessment forms for patients under Geriatrics and Palliative Medicine on 27th May 2024 and subsequent admissions to the service up to 9th June 2024 were evaluated. Data collected included patient demographics such as age and gender, Braden Scale risk factors, details of pressure injuries (if any) and preventive measures used. Forms were completed by the staff nurses for Geriatrics and Palliative Medicine and collected at the end of the audit period by the charge nurse. Forms completed after the audit period were excluded. Data was entered into Microsoft Excel and analysed using descriptive statistics.

RESULTS:

There were 53 forms for 59 Geriatrics patients and 9 forms for 18 Palliative patients, equating to a response rate of 89.8% and 50% respectively. Among the total of 62 patients with pressure injury assessment forms, there were 21 (33.9%) males and 41 (66.1%) females. The median age was 79.5 years (range 44 to 98 years). There were 29.0% (18/62) who had pressure injuries before admission to hospital, 12.9% (8/62) developed pressure injuries in hospital, 46.8% (29/62) who did not have pressure injuries, while 11.3% (7/62) did not have this assessment documented on admission. The most common site for pressure injuries were sacrum and heels in 35.5% (22/62) and 8.1% (5/62) patients respectively. In terms of documenting risk factors as per the Braden Scale, this was not done in 59.7% (32/62) patients.

The prevalence of risk factors among the 25 patients with completed forms were as follows: limited sensory perception in 16 (64%), moisture in 15 (60%), reduced physical activity in 18

(72%), limited mobility in 24 (96%), poor nutrition in 21 (84%) and friction or shear problems in 16 (64%). Among the 27 patients with pressure injuries, the primary team doctor was informed in 19 (70.4%), two hourly turns advised in 22 (81.5%), pressure relieving mattress provided in 21 (77.8%), barrier cream advised in 18 (66.7%), nutritional assessment performed in 20 (74.1%), wound chart started in 18 (66.7%), wound management plan provided in 21 (77.8%), and patient and/or family were informed of pressure injury and prevention approaches in 20 (74.1%).

DISCUSSION:

This was an audit of a group of vulnerable patients at high risk of developing pressure injuries. Risk factors for pressure injuries were prevalent in these patients, especially reduced physical activity and mobility as well as malnutrition. The completion rate of pressure injury prevention forms should be improved, particularly among palliative patients. This will require further quality improvement actions to be performed, including an enquiry regarding barriers and enablers to optimize pressure injury-based practices. A systematic review found that staff and patient education, interprofessional communication and human resources should be considered as possible areas requiring intervention to improve pressure injury care [7]. Education and training programmes with provision of evidence-based bundles of care for pressure injury prevention are also recommended [8].

In terms of interventions, having a wound chart and use of barrier creams was only performed in two-thirds of the patients, while two-hourly turns and the use of pressure relieving mattresses could also be improved. An observational study of medical and surgical wards in China found that surgical wards were better than medical wards at applying barrier creams, pressure relieving surfaces, regular turns and nutritional support [9]. While most pressure injury prevention practices should be improved for Geriatric and Palliative Medicine patients, it would be worthwhile assessing patients across all medical and surgical wards in RIPAS hospital.

The main limitation in this study is the small number of patients limited to two specialties, which were not segregated to specific wards. However, there was adequate information to indicate a need to improve on pressure injury prevention measures across the hospital.

CONCLUSION:

There was a high prevalence of risk factors to develop pressure injuries in Geriatric and Palliative Medicine inpatients. However, while pressure injury risk assessment is considered routine for inpatients, especially older people, there was a poor compliance rate of completing pressure injury risk assessment forms, particularly among palliative patients.

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