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OHIS Differences on Primary School Students in Relation to Little Dentist Training

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Abstract
Dental healthcare is very important since dental and oral hygiene should be maintained. Statistics showed that more than 80% of children in developed and developing countries suffer from dental disease. This study aimed to see the safety of OHIS (Oral Hygiene Index Simplified) in primary school students who got and did not get little dentist cadre training in Bangli Regency in 2019. The study was done in an experimental design: pre and post-test with control design, which was conducted in August-September 2019. The sample in this study is 366 students. The difference in OHIS scores before and after treatment in the control group and treatment group was carried out by the bivariate Mann Whitney U Test. The results of the study showed that before dental health training was conducted, there were 54.3% of primary school students in the treatment group with good OHIS score criteria, and after the training was carried out as many as 98.4% of the students in the treatment group had a good OHIS. Additionally, prior to the training, 57.5% of the control group had fair OHIS criteria score. Then, after the training was carried out, 73.7% of the control group had good OHIS score. Hence, the study concluded that there was a significant difference in the OHIS of primary school students who got little doctor training prior to and after the training. Also, there was a significant difference in the OHIS of the students who did not get such treatment before and after the training.

Keywords: Oral Hygiene Index, Simplified (OHI-S), Primary School Students, Little Dentists

1. Introduction

Dental and oral disease is experienced almost by everyone. Statistics showed that more than 80% of children in developed and developing countries suffer from dental disease. Caries and periodontal disease are the most common diseases, and represent a major public health problem, due to their prevalence and incidence everywhere in the world. Dental caries was a dental and oral disease that affects 90% of school-age children. Caries are also a primary pathological cause of dental avulsion in children, which occurs due to the lack of attention of the child

and parents' knowledge. Caries is a well-known disease throughout the world, and has been found thousands of years BC on mummified teeth in Pharao, Ancient Egypt.

In Indonesia, there was an increase in the prevalence of dental caries in the population from 43.4% in 2007 to 53.2% in 2013. Basic Health Research Data (Riskesdas) of Bali in 2013 showed that people having dental and oral problems in the last 12 months in Bali were 24.0% and the highest was in Bangli Regency, 41.5%(Ministry of Health of Indonesia, 2013). The 2018 health research data recorded the proportion of dental and oral problems in Indonesia of 57.6%(Ministry of Health of Indonesia, 2018).

There have been many studies that revealed that dental caries is related to student achievement (Suwelo, 1992) (4). The impact of dental caries was that children had difficulty in eating due to discomfort when chewing food. Then, the children got weight loss because they are not able to eat comfortably, felt the pain due to cavities which lead to disruption of the learning process at school as well as the discolouration of teeth from clean to black (Puspitoningsih et al., 2015). There was a significant relationship between dental-oral health status and student achievement at SD Negeri Sangga Beru, Gunung Merah District, Aceh Singkil, with a p-value = 0.009. The dental and oral health status in this study was measured by the caries index, namely the DMF-T index (Nurhamidah et al., 2016).

Most dental and oral health problems are preventable. There are many ways to reduce and prevent dental and oral diseases, including self-care (Putri et al., 2011). Taking care of dental health is very important because dental and oral hygiene must be maintained. Brushing teeth is the first thing to do to remove plaque. The purpose of cleaning the teeth is to remove the plaque. Plaque can appear at any time, although teeth are already brushed. Plaque is a thin, colorless layer containing many bacteria and adheres to the tooth surface. According to Green and Vermillion, there is an index to measure oral hygiene, namely the Oral Hygiene Index Simplified (OHI-S). This OHIS measurement is carried out on six surfaces of the six specific permanent teeth that had fully grown. The OHIS score is the sum of the debris index and calculus index. The 2018 health research data showed that the percentage of people aged 3 years old and over who brush their teeth every day in Bali is 94.7%, this data is the same as the national data. However, there were only 2.81% of those brushing their teeth properly, meanwhile, it was 5.4% in Bali, and the highest was South Sulawesi with 8.8% (Ministry of Health of Indonesia, 2018). In Bangli, the population aged 10 years old and over who brushed their teeth every day was 86.5% and only 3.2% had the proper behaviour of tooth brushing (Ministry of Health of Indonesia, 2013). The result of Mulyani's research on Bayunggede Kintamani elementary school students, Bangli in 2017, showed that only 11.6% or 0.12 of students had OHIS score with good criteria.

A quasi-experimental study on "The effectiveness of little dentist training to improve dental and oral hygiene for students at SDN 1 Kerobokan, Badung Regency in 2017" conducted by Sirat, Sumerti, and Senjaya, obtained results that there were differences in OHIS scores before and after the little dentist cadre training in Primary School 1 of Kerobokan Badung Regency, with a p-value= 0,000. This study concluded that the training of little dentist cadre was effective in improving the dental and oral hygiene of students at SDN 1 Kerobokan, District of Badung (Sirat et al., 2019).

The objective of this research was to determine the differences in OHIS of the primary school students who received and did not receive the little dentist training in the district of Bangli in 2019.

2. Method

2.1 Study Design

The study was conducted with an experimental design: pre and post-test using control design. The research was carried out at Public Primary School in the district of Bangli, Bangli Regency, from August to September 2019.

2.2 Population of Study and Sample Size

The population in this study were all students of grades 4 and 5 in the district of Bangli in 2019.

Sample size calculation and sampling method: The minimum sample size for each group is 166 people. Also, the sample was added as much as 10%, that is 17 (rounding). Therefore, the number of samples of the treatment group and the control group, each has 183 students. Then, the total sample is 366 students (Sastroasmoro, 1995).

2.3 Statistical Analysis Method

The data were analyzed using univariate statistics in the form of frequency and percentage. The difference in OHIS scores before and after the training in each group (control or treatment) was carried out using the Wilcoxon bivariate test. Meanwhile, the difference in OHIS scores between the control group and the treatment group after the training was done by using the Mann-Whitney Test.

Regarding reliability and validity of instruments, in order to determine the effectiveness of small dentist training in improving knowledge of dental and oral health, a paired T-test pre and post-test values were conducted. Sig. value less than 0.05 proved to be differences of OHIS before and after the training of little dentist besides showing effectiveness to improve dental and oral hygiene.

3. Results

The results of OHIS examination to the students prior to the little dentist cadre training in the 5 primary schools of the treatment group is shown in Table 1.

Table 1: Students' *OHIS* Prior to the Little Dentist Cadre Training in 5 Primary Schools of the Treatment Group

OHIS	Frequency	Percentage (%)
Poor	3	1,6
Fair	82	44,1
Good	101	54,3
Total	186	100

Table 1 showed that before the training was conducted, 54.3% of primary school students in the treatment group had good OHIS scores. The result of OHIS examination to the students after the little dentist cadre training in the 5 primary schools of the treatment group is presented as follows.

Table 2: Students' OHIS after the Little Dentist Cadre Training in 5 Primary Schools of the Treatment Group

OHIS	Frequency	Percentage (%)
Poor	0	0
Fair	3	1,6
Good	183	98,4
Total	186	100

Table 2 showed that after the training was conducted, 98.4% of students in the treatment group had good OHIS criteria.

Furthermore, a different test was conducted on the OHIS score of the primary school students in the treatment group before and after the training, using the Wilcoxon Signed Ranks Test. The test results showed the sig value of 0.000. The results of OHIS examination on students prior to the little dentist training in 5 primary schools of the control group are shown in table 3 below.

Table 3: Students' OHIS Prior to the Little Dentist Cadre Training in 5 Primary Schools of the Control Group

OHIS	Frequency	Percentage (%)
Poor	5	2,7
Fair	107	57,5
Good	74	39,8
Total	186	100

Table 3 showed that 57.5% of students in the control group had fair OHIS scores before the training was conducted. The results of OHIS examination on students after the little dentist training in 5 primary schools of the control group are in table 4 as follows.

Table 4: Students' OHIS After the Little Dentist Cadre Training in 5 Primary Schools of the Control Group

OHIS	Frequency	Percentage (%)
Poor	3	1,6
Fair	46	24,7
Good	137	73,7
Total	186	100

Table 4 showed that after the training of little dentists conducted, 73.7% of students in the control group had good OHIS scores.

Then, a different test was carried out on the OHIS score of the control group students before and after the dentist training, using the Wilcoxon Signed Ranks Test. The test resulted in the sig value of 0.000.

In accordance with tables 1, 2, 3 and 4, there was an increase in the dental and oral hygiene of students both in the treatment and control group. To determine the effectiveness of little dentist training, it is necessary to know whether there is a difference in OHIS among primary school students who experienced and did not experienced such training in the district of Bangli in 2019. The difference of after-training-OHIS score of primary school students who experienced and did not experience the little dentist training in Bangli Regency in 2019 was tested by the Mann-Whitney Test. The test results showed the sig value of 0.000.

The little dentists were selected from grade 4 and 5 students in the treatment group, each has 10 little dentists so that there are 50 students as little dentists. The little dentist was appointed according to the criteria specified in a book entitled Pedoman Pelatihan Dokter Gigi Kecil. They were not included in the sample of the present study. The knowledge of the little dentists about dental and oral healthcare was tested using the basic questions, as many as 15 questions (taken from the book aforesaid). Table 5 below is the pre and post-test results of dental health knowledge of those as little dentists.

Table 5: Pre and Post Test Score of the Little Dentists

	Score		
Test	Minimum	Maximum	Mean (Average)
Pre	0	73	50,42
Post	46	100	77,50

According to table 5, there were still students who got a score of 46 through the training which had been conducted. Generally, the average score increased from 50.42 to 77.50. To determine the effectiveness of little dentist cadre training in improving the knowledge of dental and oral health, a paired T-test of pre and post-test scores was carried out. It resulted in the sig value of 0.000.

4. Discussion

Table 1 above showed that before the training of little dentist was carried out, 54.3% or 101 primary school students in the treatment group had good OHIS score. Besides, table 3 showed that 39.8% or 74 students in the control group had good OHIS score before the training was conducted. This number is much better than the results of previous research in 2017 in Bayunggede Kintamani, Bangli, showing the proportion of dental and oral hygiene for grade IV and V students with good criteria of 12%. This condition is possible because Banyugede is not located in Bangli District so that factors such as environmental and limited health services also determine. The health status of a person or society is influenced by four factors, namely: environment, behavior, heredity, and health services (Cockerham et al.2017).

Table 2 above showed that 98.4% or 183 SDN students in the treatment group had good OHIS score, whereas the data before the training was conducted showed 54.3% or 101 SDN students in the treatment group had good OHIS score. There was an increase from 54.3% to 98.4%. The Wilcoxon test resulted in the sig value of 0.000. This value is less than 0.05 meaning that there is a significant difference between the OHIS score before and after the training of little dentists in the treatment group. The students who were the samples of this study were given toothbrushes, toothpaste and dental hygiene books. Then, the little dentists provide counselling and information to them once a week. The results of this study are in line with the research conducted on primary school students in grades IV, V, and VI, as there were 64% of respondents had good oral hygiene score, as measured by Oral Hygiene Index simplified (OHIS) (Gopdianto et al.,2015). Good dental hygiene is because the respondents maintain their teeth cleanliness. Also, the information about dental healthcare is obtained from counselling and advertising media.

The factors affecting a person's knowledge are: education, occupation, age, interests, experience, and access to information (Karasneh and Al-zoubi, 2018). Counselling carried out by little dentists play an important role in improving students' knowledge of tooth brushing, which then encourages them to behave. A person's behavior is influenced by three factors, namely predisposing factors, enabling factors, and reinforcing factors. Predisposing factors include education, knowledge, attitudes, and perceptions. Enabling factors includes the availability of facilities and time, and reinforcing factors include regulations, attitudes and behavior of either role models or parents (Morgan et al.,, 2019).

Table 4 noted that after training of little dentists as many as 73.7% or 137 primary school students in the control group had good OHIS score. Previously, only 39.8% or 74 students in the control group had good OHIS score. The Wilcoxon test showed the sig value of 0,000. This value is less than 0.05 which means that there is a significant difference between the OHIS score before and the OHIS score after the training was applied to the control group. Although the students were not given counselling and information by little dentists, the control group got the same facilities as the treatment group did, such as toothbrushes, toothpaste, and dental hygiene books. Therefore, the students can obtain information and knowledge about maintaining dental hygiene through the books about the health that are distributed. At the time of the assessment, the researchers also briefly explained how the study will undergo to the school principal and physical education teacher. Hence, the principal and physical health teacher are the ones who perhaps act as reinforcing factors also motivate students to brush their teeth. As a result, the number of students who get good OHIS score in the control group increases.

The distribution of toothbrush and toothpaste in both groups plays a role as a supporting factor so that it is expected the students can take it into action by brushing their teeth. Taking care of dental health is very important so that dental and oral hygiene should be maintained. Brushing teeth is the main action to remove plaque (Herrera et al., 2013;Sluijs, et al.,2018). Plaque contributes to the pathogenicity of caries and periodontal disease. Therefore, the purpose of tooth brushing is to remove plaque itself. Plaque can form at any time, even after the teeth are already brushed. Plaque is a thin, colorless layer containing many bacteria and adheres to the tooth surface (Huang, et al., 2011).

Table 1 and Table 2 as well as Table 3 and Table 4, showed an increase in the number of students having good oral hygiene criteria. According to the Wilcoxon test results in both groups, the sig value showed 0.000. This means that there is a difference in the OHIS score before and after the little dentist training. Besides each group showed significant differences, there are also differences in the OHIS score of primary school students who get and did not get the little dentist training in Bangli Regency in 2019 after such training was done, which was then tested with the Mann-Whitney Test. The test showed the sig value of 0.000. This result indicates the increase in the number of students in dental and oral hygiene into a good criterion, is more significant in the group who got the treatment in form of little dentist training. The results showed that there was a difference in OHIS scores before and after the training of little dentists at Primary School 1 Kerobokan in Badung Regency, with a p-value 0.000. This study thus concluded that the training of little dentists was effective to escalate dental and oral hygiene for students at SDN 1 Kerobokan, Badung Regency in 2017 (Senjaya, et al., 2019).

The effectiveness of little dentist training in increasing the knowledge of dental and oral hygiene was tested by using a paired T-test as well as the scores in both pre and posttest. The result showed sig value of 0,000 which

means less than 0.05. Hence, the training of little dentist is effective to widen the knowledge and understanding towards dental and oral hygiene for those who have a role as little dentists at primary schools in the district of Bangli in 2019. Training is a form of education, which can increase one's knowledge. The factors that influence a person's knowledge are education, occupation, age, interests, experience, as well as access to information (Harackiewicz, et al., 2018).

5. Conclusion

Our work has led us to conclude that there is a significant difference in the OHIS of primary school students who got the little dentist training in the district of Bangli in 2019 before and after training was conducted. Besides, there is a significant difference in the OHIS of elementary school students who did not get the training in Bangli in 2019 before and after such training was conducted. In additions, differences in the OHIS among primary school students who experienced and did not experienced the little dentist training in Bangli in 2019 occurs. The training of little dentist is effective to improve the dental and oral hygiene of primary school students in the district of Bangli District. This approach has the potential features to regularly conduct training of little dentists and monitor as well as evaluate its implementation. In addition, physical education teachers can motivate students to maintain dental and oral hygiene by brushing their teeth correctly.

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Chronic Breast Abscess Caused by Corynebacterium Kroppenstedtii

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Abstract
Corynebacterium is being increasingly isolated in specimens to be proven as a causative organism in clinical disease, especially breast abscesses and mastitis. Specifically, Corynebacterium kroppenstedtii lacks the typical mycolic acids of the cell envelope, requiring lipid rich areas to grow, hence the mammary areas being ideal for its proliferation. Conservative treatment is routinely first line in breast abscess, however commonly prescribed antibiotics such as beta lactams and fluoroquinolones, are hydrophilic and do not penetrate in lipid rich environments such as the breast, thus patients are left partially treated without complete resolution of the disease process. This case report highlights the importance of considering C. kroppenstedtii, especially if recurrent infection is seen. Microbiologists should be alerted to specialized growth conditions and tools for appropriate culture such that clinicians can use a multimodal approach with early surgical intervention alongside antibiotic treatment to maximize clinical cures and reduce recurrence.

Keywords: Breast Abscess, Mastitis, Corynebacterium, C. Kroppenstedtii

1. Background

Corynebacterium's significance as a pathology-inducing organism is debated as it can be dismissed as a skin commensal organism or contaminant in clinical specimens – especially when cultured form a non-sterile site. However, with advancement in DNA sequencing, Corynebacterium is being increasingly isolated in specimens to be proven as a causative organism in clinical disease, especially breast abscesses and mastitis (Lewis, Cecil M Jr et al., 2012; Turnbaugh, P., Ley, R., Hamady, M. et al., 2007). Since 2000, Corynebacterium has been linked with inflammatory breast disease, with a large case series concluding that Corynebacterium was found in the majority of cases of granulomatous mastitis (Taylor, Graeme B et al., 2003). Here we discuss the case of a 41-year old woman, whose samples isolated Cornyebacterium kroppenstedtii as the causative organism for a chronic breast abscess over 2 years. Uniquely, *C. kroppenstedtii* lacks the typical mycolic acids of the cell envelope, that most other members of its genus hold. The lack of mycolic acids caused by gene loss means *C. kroppenstedti* requires

lipid rich areas to grow, hence the mammary areas being ideal for its proliferation (Baumgart, Meike et al.,2013; Collins, M. D., Falsen, E., Akervall, E., Sjoden, B., & Alvarez, A., 1998; Tippelt, A., Mollmann, S., Albersmeier, A., Jaenicke, S., Ruckert, C., & Tauch, A, 2014). This case report recognizes that the unique pathogenic qualities of this bacteria encourage consideration for surgical management, namely incision & drainage, to be considered early for definitive source control.

2. Case Presentation

A 41-year old, South Asian woman presented with a chronic left breast abscess. Her medical history includes previous caesarian section, ovarian ligation and iron deficiency anemia. She is a non-smoker, non-drinker, takes regular iron supplementations and has not breast fed in more than five years. There is no family history of breast or ovarian cancer.

The patient initially presented with symptoms 29 months prior to surgery. She reported a one-week history of redness, pain and swelling of the left breast with no associated fever or other symptoms. Her GP referred her to the breast clinic and initially treated her with a one-week course of amoxicillin/clavulanic acid 500mg/125mg three times daily, which subsided the pain and redness. The patient was seen in breast clinic just after finishing the course of antibiotics. On examination, there was firm lump palpable at 12 o'clock position but no obvious signs of inflammation. Ultrasound scan (USS) demonstrated a small subcutaneous collection 15mm x 6mm at the 12 o' clock position, leading to a larger echogenic area, approximately 6cm. The USS also showed an old well-defined oval anechoic mass measuring 9 mm x 4 mm, in keeping with a cyst. Due to the examination findings, it was decided that the presentation was not typical of mastitis/breast abscess and a follow-up USS and clinic appointment was made for 4 weeks later. In this follow up appointment, the patient complained of no symptoms and refused to be examined as she felt she had no concerns. The repeat USS, done 10 days prior to the follow-up appointment, showed resolution of the subcutaneous fluid collection at the 12 o'clock position with the previously described cyst also no longer being visualised. Subsequently, the patient was discharged from the breast clinic.

26 months after the initial presentation, the GP referred the patient for an urgent 2 week wait clinic as she noted a month's history of a painful lump in her left breast. During this month of symptoms, the patient had completed a one -week course of amoxicillin/clavulanic acid 500mg/125mg three times daily, which had minimal effect on her symptoms. When seen in breast clinic, she noted the tenderness had reduced but the lump persisted. On examination, tender nodularity was felt in the left upper central breast in keeping with mastitis. The right breast examination was normal. The mammogram was normal. An USS showed an area of mixed echogenic textural change in the upper outer quadrant with prominent ducts in the area of the lump. No focal fluid collection was seen in the region. The lower outer quadrant showed a series of branching anechoic tubular structures with internal echoes in keeping with inspissated prominent ducts, the largest measuring 4 mm in diameter. As a result, the patient was started on Flucloxacillin 1 gram, four times daily and Metronidazole 400mg, three times daily for 14 days, in line with local guidelines for the treatment of mastitis. The patient was to have a follow-up USS in 4-6 weeks' time and a clinic appointment.

Two months later, the patient had a repeat USS which showed new lobulated echogenic fluid collection occupying almost the entire left upper outer quadrant, in keeping with a large left breast abscess. Using ultrasound guided fine needle aspiration, 20ml of pus was aspirated and samples sent for cytological and histological analyses – this demonstrated no growth. At this time, the patient had ongoing inflammation and swelling of the left breast. Antibiotic therapy was changed to amoxicillin/clavulanic acid 500mg/125mg three times daily and Metronidazole 400mg three times daily for further 14 days and re-review in 2 weeks' time.

The patient returned to clinic a month later. The left breast had not responded to antibiotics and symptoms had worsened. On examination, the abscess was red, hot, tender and protruding over the skin surface. The patient was admitted for incision and drainage with a view of taking a biopsy from the abscess wall. The operation finding was a raised fluctuant complex abscess measuring 50mm x 50 mm on the surface, multiple loculations and measuring approximately 50mm x 50mm x 50mm internally. Pus, serous fluid and an abscess wall biopsy was sent for microscopy, culture, sensitivities and histopathological analyses including acid-fast bacilli. The pus cultured by 16S rRNA gene sequencing grew Corynebacterium *kroppenstedtii,* as a monobacterium. The biopsy

microscopically described dense acute and chronic inflammation and granulation tissue suggestive of infections. No granulomas were seen and no evidence of malignancy. No tuberculosis was identified. The patient was discharged post-operatively with a further one-week course of amoxicillin/clavulanic acid 500mg/125mg three times daily.

After the surgical drainage of the abscess, the patient was regularly reviewed in the clinic for wound management. Repeat USS one-week post drainage showed fluid collection in cavity wound and no other separate fluid collections. Thus, a further one-week course of amoxicillin/clavulanic acid 500mg/125mg three times daily was prescribed. At the end of month 29, the fluid collection was resolved, and the wound cavity was healing well with no signs of infection. The patient reported intermittent pain controlled with paracetamol. Later, the patient was seen and discharged from breast clinic, as there were no further symptoms.

3. Discussion

This case report is one of few published on infection by this organism leading to chronic abscesses, although it appears to be an increasingly documented cause of breast abscess. The diagnosis was established by the purulent fluid culture growing pure *C. kroppenstedtii*, with biopsy findings that are typical and consistent for an immune response to an infection by this organism (Renshaw, Andrew A et al., 2011). Interestingly, the gram stain on the biopsy is negative but this is likely secondary to organisms typically residing in cystic spaces rather than inflamed tissues. In terms of antibiotic susceptibility, only a small number of clinical isolates have been tested for antimicrobial susceptibility, and it is likely that recurrent antibiotic use led to sub-detectable levels of isolates and sensitivities (Tauch, Andreas & Fernandez-Natal, M. & Soriano, Francisco.2016; Riegel, P., Liégeois, P., Chenard, M., Mathelin, C., & Monteil, H. 2004; Fernández-Natal, Maria Isabel et al., 2015).

For this patient, multiple anti-microbial agents and non-invasive techniques were initially tried with no avail. Although the patient was systemically well, she had suffered with symptoms on-off for over two years. The commonly prescribed antibiotics such as beta lactams and fluoroquinolones, are hydrophilic and do not penetrate in lipid rich environments such as the breast (Dobinson, Hazel C et al, 2015). This results in partially treated abscess causing a recurrent abscess, as seen in this case study.

Surgical management of breast abscesses is not routinely first-line, unless US guided aspiration of pus and/or catheter drainage alongside a course of antibiotics fails to evacuate the abscess (Kataria, Kamal et al, 2013). However, in this case, source control was only achieved once incision & drainage of the abscess with curettage was completed. This case report suggests that earlier use of surgical interventions in chronic abscesses caused by *C. kroppenstedtii* should be considered.

4. Conclusion

There is limited literature to guide clinicians on the treatment of breast abscess caused by Corynebacterium species. This case study proves the benefit of surgical drainage of an abscess caused by *C. Kroppenstedtii* as definitive source control, compared to empirical antibiotic treatment or ultrasound-guided drainage. Ultimately, when treating a breast abscess, especially if recurrent, infection with *C. Kroppenstedtii* should be considered and multimodal approach of surgical and antibiotic therapy should be given to appropriately treat the causative organism and reduce chances of recurrence.

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Comparison of Perceived Covid-19 Related Mental Health Stress in SMI and Non-SMI Psychiatric Populations

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Abstract
The purpose of the present study was to investigate differences in perceived COVID-19 associated mental health-related stress in individuals with psychiatric diagnoses at opposite ends of the DSM diagnostic severity spectrum. The opposite poles of the spectrum were represented by Adjustment Disorder (AjD) at one end and disorders categorized as Serious Mental Illness (SMI) at the other. The study hypothesized that persons with SMI disorders are more likely to report their mental health negatively affected by COVID-19 stress compared to individuals with non-SMI disorders. An observational, cross-sectional model was used to collect data from client intake forms completed between April 2020 and December 2020. Participants were 25 male and 23 female U.S. citizens (mean age = 32.9) diagnosed with either SMI or Adjustment Disorder. COVID-related mental health stress was measured by answering 'yes' or 'no' to the following question: "Do you feel that your mental health is being negatively impacted (for the worse) by the life-changes, hardships, and stress being caused by the current coronavirus outbreak?" A Pearson chi-square analysis was used to compare the two groups. Results indicated that individuals diagnosed with SMI disorders were significantly more likely to report their mental health negatively affected by COVID-related stress compared to individuals diagnosed with Adjustment Disorder (SMI 74% vs. AdJ 19%, $p<.001$). In this study, individuals with a pre-existing SMI disorder are almost four times (Risk Ratio: 3.89) more likely to be adversely affected by perceived stress associated with the COVID-19 pandemic than individuals diagnosed with Adjustment Disorder. No significant differences were found between the two diagnostic groups on sociodemographic characteristics (gender/age/ethnicity). These findings suggest that the mental health of individuals diagnosed with SMI may be considerably more negatively impacted by current COVID-19 related stress and therefore require greater clinical attention compared to those diagnosed with Adjustment Disorder and other non-SMI diagnoses.

Keywords: SMI, Adjustment Disorder, Stress, COVID-19

1. Introduction

In March 2020, the COVID-19 virus was declared a global pandemic by the World Health Organization (Cucinotta & Vanelli, 2020). As of June 2021, the virus continues to negatively impact the physical, social, and psychological health of individuals throughout the world.

Individual mental health has emerged as an area of functioning adversely affected by the current pandemic. COVID-19 related mental health issues had been found to include "stress, anxiety, depressive symptoms, insomnia, denial, anger and fear globally" (Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020), as well as post-traumatic stress disorder, depression, psychological distress, and anxiety in the general population (Wang, et al., 2020).

Of notable concern, certain populations have been found more vulnerable to the negative life stress associated with the pandemic in contrast to the general population. One of these populations is the mentally ill (Sher, 2020). For example, a survey of 2,206 individuals found that 64% of individuals with a pre-COVID-19 diagnosed mental illness reported worsening of their mental illness symptoms due to COVID-19-related stress (Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020).

Stressful life events have long been associated with the onset and exacerbation of psychiatric illness (Kendler, K., et al., 1995; Post, 2010). COVID-19 studies have found that individuals diagnosed with pre-COVID-19 mental illness report an array of specific stressors related explicitly to the COVID-19. These stressors include fears of sickness and dying, financial worries, as well as access to proper housing, food, medicine, and medical services (Shinn & Viron, 2020; Benjamin, 2020).

The Distinction Between Adjustment Disorders, Serious Mental Illness, and COVID-19 Effects

One question that has not been addressed in the literature is how current COVID-19 stress might affect individuals with psychiatric diagnoses at opposite ends of the DSM diagnostic severity spectrum, namely Adjustment Disorder (AjD) and disorders categorized as Serious Mental Illness (SMI).

The NIMH distinguishes SMI disorders from non-serious mental disorders, with SMI disorders considered an emotional, mental, or behavioral condition which "substantially interferes or limits one or more major life activities" (Druss, 2021). The less severe diagnosis of Adjustment Disorder does not meet this criteria.

Non-COVID-19 related physical and mental health differences have been found between persons with Adjustment Disorder and SMI. Regarding physical health, when compared to persons with AjD, those with a SMI diagnosis engaged in lower exercise frequency, suboptimal eating habits and were more likely to have gained at least ten pounds in the past six months ($p < 0.001$) (Kilbourne et al., 2007).

Mental health differences between the two groups (AjD/SMI) can be understood in the symptom severity differences between the groups. The type and potential severity of symptoms associated with SMI are distinct compared with the symptoms of Adjustment Disorder. Non-COVID related investigation by Narrow, et al. compared subjects with SMI and AjD over 12 months. Individuals diagnosed with SMI were more likely to be diagnosed with a comorbid substance use disorder (29.5% vs. 13.3%), more likely (59% vs. 20%) to have sought services in the general health systems sector, and more likely (17% vs. 0.9%) to have sought inpatient mental health or addictions services, compared to individuals with non-SMI mental health diagnosis (Narrow et al., 2000) These realities raise an important question: Is the mental health of persons with SMI more likely to be negatively affected by perceived COVID-19 stress compared to individuals with Adjustment disorder?

In this present study the possible differences in perceived negative COVID-19 stress between individuals diagnosed with a mild psychiatric disorder and those diagnosed with SMI are compared in a clinical sample of adults from the United States. This study hypothesized that individuals with SMI would be more likely to report being adversely affected by perceived COVID-19 stress than individuals with ADJ.

2. Materials and methods

This was an observational, cross-sectional study based on information collected from client intake forms filled out at the beginning of mental health counseling services. The client intake sheets were collected from April 2020 through December 2020.

2.1 Participants

Participants were an online sample drawn from this study author's telehealth mental health counseling caseload. The clients were randomly assigned to the counselor by the telehealth provider. The sample was represented by clients from states representing all four geographical locations of the U.S. (North, East, West, South).

Before beginning counseling, all clients were required to complete a self-report intake information sheet. This study consisted of the intake sheets of 48 clients that met DSM-V diagnostic criteria for either SMI or Adjustment Disorder. Serious mental illness disorders were limited to depressive, anxiety, and OCD diagnoses.

2.2 Measures

One question on the intake sheet was used to evaluate each participant's perceived COVID-19 stress:
"Do you feel that your mental health is being negatively impacted (for the worse) by the life-changes, hardships, and stress being caused by the current coronavirus outbreak? Yes or No.

3. Results

Of the total sample of 48 respondents, 23 (47.9%) identified as female and 25 (52.1%) as male. Participants ranged in age from 19 to 55 years ($M = 32.9$; $SD = 10.2$). The majority ($n = 22$; 79.2%) of the participants were Caucasian, with the remainder evenly divided between African- American and Hispanic ethnicities ($n = 5$; 10.4% each). As shown in Table 1, no significant differences were found between the two diagnostic groups on sociodemographic characteristics. The groups were compared by gender using a Pearson chi-square analysis (χ^2 (1) = *0.38,* p = 0.536); mean age was compared using an independent samples t-test (t (46) = -1.18, p = 0.244); and Caucasians were compared to respondents of African-American and Hispanic ethnicities combined using a Fisher's exact test (p = 0.729).

Table 1: Sociodemographic characteristics

Characteristic	Diagnosis Serious Mental Illness	Adjustment Disorder	*p*
Gender			
Male	14 (51.9%)	9 (42.9%)	0.536
Female	13 (48.1%)	12 (57.1%)	
Age	31.4 ± 10.1	34.9 ± 10.2	0.244
Race/ethnicity			
Caucasian	22 (81.5%)	16 (76.2%)	0.729
African-American	3 (11.1%)	2 (9.5%)	
Hispanic	2 (7.4%)	3 (14.3%)	

Note. gender and race/ethnicity values are *ns (%s)*; age values are *Ms ± S.D.s*

In response to the question, "Do you feel that your mental health is being negatively impacted (for the worse) by the life-changes, hardships, and stress being caused by the current coronavirus outbreak?" significantly more of the participants with serious mental illness (74.1%) said "yes," compared to those with adjustment disorders (19.0%; χ^2 (1) = 14.31, $p < .001$).

Table 2: Comparison of the perceived negative impact of COVID on mental health by diagnosis

	Diagnosis				
Perceived negative impact of COVID	Serious Mental Illness	Adjustment Disorder	χ^2	*df*	*p*
Yes	20 (74.1%)	4 (19.0%)	14.31	1	< .001
No	7 (25.9%)	17 (81.0%)			

4. Discussion

This cross-sectional study was designed to assess possible differences in perceived COVID-19 related stress on individual's mental health in diagnostically opposite psychiatric populations, represented by Adjustment Disorder and Serious Mental Illness. Of individuals diagnosed with SMI, 20/27 (74.07%) reported their mental health had been negatively affected by stress associated with the COVID-19 pandemic. Of the same group, 7/27 (25.92%) reported no negative mental health effects from the COVID-19 pandemic. Individuals diagnosed with Adjustment Disorder were significantly less likely to report their mental health negatively affected by perceived COVID-19 related stress. 17/21 (80.95%) individuals stated COVID-19 related stress had not affected their mental health, while only 4/21 (19.04%) reported negatively adversely affected. A risk ratio was computed between these two groups. The individuals with SMI were 3.89 times at greater risk of reporting their perceived mental health negatively affected by the COVID-19 pandemic than individuals with an AdJ diagnosis.

Intuitively, these findings are not surprising. While Adjustment Disorder is considered a temporary, time-limited disorder, SMI is significantly more debilitating for persons diagnosed with it. SMI results in "serious functional impairment" and substantially interferes with major life activities (Druss, 2021).

For individuals dealing with the physical, psychological, and social burdens of an SMI, the additional burden of the negative stresses associated with a global pandemic should raise concerns. Medical and mental health practitioners treating persons with SMI must have a heightened awareness of the serious difficulties and stress their patients/clients may be experiencing.

In conclusion, the results of this study suggest that individuals with a pre-existing SMI disorder are almost four times (Risk Ration: 3.89) more likely to be adversely affected by perceived stress associated with the COVID-19 pandemic compared to individuals diagnosed with Adjustment Disorder. Persons with SMI deserve increased attention by the medical community and caregivers to stem the harmful effects of increased perceived stress resulting from the current global pandemic known as COVID-19.

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Influence of Emo-Demo for Woman of Childbearing Age to Perform Cervical Cancer Screening

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Abstract
The lack of knowledge about cervical cancer in woman of childbearing age is the cause of high mortality rate problem. The awareness of performing inspection with acetic acid is low. The aim of the study is to find the EMO-DEMO educational influence on the enhancement of knowledge, attitudes and participation of women of childbearing age in screening cervical cancer using the method of Visual Inspection with Acetic Acid (VIA). We undertook this research using quasi experimental research with nonequivalent control group design. The sample selection was made probability sampling simple random sampling for 60 respondents per group, the data collected using the questionnaire for the knowledge and attitude data and the interview sheets for the participation data. The results show there is a meaningful difference between pretest and posttest on knowledge, attitude and participation in cervical cancer screening using VIA method with p = 0.000. In conclusion, there is increase in knowledge, attitudes and participation in screening cervical cancer using VIA.

Keywords: EMO DEMO, VIA, Woman, Influence

1. Introduction

Cervical cancer in 2012 was reaching 528,000 new cases and 266,000 death where 70% are deaths in developing countries. The rate in Indonesia increased to 98,692 cases in 2013 and 235,000 are death cases (Bott, 2014). In 2016, the number of cervical cancer in Jakarta was 269 cases, Bali 254 cases and Bangka Belitung 227 cases (Pusdatin Kemenkes RI, 2017). It shows that Bali is one of areas with high risk of cervical cancer.

Visual Inspection with Acetic Acid (VIA) is a cervical cancer screening method using a 3-5% acetic acid solution in the cervix and seeing the discoloration that occurs after the spreads. VIA is intended to observe the cervical cells in dysplasia (Mulyati, Suwarsa, & Arya, 2015). VIA test has been widely used in primary health care because VIA method is relatively simple, easier and more cost effective so that it can increase the coverage of VIA(Momenimohayed & Salehiniya, 2017). It was targeted in 2014 in Bali that VIA examination reached 1.28% of the population of women aged 30 -50. In the implementation, the result was beyond the target with the coverage of 2.69%. While in 2015, in Karangasem, it was conducted a screening to women aged 30-50 and found 19.8% VIA in positive result and in 2016 found 5.45 with positive VIA. Rendang sub district, one of the sub-districts in Karangasem Regency, is a sub-district with the highest positive result of 30.4% (Dinas Kesehatan Kabupaten Karangasem, 2017).

The high mortality rate caused by cervical cancer in Indonesia is because 95% of women do not perform early examination, causing a late diagnosis of cervical cancer and lowering the life expectancy of women. There should be awareness of women of childbearing age for screening against cervical cancer by VIA check-up. The data shows that public awareness especially women of childbearing age to perform VIA is still low, whereas the Government has encouraged healthy lifestyle and early detection. This problem occurs because their knowledge of cervical cancer is lacking, felt ashamed, felt no symptoms of cervical cancer, and felt no need to be checked (Weng, Jiang, Haji, Nondo, & Zhou, 2020). Educational influence is inevitable for such case, intended to woman of childbearing age on VIA test with Emo Demo (Emotional Demonstration) method. Emo Demo is the method of public education using a new approach which focuses on Behaviour Centred Design (BCD). BCD finds how brains learn with a practical set of steps and tools to create successful behaviour change programs in which the change can be achieved with response to something new and challenging. There are five steps regarding behaviour change, i.e. Assess, Build, Create, Deliver and Evaluate (Aunger & Curtis, 2015)(Aunger & Curtis, 2016)(Birawida, Selomo, Mallongi, & Adilah, 2019). The information given in Emo Demo is educational activity accompanied by demonstrations that need emotional power. Implementation of counseling with Emo Demo method takes only 15 – 20 minutes. The activity includes also fun games and watching movies.

Based on empirical studies performed, Karangasem regency, especially the work area of Public Health Service of Rendang, experienced problems of low number of woman of childbearing age performing VIA test as early detection of cervical cancer due to lack of knowledge and information about its urgency.

Cervical cancer is one of cancers which leads to hundreds of thousands premature death among women and 8-% from developing countries and is second common cancer in woman (Germar & Merialdi, 2003)(Ginsburg et al., 2018). Human papillomavirus (HPV) is the cause of invasive cervical cancer in which 70% of all cervical cancer are with HPV -16 and 18 (Chan, Aimagambetova, Ukybassova, Kongrtay, & Azizan, 2019)(Okunade, 2019). Key components to comprehensive approach of cervical cancer prevention are community education, social mobilization, vaccination, screening, and treatment to palliative care(World Health Organization (WHO), 2013). Summary estimation of visual inspection with acetic acid (VIA) was done with 29 studies review in which the summary sensitivity and specificity of VIA for CIN2+ were 73.2% and 86.7%. VIA is proven good in its sensitivity detecting severe outcome, in spite of slight loss is specificity. VIA could be a good option for cervical cleaning in low -resource settings (Qiao et al., 2015). Yet, community based screening programs require sophisticated infrastructure, highly trained personnel, as well as adequately equipped laboratories and good referral system. The study with cross-sectional with questionnaires with samples by simple random sampling was done and the majority of reproductive age and married woman were willing and accept VIA test. Meaning that the test can arise their awareness. However, that should be simultaneously done with education. Somehow, the studies about Emo Demo is still few discussed. One thing to understand is that the future of emotion research can be successful if keep in mind that emotion became respectable, need to focus on experimental approach that simplified the problem in way to make it tractable.

2. Method

We initiated this research in June to August 2019 with experimental research quasi nonequivalent control group design. The population in this study was all women of childbearing age in Karangasem Regency, Bali, Indonesia with analysis unit or respondent of this research is women of childbearing age in Rendang District. The selection

of samples was probability sampling by simple random sampling in accordance with the criteria of inclusion and exclusion criteria. Total respondents were as much as 60 people per group. The data collection was done using questionnaire for the data of knowledge and attitudes as well as interview sheets for the participation data. All data is processed with normality test using Kolmogorov Smirnov with the results of undistributed data and different tests using non parametric tests: Wilcoxon, Mann Whitney, and Chi-Square

3. Results

3.1. Characteristics of Respondents

Characteristics of respondents are organized based on respondents' ages and educational background, occupation, income, number of children and source of information. The results of characteristics of respondents according to ages are shown in Table 1.

Table 1: Characteristics distribution based on ages

No	Group	N	Mean	Median	Modus	SD	Min-Max
1	Control	30	34.12	35	35	7.321	21-41
2	Intervention	30	30/90	29	25	6.724	19-48

Table 1 shows the information of 60 respondents in the control group, the average age is 34.12 with a median of 35. Meanwhile the highest age is 35 with a standard deviation of 7.321, and the youngest is 21 years old and the oldest is 41. Apart from control group, the intervention group shows the average age is 30.90 with a median of 29. Most age is 25 with a standard deviation of 6.724. The youngest age is 19 and the oldest is 48 years old.

Second results of educational background, occupation, income, number of children and source of information are shown in Table 2.

Table 2: Characteristics based on educational background, occupation, income, number of children and source of information

Variable	Control		Intervention	
	f	%	f	%
Educational background	11	18.3	21	35.0
Elementary School				
Junior High School	14	23.3	15	25.0
Senior High School	30	50.0	19	31.7
University	5	8.3	5	8.3
Total	**60**	**100**	**60**	**100**
Occupation				
Private employer	10	16.7	15	25.0
Private employee	7	11.7	3	5.0
Labour/Farmer/Breeder	4	6.7	16	26.7
Tailor	1	1.7	0	0
Civil servant	2	3.3	0	0
Housewife	36	60.0	26	43.3
Total	**60**	**100**	**60**	**100**
Income				
None	38	63.3	43	71.7
≤1.900.000 (IDR)	5	8.3	3	5.0
>1.900.000 (IDR)	17	28.3	14	23.3

Total	**60**	**100**	**60**	**100**
Number of children				
1	17	28.3	26	43.3
2	26	43.3	23	38.3
3	14	23.3	10	16.7
4	3	5.0	1	1.7
Total	**60**	**100**	**60**	**100**
Source of information	18	30	16	26.7
Community leader				
Health worker	7	11.7	21	35.0
Social media	35	58.3	23	38.3
Total	**60**	**100**	**60**	**100**

Table 2 indicates that most of them are 50% high school graduates, while in the intervention group, most of them are 35% elementary school graduates. Based on the occupations in both the control and intervention groups, it was found that most of the respondents' are housewives. According to income, most of them, namely 63.3%, have no income and in the intervention group, most of them also have no income. From the number of children in the control group, 43.3%, have 2 children, while in the intervention group, most of them 43.3%, have 1 child. Based on sources of information in the control group, it was found that most of them, namely 58.3%, received information from social media, while in the intervention group, most of them, namely 38.3%, also received information from social media.

3.2. Research Variables

The results of observation on knowledge of screening cervical cancer using VIA is shown in Table 3.

Table 3. Knowledge variable

No	Group		N	Mean	Median	Modus	SD	Min-Max
1	Control	Pre	60	73.37	76	76	12.117	47-95
		Post	60	78.50	81	76	11.281	60-98
2	Intervention	Pre	60	68.38	67	66	10.440	52-90
		Post	60	80.36	80	78	9.476	65-98

Of the 60 respondents either in the control or intervention group, it can be seen that there is different number in pre and post-tests. From the control group, the post-test mean and median is higher than pre-test. While the most value is same, in 76. Those condition is also shown in intervention t group in which the mean, median and mode of post- test is higher than its pre-test. Between control and intervention group, the one that has better Min-Max value is the intervention group. Secondly, the results with research variables of attitude shows the data in Table 4.

Table 4: Attitude variable

No	Group		N	Mean	Median	Mode	SD	Min-Max
1	Control	Pre	60	72.07	70	69	5.772	59-93
		Post	60	78.78	77.50	75	5.012	67-96
2	Treatment	Pre	60	73.28	73	69	4.923	64-88
		Post	60	83.15	81.50	80	4.967	75-97

The results show that both control and intervention group has better mean, median and mode in its each post-test than the pre-test. Although in general, intervention group has better result that control group. In addition, the Min-Max value of intervention group is better than control group. It can be seen in its post-test that intervention group gained 75-97, better than that in control group with only 67-96.

Last variable which is participation, obtained data as shown in Table 5.

Table 5: Distribution of women of childbearing age based on participation

No	Group		Participation				Total	
			Do		Not			
			f	%	F	%	f	%
1	Control	Pre			60	100	60	100
		Post	21	35.0	39	65.0	60	100
2	Treatment	Pre			60	100	60	100
		Post	33	55.0	27	45.0	60	100

Table 5 shows that from 60 respondents in the control group specifically in *pre-test,* didn't do screening cervical cancer with VIA, while in the *post-test* most of the 65.0% also did not do cervical cancer screening by VIA. The treatment group of 60 respondents in *pre-test* also didn't perform cervical cancer screening with VIA while *posttest* data is mostly 55.0% did cervical cancer screening with VIA.

3.3 Data Analysis

The data of knowledge was analyzed using Wilcoxon and Mann Whitney as the data is not normally distributed with $p < \alpha$ (0.05). In terms of knowledge, the result of analysis show that there is improvement in knowledge both in control group from mean 73.37 to 78.50 and intervention group from 68.38 to 80.36. While in p value, the analysis obtain 0.000, which indicates that there is a difference of knowledge in respondents (women of childbearing age) in performing cervical cancer using VIA either in control and intervention group.

Apart from knowledge, the results of analysis on attitude also show improvement either in control group (mean 72.07 to 78.78) and intervention group (73.28 to 83.15). The result of p – value also show 0.000 which means there is difference in attitude performing cervical cancer screening using VIA. While in participation, it also shows p value of 0.000 which indicates there is difference in participation on performing cervical cancer screening using VIA.

4. Discussion

These tests revealed a significant difference in the control group regarding women of childbearing age knowledge in cervical cancer screening using the VIA before and after counseling with the Emo Demo method (p value 0.000). The results of the knowledge pretest, respondents obtained a mean value of 68.38 with a standard deviation of 10.44. The value of knowledge before education with the Emo Demo method is 52-90. This shows that the level of knowledge of respondents varies greatly, meaning that there is a considerable difference in knowledge between respondents. Although health counseling about cervical cancer screening using the IVA method is rarely held, there are respondents who get a knowledge score of 85 at the time of the pretest. These data indicate that respondents have been well-informed to information about cervical cancer. Information sources collectively develop and influence individual decisions regarding specific tasks, behaviors, or appearance or achievement (Bandura, 1997).

The results of the posttest knowledge obtain a mean value of 80.36 with a standard deviation of 9.47. The value of the range of knowledge of the respondents after the training is 65-98. This shows that the Emo Demo method can take respondents' attention. Thus the respondents are more knowledgeable. Based on education 50% of respondents received secondary education equivalent to formal high school education. The respondent's educational background has effect on the respondent's knowledge after the intervention was given with Emo Demo. Hence, there are differences in the results of the pretest and posttest. These results are in line with (Idris, Hassan, Ya, Kaur, & Aziah, 2012)that educational factors affect a person's knowledge and it is undeniable that the higher a person's education, the easier it is for them to receive information and the more knowledge they are able to receive.

There is an increase in attitude after intervention of Emo Demo method compared to previous attitude. Before the intervention, the average value was 73.28 while after the intervention with emo demo it increases to 83.15. The results of the bivariate analysis using the Wilcoxon test and obtained p value = 0.000 which indicates that there are differences in the attitudes of women of childbearing age in screening cervical cancer using the IVA method before and after the intervention of Emo Demo. Attitude is the second domain after knowledge in the level of behavior change. Knowledge of respondents about cervical cancer screening in the intervention group significantly increased. Change in attitude cannot be separated from an increase in one's knowledge (Arlinghaus & Johnston, 2017). Regarding our research, the addition of a property in the form of cervical phantom succeed to increase emotions and feelings of the respondents. This is in line with the theory of Behavior Centered Design (BCD) that education is aimed at feelings not thoughts, so changing feelings can increase women of childbearing age attitudes. BCD theory states that an intervention must change something in the environment (Aunger & Curtis, 2016).

In the treatment group of 60 respondents, it was found that in the pre-test all of them had not screened for cervical cancer using the VIA, while after the posttest most of them, 55.0%, had screened cervical cancer with VIA. This shows that the percentage of respondents who participate in cervical cancer screening activities is greater after counseling with the Emo Demo method. Emo demo is used as a way to carry out education because this method can provide detailed and clear information as it uses teaching aids easily understood by respondents directly and most importantly by involving emotions from respondents.

The difference of participation in cervical cancer screening is influenced by many factors, in this case is the intervention method carried out. Emo Demo is not only a method to give health information but also to boosts emotion of the respondents to change their behavior. Fear is one of the emotions that can be increased to change the behavior of research subjects. An individual will naturally avoid painful threats (Harrison, Ahn, & Adolphs, 2015). The good knowledge possessed by woman in childbearing age about cervical cancer and its examination can be a motivating factor for them to try to avoid cervical cancer. Lack of knowledge and awareness of the importance of examination is an inhibiting factor for cervical cancer screening. Individual knowledge about disease will shape individual perceptions about disease threats and beliefs about disease susceptibility. Thus, it will motivate individuals to perform health behaviors (Asgarlou et al., 2016). The Emo Demo method was carried out as an intervention using the Behavioral Centered Design (BCD) approach. This approach includes psychological elements as innovations to change individual behavior. The combination of science and creativity in the preparation of messages makes this method able to transfer behavior change messages.

5. Conclusion

We have implemented Visual Inspection of Acetic Acid with Emo-Demo (Emotional Demonstration) towards women of childbearing age. This method brings results on differences in knowledge, attitude and participation of the respondents. There are meaningful differences in knowledge, attitude and participation of the respondents namely women of childbearing age in as much as 60 persons provided with p-value of less than 0.05.

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Anesthetic Management of Patient with Preeclampsia, Pulmonary Edema, and Peripartum Cardiomyopathy in Pregnancy Undergoing Caesarean Section: A Case Report

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Abstract
Preeclampsia is a disease that occurs in pregnancy after 20 weeks of gestation with manifestations involving multi organ systems such as pulmonary edema and ventricle dysfunction. Cardiomyopathy is a heart disorder characterized by myocardial dysfunction unrelated to any other previous heart disease. Case: A 31-year-old woman diagnosed with G1P0A0 full-term pregnancy, preeclampsia, pulmonary edema, cardiomyopathy, and fetal distress, who underwent cesarean section. On physical examination, shortness of breath was found in semi-Fowler position. Patient had high blood pressure and global hypokinesis was found on echocardiography results. She was planned for general anesthesia with semi-closed intubation technique and breath controlled. Anesthetic management should optimize the preoxygenation, provide positive pressure ventilation with positive end-expiratory pressure (PEEP), maintain the minimal myocardial depressant effect of drugs, and maintain a normovolemic state. It could improve the good outcomes. Conclusion: Three things that must be considered when starting the induction are oxygenation, fluid status, and selection of drugs that do not make the heart work harder. The combination of fentanyl, midazolam, and sevoflurane is the drug of choice used for induction, because it can minimize the cardiac depressant effect.

Keywords: Preeclampsia, Pulmonary Edema, Cardiomyopathy, Anesthetic Management

Introduction

Preeclampsia is a multi-organ disease found in pregnancies over 20 weeks of gestation. One of the manifestations is pulmonary edema caused by plasma leakage (Stoelting & Dierdorf, 2002). Peripartum cardiomyopathy is a heart disease that occurs during gestation characterized by myocardial dysfunction in which no underlying disease is

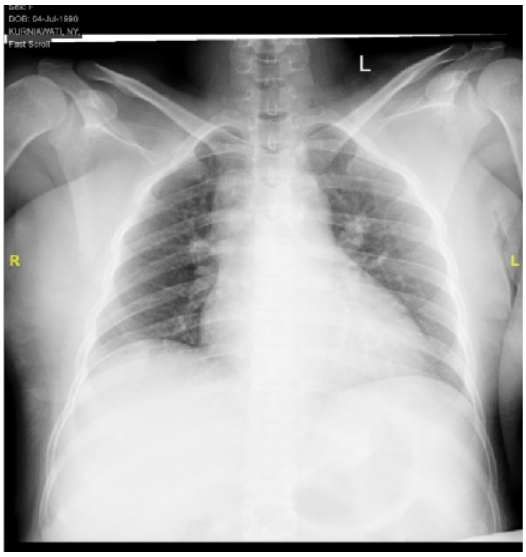
found (Stoelting & Dierdorf, 2002). Both cardiomyopathy and preeclampsia with pulmonary edema show almost the same symptoms which are: shortness of breath, fatigue, and edema (Cunningham, et al., 2011).

The prevalence of preeclampsia ranges from 2-10% of pregnancies while the prevalence of peripartum cardiomyopathy is around 1:1500 to 1:4000 pregnancies with a mortality rate of 18-56%. Cardiomyopathy in pregnancy is called PPCM (*Peripartum Cardiomyopathy*), with mortality rate of 70%; other types that can be found in pregnancy are HOCM (*Hypertrophic Cardiomyopathy*), with mortality rate of 4% and idiopathic dilated cardiomyopathy with mortality rate of 4%. Until this case report was made, the authors have not found definitive data on the incidence of severe preeclampsia accompanied by cardiomyopathy (Blackburn & Bracco, 2011).

In preeclampsia patients with pulmonary edema, general anesthesia with intubation is a treatment of choice. However, several problems might be encountered when starting anesthesia for these patients: 1) Oxygenation during induction and intubation in pulmonary edema patients in which the patient is experiencing hypoxia; 2) fluid management; 3) drug selection in patients with cardiomyopathy.

Case

A 31-year-old female patient came with a diagnosis of G1P0A0 gestation with preeclampsia, pulmonary edema, and peripartum cardiomyopathy. The patient was planned to undergo an emergency cesarean section. The patient had experienced shortness of breath for one month before entering Hasan Sadikin Hospital and was getting worst for five days before entering the hospital. The patient slept comfortably in a semi-sitting position. The patient's vital signs were blood pressure of 160/110 mmHg, sinus pulse of 120 beats per minute, respiratory rate of 30 breaths per minute, and oxygen saturation of 88-90% with an oxygen mask of 10 liters per minute. The patient had been treated with furosemide 2x20 mg intravenously, methyldopa 3x500 mg orally, and nifedipine 2x10 mg orally. On physical examination, the shortness of breath was found in the semi-Fowler position. On thoracic examination, crackles were found at the lung bases, widened ictus at ICS 6 on the anterior axillary line, and legs edema. In addition, global hypokinesis was found on echocardiography results. The platelets were found decreased to 125,000/ml on laboratory examination, and proteinuria was 500 mg/dl on urinalysis.



Picture 1: Patient Chest Xray

The patient was planned for general anesthesia with a semi-closed intubation technique and breath controlled. After the patient was placed on the operating table, the patient was pre-oxygenated with 100% oxygen using a face mask. The patient's body was placed in the semi-Fowler position until the oxygen reached maximum saturation (96% within 5 minutes). The Induction was performed with a combination of midazolam 5 mg, fentanyl 150 mg, and sevoflurane, which was started with a concentration of 2%, then gradually increased until the patient was induced. The position of the patient was lying down while being given breathing support with positive pressure ventilation. Rocuronium 50 mg was given for intubation. The Sellick maneuver was performed, followed by

intubation with direct laryngoscopy, then an endotracheal tube (ETT) number 6.5 was placed with a balloon. Anesthesia was maintained by sevoflurane 1.5-2 vol%, and oxygen and air with a ratio of 50%. The duration of the operation was 60 minutes.

During surgery, the patient's blood pressure and heart rate were stable with a systolic blood pressure of 130-150 mmHg, a diastolic blood pressure of 70-100 mmHg, a pulse of 90-100 beats per minute, and oxygen saturation of 94-98%. A live baby boy was born and started crying immediately with an APGAR score of 6-8. At the end of the surgery, the patient's blood pressure was 148/94 mmHg, pulse rate was 102 beats per minute, and oxygen saturation was 96%. The recapitulation of fluid for the first hour is 500 cc with an estimated blood volume of 5300 cc with an allowed blood loss (ABL) of 1412 cc. During surgery, 1000 cc of crystalloid was given, with blood loss of 600 cc.

Based on the results of post-anesthesia monitoring in the recovery room, the general condition of the patient was fully conscious with a blood pressure of 142/95 mmHg, a pulse of 98 times per minute, breathing of 24 times per minute, oxygen saturation of 96% with oxygen mask of 6 liters per minute. Fentanyl 25 mcg per hour was given as postoperative analgesia. The patient was given ondansetron 4 mg intravenously if nausea and vomiting occurred. In addition, antibiotics were also given postoperatively. The administration of furosemide and antihypertensive therapy was continued. The patient's vital signs, such as consciousness, blood pressure, pulse, and breathing, were monitored every five minutes during observation in the recovery room. We proceeded to transfer the patient into the HCU. The patient was treated for one day in HCU with hemodynamics within normal limits, then transferred to the standard care room.

Discussion

Preeclampsia is a disease found after 20 weeks of gestation characterized by hypertension, proteinuria, or thrombocytopenia if there is no proteinuria (Stoelting & Dierdorf, 2002) (Roberts, et al., 2013). It is said to be severe preeclampsia if there are advanced complications of preeclampsia such as pulmonary edema, myocardial infarction, stroke, kidney failure, coagulopathy, and retinal injury (Roberts, et al., 2013) (Oh, 2003). Preeclampsia occurs due to the failure of the spiral arteries remodeling in the placenta, resulting in ischemia of the placenta, which triggers the release of inflammatory mediators, and causes increased permeability and generalized vasoconstriction (Reed & Yudkowitz, 2005).

Generalized vasoconstriction also occurs in the heart, causing myocardial ischemia. In addition, the increased afterload can lead to left ventricular hypertrophy and left ventricular dysfunction. Pulmonary edema in preeclampsia is primarily due to plasma leakage but can also occur due to a combination of plasma leakage and fluid retention caused by left ventricular dysfunction (Stoelting & Dierdorf, 2002).

Cardiomyopathy is a heart disorder characterized by myocardial dysfunction in the absence of other underlying heart diseases. Based on morphology and hemodynamics, cardiomyopathy is divided into four types: dilatation, restriction, hypertrophy, and obliteration (Stoelting & Dierdorf, 2002). As stated in the introduction, the most common cardiomyopathy in pregnancy is PPCM. Peripartum cardiomyopathy can occur in the last trimester of pregnancy or 1-5 weeks postpartum (Stoelting & Dierdorf, 2002) (Stergiopoulus, et al., 2011).

The etiology of PPCM is still unclear. Several factors suspected to be the cause of PPCM are inflammation (myocarditis, cytokines), viral infection, autoimmunity, abnormal hemodynamic responses during pregnancy, oxidative stress which triggers endothelial cell damage, and vascular cell apoptosis (Bhakta, et al., 2011) The risk factors for PPCM are obesity, malnutrition, advance maternal age, multipara, gestational hypertension, preeclampsia, smoking, and family history (genetic). According to Cunningham et al., oxidative stress that contributes to or is a stimulant of preeclampsia is a crucial concept in the occurrence of cardiomyopathy. There are four criteria for establishing the diagnosis of PPCM: 1) heart failure occurring in the last trimester of pregnancy or 1-5 months after delivery; 2) no underlying disease that causes heart failure; 3) no signs and symptoms of heart failure in the first and second trimesters; 4) left ventricular ejection fraction < 45%. (Cunningham, et al., 2011)
Based on the clinical presentation, severe preeclampsia complicated with pulmonary edema and cardiac disorders is very difficult to distinguish from PPCM. Both showed the same symptoms: dyspnea, orthopnea, cough, fatigue,

and edema.

It was difficult to diagnose whether this patient only suffered from preeclampsia or preeclampsia with cardiomyopathy. However, the patient's chest X-ray showed significant cardiomegaly, and global hypokinesis was found on echocardiography results, so it could be said that there is a possibility of impaired myocardial contractility, a pathognomonic sign of cardiomyopathy. Although the diagnosis and type of cardiomyopathy could not be established with certainty, this patient could still be considered to be diagnosed with cardiomyopathy or PPCM.

The anesthetic technique of choice in preeclampsia with pulmonary edema was general anesthesia with intubation technique (Cunningham, et al., 2011). Ideally, this patient requires invasive monitoring such as CVC placement, arterial line, and Swan-Ganz, but this patient only uses standard monitoring (NIBP, ECG, pulse oximetry). Anesthetic management in preeclampsia with pulmonary edema and ventricular dysfunction with PPCM is the same: maintaining normovolemic state, preventing increased afterload, maintaining contractility, maintaining hemodynamic stability, preventing tachycardia, and maintaining adequate uteroplacental oxygenation. During the use of medication, avoid using drugs that depress the myocardium (Cunningham, et al., 2011) (Sahoo, et al., 2010) (Bilehjani, et al., 2008) (Neuenschwander & Baliga, 2007).

Induction is the administration of intravenous drugs to make the patient from conscious to unconscious. In severe pulmonary edema, almost all of the alveoli are filled with fluid, so these patients have no residual functional volume, especially when the patient is in supine position. Fluid will fill all three lung zones when the patient is in supine position so that desaturation will occur immediately when the patient is induced. Therefore, pre-oxygenation is carried out so that oxygen reserves in the blood can be optimal. After the patient is induced, oxygenation is carried out with positive ventilation by giving PEEP (Neuenschwander & Baliga, 2007).

The choice of drug at induction is crucial. Bilahjeni et al., in their case report, wrote about the benefits of using remifentanil and etomidate in patients with peripartum cardiomyopathy; however, at our hospital, neither of these drugs was available (Bilehjani, et al., 2008) (Stoelting & Hillier, 2006).

Fentanyl is one of the opioid agonists with a rapid and immediate onset after administration, but the analgesic effect or respiratory depression is not seen within a few minutes. Effects that can be seen through intravenous administration are generally obtained after 30 to 60 minutes. Fentanyl has the effect of drug-induced bradycardia and depresses the SA node, resulting in slower heart rate, longer diastolic and coronary filling times, and can reduce oxygen demand. Fentanyl also has a peripheral vasodilating effect, making it beneficial in patients with pulmonary edema. Fentanyl can cross the placenta and depress the fetus, but in this case, the APGAR score was still normal (Stoelting & Hillier, 2006) (Neuenschwander & Baliga, 2007).

Midazolam is a benzodiazepine drug that has a sedative and rapid effect. The decrease in blood pressure due to decreased SVR tends to be milder than propofol. Midazolam also does not decrease cardiac output. Among other inhaled agents, sevoflurane depresses the myocardium the least. In addition, sevoflurane is also an anesthetic gas that is used as ischemic preconditioning in the myocardium. In this patient, induction of anesthesia was performed by combining these three drugs. By combining drugs, the dose given is smaller than the induction dose so that the adverse effects on the heart can be minimized and the beneficial effects still exist. (Stoelting & Hillier, 2006) (Sahoo, et al., 2010) (Morgan, et al., 2006) (Neuenschwander & Baliga, 2007).

Conclusion

Cardiomyopathy is challenging to distinguish from ventricular hypertrophy/dysfunction in preeclampsia patients with pulmonary edema. For this reason, adequate diagnostic support is needed to establish a definite diagnosis of cardiomyopathy.

Three things must be considered when starting the induction are oxygenation, fluid status, and selection of drugs that do not make the heart work harder. Pre-oxygenation is needed to optimize blood oxygen levels. In addition, CVC placement should be done to ensure the patient remains in a normovolemic state. The combination of

fentanyl, midazolam, and sevoflurane is the drug of choice used for induction, because it can minimize the cardiac depressant effect. However, the beneficial effects on the heart are still obtained.

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Adherence to NICE Guidelines on Colorectal Cancer Follow-Up: A Cross-Sectional Analysis

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Abstract
Purpose: Our aims were to determine adherence to National Institute of Clinical Excellence (NICE) guidelines on colorectal cancer (CRC) surveillance and to evaluate local practice patterns determine how it can be further improved. Patients and methods: Patients with colorectal cancer resection between January 1, 2017 and December 31, 2017 were identified, and their records retrospectively reviewed. Results: A total of 18 patients were eligible. Surveillance patterns, including blood tests and colonoscopies, were inconsistent with NICE recommendations in a significant proportion of patients. Follow up appointments and CT imaging occurred more frequently in line with the guidelines. For recurrences detected by surveillance, 66.6% were resectable whereas 0% of those detected by symptoms were resectable. Conclusions: The results prove that a moderately intensive follow-up strategy can positively identify resectable recurrence thus increasing overall survival. Our data highlights the need for local improvement to adherence to NICE guidelines regarding CRC follow-up. We have created a pro forma which is attached to the patient's clinical notes. It will aid clinicians in reminding them when appropriates tests should be completed. A re-audit will be completed in December 2020 which will include looking at the effectiveness of the new pro forma.

Keywords: Colorectal Cancer, Tumor, Follow-Up, Resection, CEA

1. Introduction

1.1 Background

Colorectal cancer (CRC) is the second most common malignancy in the world, with there being around 42,300 new cases in the UK every year (1). At presentation, around two-thirds of these patients will undergo resection with curative intent. The TNM stage at diagnosis is the most important prognostic factor for disease-free and overall survival (OS), with patients with stage II and III CRC having a 5-year OS rates of 70% and 55%,

respectively (2,3) Despite potentially curative surgery and the use of adjuvant chemotherapy, radiation, or chemoradiation, ≤ 40% of patients with stage II/III disease will still develop disease recurrence within three years of their initial diagnosis (4.5). The substantial risk of recurrence highlights the importance of adequate postoperative surveillance, so that appropriate detection and treatment of disease relapse can be offered. There are three purposes of surveillance following CRC resection: (a) detection of residual tumour tissue or local recurrence; (b) detection of metachronous colorectal tumours; and (c) detection of metastases (6-8). For the detection of residual tumour tissue or local recurrence and metachronous colorectal lesions, colonoscopy is the most established examination method and computed tomography (CT) is used to detect metastases. In addition, medical history, physical examination and carcinoembryonic antigen (CEA) measurement are recommended for surveillance (9.)

The ongoing debate regarding the intensity of follow-up investigations is complex. There is a plethora of research that demonstrates intense postoperative surveillance compared with less intensive strategies results in a survival benefit. Proponents of an intensive surveillance regimen argue that early detection of recurrence results in a higher proportion of potentially resectable tumour recurrences and improves OS (10-12). In contrast, advocates for a simpler strategy argue that excessive investigations can lead to increased health care costs, contribute to patient and physician anxiety, and rarely alter the natural course of disease (13,14). To date, there is no universally accepted protocol.

In view of ambiguous protocol, the National Institute of Clinical Excellence (NICE) has published guidelines for managing and surveillance of colorectal cancer in adults. The set of NICE guidelines released in 2011 (and later updated in 2014) recommends a moderately intensive surveillance scheme in which patients are offered follow up clinic in 4-6 weeks after resection, at least two CT Chest, Abdomen & Pelvis (CAP) in the first three years, regular carcinoembryonic antigen (CEA) tests at least every six months in the first three years and offered a colonoscopy one year after surgery (15). Despite the existence of clear guidelines, nationwide surveys of oncologists reveal marked differences in attitudes towards CRC follow up. Research shows the substantial variations in actual surveillance practice amongst cancer centres and in the guidelines published by major cancer societies (16-21). To better understand the protocol practice locally, we conducted this study to determine the adherence rate of NICE guidelines on CRC follow- up to examine the impact of patterns on patient outcomes.

1.2 Colorectal Cancer Stages

The staging system (Table 1) most often used for colorectal cancer is the American Joint Committee on Cancer (AJCC) TNM system, which is based on 3 key pieces of information:

- The extent (size) of the tumor *(T)*
- The spread to nearby lymph nodes *(N)*
- The spread (metastasis) to distant sites *(M)*

Table 1: AJCC staging system. Describes the extent of disease progression in cancer patients, utilising the TNM scoring system: **T**umour size, Lymph **N**odes affected and **M**etastases (22)

Stage IA	*T1*	*N0*	*M0*
Stage IB	T2	N0	M0
Stage IIA	T2	N0	M0
Stage IIB	T1- T3	N1	M0
Stage IIIA	T1- T3	N2	M0
Stage IIIB	T4	Any N	M0
Stage IV	Any T	Any N	M1

1.3 Surveillance following surgical resection

Table 2 summarizes the recommendations on surveillance following curative survival resection of CRC in the US, EU, and UK (23). In all guidelines, medical history and examination, CEA measurements, CT of chest and abdomen and colonoscopy are recommended after surgery for colon cancer. For rectal cancer, CT pelvis is recommended for all guidelines. Except for colonoscopy for detection of metachronous colorectal tumours, the surveillance period is determined to be five years in every guideline. This is based on previous studies showing that most recurrences and metastases are detected within five years after initial treatment (24-26). Forty percent of patients with stage II and III will develop recurrences (2). It is widely recommended in national guidelines be applied for patients with Stage II and III CRC. Surveillance after surgical resection of cancer in Stage I does not require such intense follow up as there is allow possibility of recurrence, particularly for node negative pT1 cancer. This goes as far as the surveillance recommendations for Stage I cancer is not described in the ASCO guidelines because of minimal data to provide guidance. It is reasonable to note further investigation is necessary to establish more efficient programs for surveillance of pT1 cancer (27,28).

2. Methodology

2.1 Audit standard

The 'Colorectal Cancer Diagnosis and Management' NICE guidelines, published in 2011 and last updated in 2014 (summarized in Table 2) were used as the reference standard on which clinicians adherence to CRC follow up was measured and practice patterns evaluated.

2.2 Study Hospital

Whipps Cross Hospital is a district general teaching hospital located in East London serving a population of around 350,000 people. It houses a General Surgery which provides urgent and emergency services through its accident and emergency department and urgent care centre.

Table 2: Summary of surveillance following colorectal resection secondary to cancer in the US, EU and UK. ASCO, American Society of Clinical Oncology. ESMO, European Society for Medical Oncology. NICE, National Institute of Clinical Excellence. CEA, carcinoembryonic antigen. CT, computed tomography

	ASCO US	ESMO EU	NICE UK
History and physical examination	Every 3-6 months for 5 years after surgery	Every 3-6 months for 3 years and every 6-12 months at years 4 and 5 after surgery	offered follow up clinic in 4-6 weeks after resection
CEA measurement	Every 3-6 months for 5 years after surgery	Every 3-6 months for 3 years and every 6-12 months at years 4 and 5 after surgery	At least every 6 months in the first three years
CT scan of chest, abdomen and pelvis	Every 12 months for 3 years/ every 6-12 months for high risk recurrence patients	Every 6- 12months for the first 3 years for patients at high risk of recurrence	At least 2 scans in the first 3 years
Colonoscopy	AT year 1 and every 5 years thereafter if the findings were normal	At year 1 and 3 -5 years there after	At year 1 and 3 -5 years there after

2.3 Study design

This study is a cross- sectional analysis within the colorectal cancer database with a population – based cohort study to assess the post resection follow up care for adult patients for with colorectal cancer.

2.4 Data collection

This study was conducted upon receiving approval from the General Surgical department lead. Consecutive patients diagnosed with colorectal cancer and underwent curative resection from January 1, 2017 to December 31, 2017 were included. An electronic database compromising a list of the patient that had undergone colorectal resection was made available to all surgical doctors on the hospital shared drive. Surgical juniors were periodically reminded by consultants to ensure patients having colorectal resection secondary to CRC were added to the database for audit purposes. Electronic medical records were respectively reviewed to abstract patient demographics, baseline tumour characteristics, local and systemic treatment history, surveillances practices and clinical outcomes during the first three years of follow-up.

2.5 Sample size

The sample size for this study was determined by the sample size of the Colorectal Database. N = 18. One patient was excluded from data because of death.

2.6 Statistical Analysis

Descriptive statistical analysis was conducted to summarize the baseline patient demographics and tumour characteristics. The NICE guidelines on CRC surveillance were used to estimate the appropriate number of surveillance interventions over a three-year follow-up period. Statistical analysis was conducted using Microsoft Excel. All visits and tests prompted by patient symptoms or abnormal laboratory and imaging results as well as investigations occurring after disease relapse were excluded from our tally and analysis of surveillance interventions. Study participants were compared with respect to imaging, follow up and CEA testing results. The primary outcomes were the proportion of patients with curative intent, who since completing treatment had:

- received a follow up clinic report which has been uploaded onto the electronic system
- two CT Chest, Abdomen & Pelvis reports in the first three years
- CEA tests at least every six months in the first three years, this a total of six CEA values in three years
- colonoscopy reports one year after resection

3. Results

3.1 Follow up pattern

83% (15/18) of the patients received two CT CAPs within three years. The remaining 17% (3/18) had two CT CAPs done within four years. 22% (4/18) patients had colonoscopy one-year post surgery. Of the remaining patients, 47% (7/18) had flexible sigmoidoscopy and 47% (7/18) had no further scopes. 5% (1/18) had six-monthly CEA tests. 17/18 (95%) had four CEA tests within three years, with the average length of time between tests being 8.4 months between each test. 61% (11/18) of patients were seen in clinic within 4-6 weeks. Of those not seen in recommended time, 29% (2/7) were seen between 8-12 weeks, 43% (3/7) within 12-24 weeks and 29% (2/7) between 24-40 weeks.

3.2 Tumour recurrence

In total there were four recurrences. Table 3 outlines the characteristics of disease recurrences. Among those who experienced recurrence, 75% (3/4) were detected by surveillance and the remaining 25% (1/4) by patient symptoms. 66.6% (2/3) of those recurrences detected by surveillance were amenable to resections. The one recurrence discovered by patient symptoms was not suitable for resection. CT CAP was the method of diagnosis for 100% of recurrences, followed by a colonoscopy and CEA test in 25% (1/4).

4. Discussion

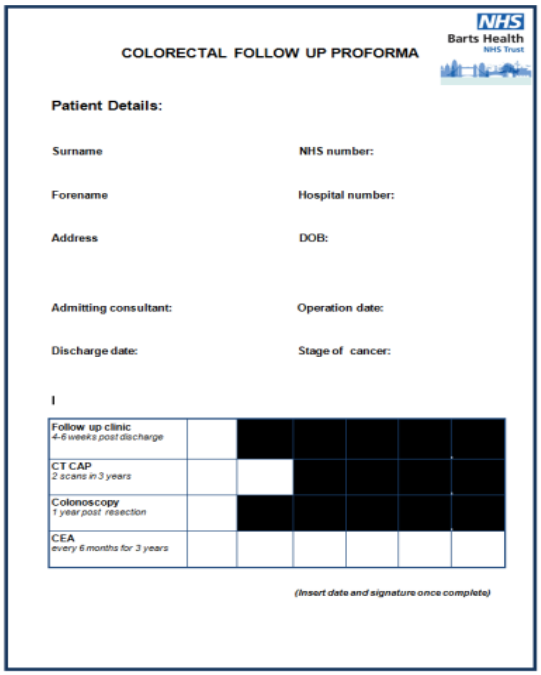
It is evident from the results that there was much scope for improvement. Majority of the CT scans and follow-up appointments were completed as per NICE recommendations, nonetheless the colonoscopy and CEA testing were poor. CEA has been illustrated to detect disease two - five months prior to any other means and therefore remains as a crucial component in diagnosing and managing colorectal cancer. Regarding the importance of colonoscopy during follow – up, it is performed with two intentions; 1. to detect metachronous tumours and 2. to detect anastomotic recurrences (9). Three percent of patients develop metachronous tumour within 5 years of surgery, and 50% of these develop within one year (29). The poor adherence to NICE guidelines in some aspects of testing is evident in this study and indicates the need for better education and widespread implementation of evidence-based guidelines. To try and achieve this we have held a teaching session at the weekly surgical departmental meeting. We presented our audit research and discussed with the department the reasons as to why we adherence to guidelines is not 100%. From this, it was decided a pro forma (Figure 1) would aid in reminding clinicians to ensure patients are followed up in the advised timeline. This pro forma has been implemented by being attached to the front of the physical patient notes folder which the clinician running the clinic will be required to fill in.

Table 3: Outline of disease recurrence characteristics by stage of cancer, type of cancers and site of resectable recurrences.

Characteristic	**Recurrence detected by Surveillance n=3 (%)**	***Recurrence detected by symptoms n=1 (%)***
Stage		
Stage II	1 (33.3%)	-
Stage III	2 (66.7%)	1 (100%)
Type of Cancer		
Colon	3 (100%)	1 (100%)
Rectal	-	-
Resectable	2 (66.7%)	-
Unresectable	1 (33.3%)	1 (100%)
Site of resectable recurrences		
Liver	1 (50%)	-
Local	1 (50%)	-

Surveillance for disease recurrence is an integral component in the management of many tumours once active treatments such as surgery, chemotherapy, and/or radiation have been completed. Although there is emerging evidence to suggest that intensive post - treatment monitoring with periodic imaging results in earlier detection of asymptomatic recurrences and potentially more opportunities for cure, these benefits must be weighed against the physical, psychologic, and economic detriments of unnecessary and repeated assessments (30). Our study supports the periodic imaging notion as 100% of the resectable recurrences were detected by CT scans, thereby endorsing the use of imaging studies during follow-up. Several large meta-analyses have indicated a possible survival advantage from intensive follow-up, whereas competing studies have found that a conservative, symptom-based approach provides equivalent outcomes (31-33). In a recent prospective, multicentre, randomized, controlled trial, Rodriguez-Moranta et al did not demonstrate any statistically significant differences in OS between patients who

underwent simple versus intensive follow-up (4). However, interestingly, an exploratory subgroup analysis of the stage II CRC cohort did reveal a trend toward improved survival among patients randomized to the intensive arm as a result of a higher rate of resection at the time of recurrence . The trial consisted of 259 patients and perhaps underpowered to detect survival differences in the entire patient sample. The lack of conclusive evidence from this and previous studies drives the surveillance controversy and contributed to wide variations in current follow-up programs (34).



COLORECTAL FOLLOW UP PROFORMA

NHS Barts Health NHS Trust

Patient Details:

Surname | NHS number:

Forename | Hospital number:

Address | DOB:

Admitting consultant: | Operation date:

Discharge date: | Stage of cancer:

I

Follow up clinic *4-6 weeks post discharge*		■	■	■	■	■
CT CAP *2 scans in 3 years*			■	■	■	■
Colonoscopy *1 year post resection*		■	■	■	■	■
CEA *every 6 months for 3 years*						

(Insert date and signature once complete)

Figure 1: Colorectal Cancer Clinic Pro forma. aid in reminding clinicians to ensure patients are followed up in the advised timeline. Implemented by being attached to the front of the physical patient notes folder which the clinician running the clinic will be required to fill in.

Our results confirm that there are noticeable departures from evidence-based surveillance guidelines. Many patients satisfy the minimum number of clinic visits and CT CAP but were hugely missed out when it came CEA testing and post-operative colonoscopies. The accessibility to organise clinic dates and in house imaging may be the reason that patients would more routinely receive follow up clinic and imaging whereas the increased number of people involved in organising CEA testing with the GP/ hospital phlebotomy service or arranging scoping with the Endoscopy department led to patients more likely to fall through the gaps.

In terms of limitations of the study, the sample size was small and the data we had used was collected by predecessors and therefore we were unable to be certain that it contained a complete list of all patients that were diagnosed with malignant colorectal cancer in 2017. It is also possible that some patients may have not had the relevant electronic documentation, therefore we were unable to clarify whether the patient was lost to follow up, had moved to a different hospital trust, if patient had declined further tests or if it was documented on paper notes. As the data and results were collated in April 2020, and we used a patient database that had patients diagnosed with colorectal cancer in 2017, a proportion of the patients still had the remaining year to have their CT CAP as the recommended follow up guidelines was over a three-year period. Going forth, it will be vital to add all patients to the database to guarantee no one is by-passed accidentally and all notes are electronically recorded. Additionally, we are aware that other national CRC surveillance recommendation exist, and only NICE guidelines were used as the reference standard because it had the broad appeal and applicability to a UK audience. Finally, resectability of recurrence was chosen as the main outcome instead of measuring OS. Although OS arguably is preferable, the logistic difficulties to detect OS differences has led research to recognises resectability of recurrence as an acceptable alternative for survival analysis. A re-audit will be completed in December 2020 which will include looking at the effectiveness of the new pro forma.

5. Conclusion

In summary, our data shows that locally there is need for improvement in adherence to NICE guidelines regarding CRC follow- up. The results prove that a moderately intensive follow-up strategy can positively identify resectable recurrence this increasing overall survival. However, this study also adds to the plethora of research the highlights the impetus to find a scientifically agreed follow up strategy that balances patients' benefits vs risks vs cost effectiveness.

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Early Post-Acute Myocardial Infarction: Psychosocial and Financial Concerns

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Abstract
Purpose: Acute myocardial infarction (AMI) is a major cardiovascular event that has significant psycho-social-physical and lifestyle consequences. This study assessed the feelings of patients within days following an AMI in a public health institute in Trinidad and Tobago. Results: Of the 150 AMI patients, 134 (89.3%), were included in the study. Sixteen (10.7%) patients were not included due to inadequate information. Among the post-AMI patients, common negative feelings experienced include fear of another heart attack (n = 74, 55.2%), fear of death (n = 40, 29.9%), and fear of the future (n = 29, 21.6%). However, the positive thoughts of the AMI patients predominated: intentions to improve eating habits (n = 97, 73.5%), and increased spirituality (n = 82, 62.1%). Changes in feelings from pre to post AMI were most pronounced for positive feelings such as improved eating habits, regular exercise, and improved goals. In general, among the post-AMI patients, there were no significant associations between age and sex. However, significant associations were found between selected lifestyles variables (exercise, alcohol, eating habits, employment status, hypertension, and obesity) and psychological issues such as fear of another heart attack, improved relationships, or turning to God. Conclusions: Post-AMI patients experienced major psychosocial issues in the early post-AMI period. Though negative feelings were common, most of the patients resolved to make positive lifestyle changes.

Keywords: Depression, Post-AMI, Post AMI Feelings, Psychosocial Factors

1. Introduction

Although life-threatening diseases such as heart attacks, aortic dissections, and pulmonary emboli have generally been accompanied by physical, social, and psychological/emotional trauma (British Heart Foundation [BHF], 2019; Rozanski, Blumenthal, Davidson, Saab, & Kubzansky, 2005), the accompanying psychological distress, such as anxiety and a sense of impending doom (Boersma & Maes, 2006), as well as social and financial problems have been less widely studied (Strawbridge, 2012). Following an acute myocardial infarction (AMI), many patients experience feelings of numbness (BHF, 2019), fear (BHF, 2019; Strawbridge, 2012), sadness/grief (BHF, 2019), helplessness (BHF, 2019; Boersma & Maes, 2006), guilt (BHF, 2019), shame (BHF, 2019; Boersma & Maes, 2006), anger (BHF, 2019), changes in relationship dynamics (BHF, 2019; Derbyshire Community Health Services

[DCHS], 2012; Singer, 2010), shock (Strawbridge, 2012), worry (BHF, 2019), and isolation (BHF, 2019; DCHS, 2012; Singer, 2010). The sequelae of decreased physical (Anokye, Trueman, Green, Pavey & Taylor, 2012) and social activities (H. Park, Chun, Choi, Lee, Kim, E.-C. Park, 2015) are the worsening lifestyles of patients (Sertoz et al., 2013), increased risk of cardiac-related incidents, deaths, and re-hospitalisations (Hiriscau and Bodolea, 2019; Smith and Blumenthal, 2011). The psychosocial and financial issues also contribute to a decrease in the patients' general well-being. While it is indeed necessary to deal with the life-threatening physical issues at the time of admission, the patients' non-physical issues should also be addressed, as these may also have an impact on their overall health and recovery. However, there have been no published studies on the early psychosocial consequences that occur post-AMI, in the Caribbean. Therefore, this study explored the patients' psychosocial and financial concerns soon after they experienced myocardial infarctions.

2. Method

This cross-sectional study comprised patients admitted to the San Fernando General Hospital (SFGH), Trinidad, between November 2015 and March 2016, with a diagnosis of AMI identified by change in troponin and with symptoms of AMI (Thygesen K, Alpert JS, Jaffe AS, Simoons ML, Chaitman BR, White HD, et al. 2012). The hospital is a 745-bed facility that offers free public healthcare to a catchment of 600,000 persons. There are 46 785 admissions to this hospital annually, of which 15 339 (32.8%) are medical admissions (2010) [12]. The overall hospital-based incidence rate (IR) of AMI in South Trinidad was 90.6 per 100,000 population: Indo-Trinidadian males (141 per 100,000), Indo-Trinidadian females (90 per 100,000), Afro-Trinidadian males (81 per 100,000), and Afro-Trinidadian females (45 per 100,000) (Bahall, 2016). Patients with a diagnosis of AMI identified from the ward registration book were reviewed for confirmation using the patients' medical records and by double-checking with the attending doctors. Exclusion criteria included patients who were confused (incoherent), declined participation, had poor health statuses, or were unavailable at the time of selection because of medical treatment. Due to the challenges in interviewing acute AMI admissions, a study using approximately 150 patients was conducted. Data were obtained using a questionnaire. The questionnaire comprised questions on demographics (9 questions), medical histories (23 questions), and psychosocial evaluations (47 questions). The list of specific areas in the psychosocial questions was obtained after reviewing the literature and ascertaining areas of possible interest. The questionnaire was pre-tested to ensure clarity of the questions and fulfilment of the objectives of the study. Patients identified as fulfilling the criteria (lucid and unambiguous) and available at the time of selection for the sample, were approached. Patients were included after discussing the nature of the study and providing verbal consent. Patients who consented to participate in the study were informed that they were free to discontinue the interview if they wished to do so, without any compromise whatsoever, in their treatment. The interview was conducted by a trained research assistant (a second-year medical student) between the third and fifth-day post-AMI.

2.1 Statistical Analysis

The collected data were entered into a secure computer that was accessible only to the researcher and his assistants. Data analysis was conducted using SPSS, Version 21 (IBM Corp., Armonk, NY). Both descriptive and inferential analyses were used. A change in patient responses (both negative and positive) in post-AMI patients was calculated by using the difference between the overall number of patients who experienced the [named] effect post-AMI and those who also experienced the effect pre-AMI. This difference represented those additional patients who experienced or developed the effect post-AMI. Differences in socio-demographics, lifestyle and medical factors (sex, age, ethnicity, employment status, stress/depression, level of support, history of smoking, exercise, alcohol usage, diabetes, hypertensive, STEMI/NSTEMI, obese, hypercholesteraemic and whether they have a family history of ischaemic heart disease [IHD]) were obtained. For simplicity, the patient support variable was recoded into categories, namely 'Spouse,' 'Other Family,' 'Friend,' 'Other,' or without support. Descriptive methods included frequency and percentage distribution tables and summary statistics (means and standard deviations). Inferential methods included 95% confidence intervals (CI) and hypothesis testing.

3. Results

3.1 Demographic Data

Table 1: Demographic data

Characteristics	n	%
Age (n = 127)		
≤ 45 years	12	9.4
>45 years	115	90.6
Sex (n = 131)		
Male	87	66.4
Female	44	33.6
Ethnicity (n = 122)		
Indian	100	82.0
African	19	15.6
Mixed	3	2.5
Employed (n =121)		
Yes	54	44.6
No	67	55.4
AMI diagnosis (n = 101)		
STEMI	76	75.2
NSTEMI	25	24.8

Patients were predominantly male (66.4%), middle aged (90.6%), Indo-Trinidadian (82.0%) and suffered from hypertension (66.4%) and (STEMI (75.2%)) (Table 1 and Figure 1).

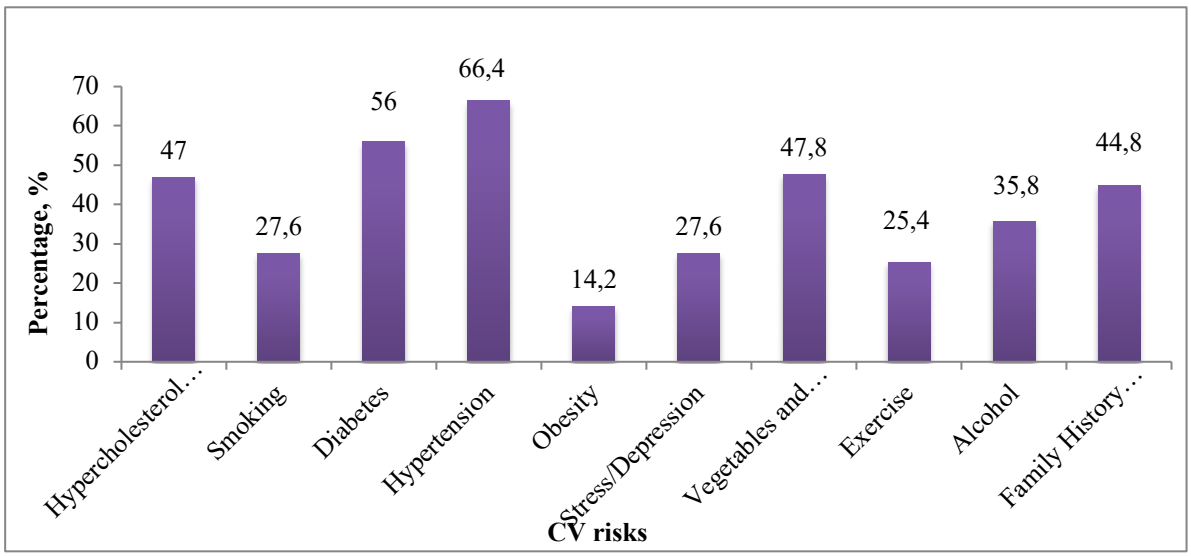

Figure 1: Medical History

3.2 The Overall Post AMI State

Following an AMI many patients feared of having another heart attack or AMI (n = 74, 55.2%) while others were worried (n = 83, 62.4%) (Figure 2). In this early stage, most patients resolved to improve their lives. They resolved to improve their eating habits (n = 97, 73.5%), goals (n = 94, 71.8%), relationships (n = 89, 67.4%), exercise (n = 85, 63.9%), to increase their spirituality (n = 82, 62.1%), social activities (n = 73, 56.2%), and to turn to God (n = 87, 65.4%).

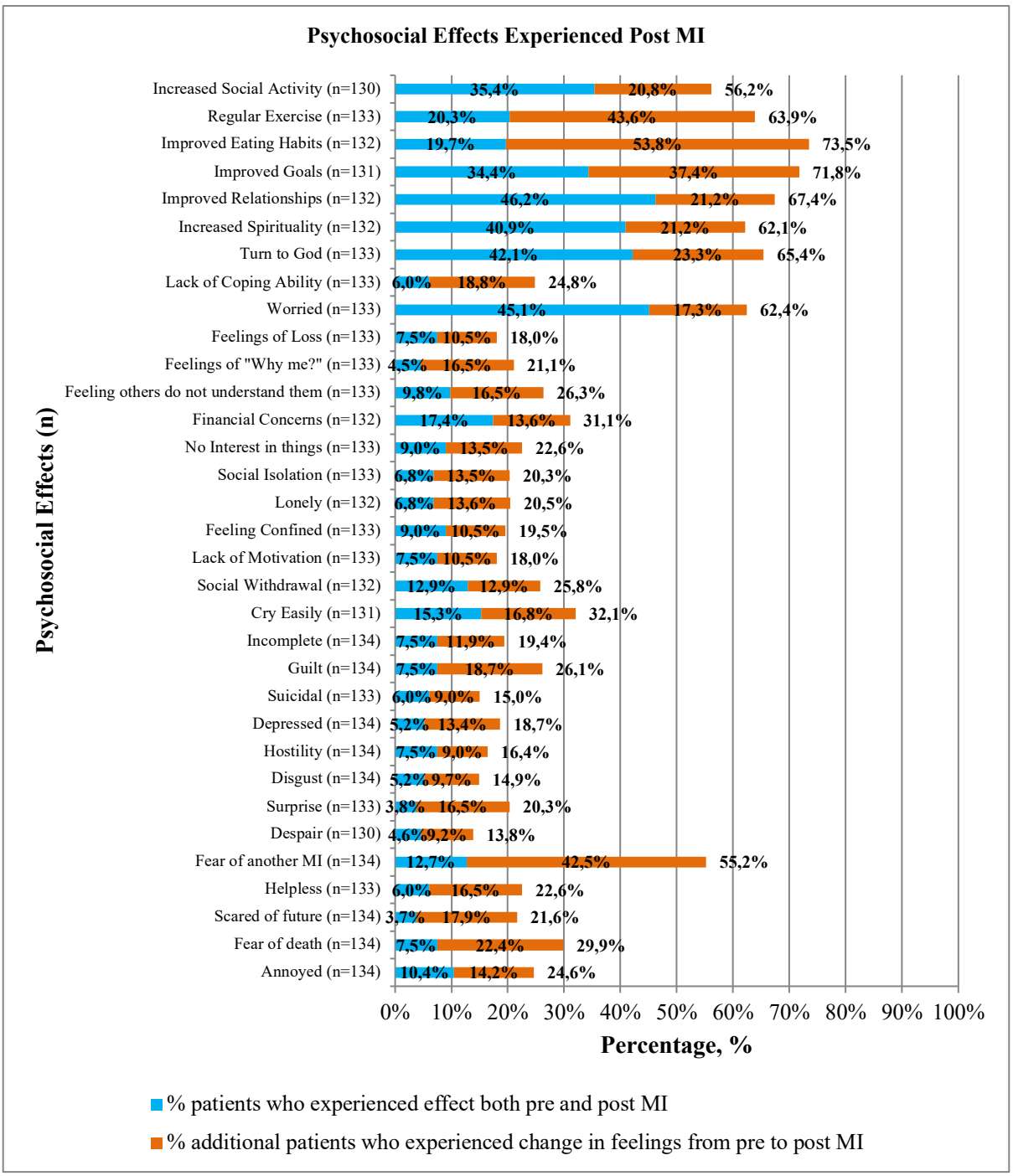

Figure 2: Psychosocial effects experienced post-AMII

Additional negative feelings that were experienced post AMI were fear of another MI (n = 57, 42.5%), fear of death (n = 30, 22.4%), lack of coping ability (n = 25, 18.8%), guilt (n = 25, 18.7%), and fear of the future (n = 24, 17.9%). (Figure 2).

Table 2: Odds ratios of significant associations

Indicator	Ref	OR	CI	*P*
Exercise/Fear of Another HA	Exercise Regularly	1.922	1.054, 3.505	0.010
Employment Status/Helpless	Employed	0.409	0.178, 0.941	0.028
Hypertension/Despair	Hypertensive	0.175	0.023, 1.299	0.045
Obesity/Despair	Obese	0.274	0.100, 0.749	0.010
Obesity/Surprise	Obese	0.357	0.168, 0.759	0.010

Hypercholesterolemia/Disgust	Hypercholesterolemia	0.266	0.077, 0.924	0.023
Obesity/Hostility	Obese	0.330	0.110, 0.990	0.046
Employment Status/ Depressed	Employed	0.403	0.162, 1.003	0.041
Hypertension/Suicidal	Hypertensive	1.156	1.065, 1.255	0.011
Family History of IHD/Guilt	Yes	1.994	1.048, 3.794	0.027
Obesity/Feels Incomplete	Obese	0.363	0.142, 0.930	0.037
Obesity/Crying	Obese	0.341	0.162, 0.720	0.007
Alcohol Consumption/Lack of Motivation	Yes (Alcoholic)	7.341	0.991, 54.404	0.017
Employment Status/Feeling of "Why me?"	Employed	2.136	0.973, 4.689	0.047
Obesity/Worried	Obese	0.381	0.181, 0.801	0.015
Obesity/Confined	Obese	0.300	0.113, 0.799	0.015
Diabetes Mellitus/Social Isolation	Diabetic	0.358	0.124, 1.031	0.042
Obesity/ Social Isolation	Obese	0.333	0.142, 0.781	0.013
Ethnicity/Feeling No Interest	African	0.348	0.147, 0.828	0.019
Obesity/Feeling of Loss	Obese	0.257	0.130, 0.511	0.000
Hypertension/Lack of Coping	Hypertensive	0.367	0.152, 0.887	0.014
Obesity/ Lack of Coping	Obese	0.490	0.260, 0.925	0.041
Exercise/Improved Relationships	Exercise Regularly	0.730	0.577, 0.923	0.033
Hypertension/Improved Relationships	Hypertensive	1.377	1.082, 1.753	0.016
Family History of IHD/ Improved Relationships	Yes	0.664	0.512, 0.861	0.002
Support/Improved Goals	Has Support	0.198	0.032, 1.217	0.001
Hypertension/Improved Goals	Hypertensive	1.299	1.035, 1.630	0.036
Family History of IHD/ Improved Goals	Yes	0.753	0.593, 0.958	0.021
Exercise/ Improved Eating Habits	Exercise Regularly	0.754	0.617, 0.920	0.030
Stress and Depression/ Improved Eating Habits	Yes	0.764	0.622, 0.939	0.026
Hypertension/ Improved Eating Habits	Hypertensive	1.347	1.093, 1.660	0.011
Exercise/ Increased Regular Exercise	Exercise Regularly	0.632	0.503, 0.794	0.002
Age/ Increased Social Activity	>45	0.345	0.099, 1.204	0.021
Stress and Depression/ Increased Social Activity	Yes	1.579	0.993, 2.500	0.030
Obesity/ Increased Social Activity	Obese	1.972	0.927, 4.196	0.029
Age/Increased Spirituality	*>45*	*0.466*	*0.179, 1.215*	*0.033*
Alcohol//Increased Spirituality	*Yes*	*1.409*	*0.989, 2.008*	*0.038*
STEMI/NSTEMI/Increased Spirituality	*NSTEMI*	*0.678*	*0.496, 0.927*	*0.034*
Obesity/Increased Spirituality	*Obese*	*1.646*	*0.905, 2.991*	*0.045*
Sex/Turn to God	*Female*	*0.670*	*0.515, 0.871*	*0.006*
Employment Status/Turn to God	*Employed*	*1.821*	*1.289, 2.573*	*0.000*
Alcohol/Turn to God	*Yes*	*1.395*	*0.996, 1.953*	*0.034*
STEMI/NSTEMI/Turn to God	*NSTEMI*	*0.581*	*0.448, 0.753*	*0.001*

3.3 Associations/degree of associations (OR) of significant indicators

In general, there were no significant differences in the feelings between both sexes except for a larger percentage of males turning to God *(P* = 0.006). The self-claimed obese patients had significant associations with at least 12 variables with a majority being psychological. Significant differences were also found with employment and helplessness (*P* = 0.028), depression (P = 0.041), 'Why me?' (*P* = 0.047), and turning to God (*P* = 000). (Table 2)

The odds ratios of the significant associations are shown in Table 2. People who used alcohol were 7.341 times more likely to be associated with a lack of motivation post-AMI (OR: 7.341, CI: 0.991, 54.404, $P = 0.017$). Patients who exercised, or were employed were more likely to experience fear of another attack (OR: 1.922, $P = 0.010$) or a feeling of 'Why me?' (OR: 2.136, $P = 0.047$), respectively. Increased alcohol usage and obesity also led to increased spirituality (OR > 1). Hypertensive patients were more likely to be associated with suicidal tendencies, lack of coping mechanisms, and improved goals (OR >1) and the young, STEMI, male, and employed patients were more likely to resort to increased spirituality or turned to God (Table 2).

4. Discussion

4.1. Psychosocial and financial sequelae post-AMI

In the immediate post-AMI period, patients' feelings were prominent. Although priority care by healthcare providers focused on pharmacological and surgical treatment, many patients, even in the first few days, experienced significant psychosocial feelings: both negative and positive. However, few studies have reported on the immediate post-AMI period.

Many patients in the overall sample of post-AMI patients in this study experienced varied feelings: felt that others did not understand them (26.3%), guilt (26.1%), helplessness (22.6%), hostility (16.4%), loneliness (20.5%), and a sense of loss (18.0%). Among the patients with poor health, similar feelings of loneliness, social isolation and withdrawal, social deficiencies, depression, and anxieties have been identified (Stickley et al., 2015; Valtorta, Kanaan, Gilbody, Ronzi & Hanratty, 2016). Moreover, intense levels of distress and fear of dying post-acute coronary syndrome were also noted among 21.7% of the patients in a hospital (Steptoe et al., 2011).

Among the overall population, common positive thoughts and resolutions included improved life goals and expectations (71.8%), eating habits (73.5%), spirituality (62.1%), and increased participation in social activities (56.2%), as well as turning to God (65.4%). Similar findings of increased positivity were reported by Kroemeke, in a study conducted 1–6 months post-AMII (Kroemeke, 2016). In addition, Huffman et al. in their analysis also stated that optimism, measured 2 weeks after acute coronary syndrome (ACS), was associated with greater physical activity at 6 months (Huffman et al., 2015) while Tello, concluded that patients who scored the highest in an optimism questionnaire had a reduced risk of death due to heart attacks (Tello, 2019).

The financial concerns reported by 31.1% of the participants in this study have also been identified by other researchers. Financial barriers post-AMII affected younger patients more commonly; however, this did not vary by sex (Beckman et al., 2016). Moreover, in a study of AMI patients over 12 months, 18.1% of the patients experienced financial barriers (Rahimi, Spertus, Reid, Bernheim & Krumholz, 2007).

This study revealed that in early post-AMI, the overall self-confessed depression, determined by the two key questions of the PHQ9 (American Psychological Association [APA], 2011) was 18.7%. However, a study by Murphy et al. during early convalescence among post-AMI patients, which was conducted over a period of 2 months prior to the event to 12 months after the event, reported a significant prevalence of loneliness, anxiety (28%), and depression (17%) (Murphy, Le Grande, Alvarenga, Worcester & Jackson, 2020). The European Society of Cardiology also reported on the presence of anxiety and depression (15% at 2 months post-MI) in 20% of the patients experiencing emotional distress (Olsson, 2019). Furthermore, Maqsood et al. found the frequency of depression in MI patients who were interviewed on the third day of admission, to be 27.24% (Maqsood et al., 2017), and another study conducted by the Cleveland Clinic showed that up to 15% of the patients with cardiovascular disease experienced major depression (Pozuelo, 2019).

In this study of post-AMI patients, the depressive symptoms varied between 15–32%: helplessness (22.6%), crying easily (32.1%), suicidal thoughts (15.0%), helplessness (22.6%), disgust (14.9%), and crying (32.1%). A study that assessed the prevalence and persistence of symptoms of depression and anxiety during the first 12 months post MI revealed that more than half of the patients with complete Beck's Depression Inventory (BDI) and anxiety data experienced either elevated symptoms of anxiety or depression (Lane, Carroll, Ring, Beevers and Lip, 2002). Furthermore, a study by Hasanović et al. found suicidal thoughts, accompanied by helplessness/vulnerability,

disgust/anger, crying easily/being easily hurt, loneliness and social withdrawal with depression occurring in approximately one out of every five patients with an AMI during their initial hospitalization (Hasanović, Čizmić & Jašarević, 2017). In addition, a study by Kaptein et al. found that the prevalence of 'significant depressive symptoms ranged from 22.7–25.5% throughout the post-MI year' (Kaptein, de Jonge, van den Brink & Korf, 2006). A study conducted by Silverman et al., 2019, has revealed that the presence of depressive symptoms increased the risk of cardiac events and was associated with tragic outcomes (A. Silverman, Herzog & D. Silverman, 2019) and the likelihood of death also increased, according to a study by Lissåker et al., which was conducted 2 and 12 months post-MII (Lissåker, Norlund, Wallert, Held & Olsson, 2019). Moreover, in a study of AMI patients ($N = 154$) conducted within days of AMI and at 3 months, linear regression explained '23% of the variance in MI-induced PTSS-symptoms' (Ledermann et al., 2020).

4.2. Associations of socio-demographics and Psychosocial feelings.

In general, there were no significant widespread differences in feelings between both sexes except for a larger percentage of males turning to God (OR: 0.670, $P = 0.006$). Other studies investigating patients with heart failure revealed that they experienced spiritual well-being (Flint, Fairclough, Spertus & Bekelman, 2019). In addition, self-claimed obese patients showed significant associations, mainly with psychological factors. Obese patients are a subgroup that suffers from low self-esteem (Moradi, Mozaffari, Askari & Azadbakht, 2020) may have been responsible for these associations.

Those who resolved to exercise or were employed were more likely to have a fear of another attack or a feeling of "Why me?" (OR: 2.136, $P = 0.047$), respectively. This may have been due to a positive personality who could not see themselves facing another episode (Robinson, 2014). Increased alcohol usage and obesity also led to increasing spirituality (OR > 1). The presence of a comorbidity, hypertension, led to more negative feelings such as suicidal tendencies and lack of coping. The association of comorbidities with negative feelings has also been reported by (Wu et al., 2019). This study revealed that the young, STEMI, male, employed patients are more likely resolve to increase their spirituality or turn to God. As has been reported in another study, these patients may have more to live for and expect more (Boehm, Chen, Koga, Mathur, Vie & Kubzansky, 2018). According to Norlund et al., "Previous depression/anxiety, female gender, younger age, smoking, born outside of the Nordic countries, neither employed nor retired and readmission due to cardiovascular events were strongly associated with emotional distress post-MII." (Norlund, Lissåker, Wallert, Held Olsson, 2018).

The classification by Everson-Ross and Lewis (2005) of the psychological consequences of post-AMII (Everson-Rose & Lewis, 2005) was similar to the findings of our study, which identified negative and positive feelings (Figure 3). In order to recover from the initial emotional reaction to a heart attack, Olsson's recommendation was 'try to keep doing your usual activities, at least the positive ones…' (European Society of Cardiology [ESC], 2019).

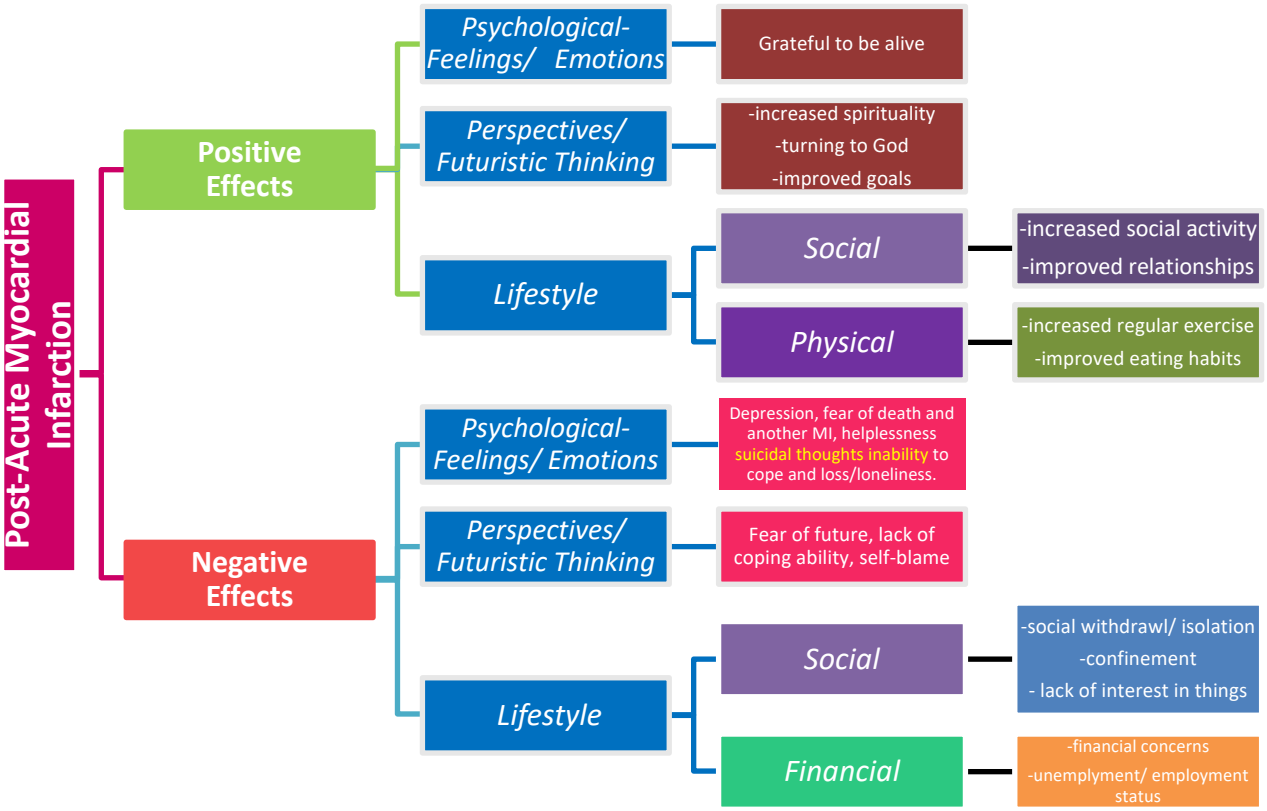

Figure 3: Schematic Diagram outlining the study

4.3 Limitations

The sample size was small, and the participants were selected from a single centre. Although the generalisation of findings may not be appropriate, because patient's feelings are similar, the information may still be applicable. The patients' responses were subjective and may not have reflected their exact feelings, especially their recall of the pre-AMI state. Their AMI experiences may have also influenced their recall of their pre-AMI responses. The findings of this study were dependent on the patients' self-reports and recall, which may have been unreliable for many patients. Many of the responses obtained may also have been exaggerated or under-reported, due to their subjective nature.

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LASIK and Dry Eye Disease: A Case Report

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Abstract
Background: Post- Laser- assisted in situ keratomileusis (LASIK) dry eye is one of the most common postoperative dry eyes after ophthalmic surgeries. Clinically, patients have positive vital staining of the ocular surface, decreased tear breakup times, reduced corneal sensitivity, and decreased visual acuity. In majority of patients, symptoms last about one month, but some patients can experience these symptoms for more than a year. Case presentation: A 29-year-old female with Dry Eye Disease (DED) secondary to isotretinoin use wanted to undergo LASIK for refractive improvement. Ophthalmologists were thorough in informing the patient of the significant risk of post-operative dry eyes, especially in patients with pre-operative DED. A cautious approach was taken by the ophthalmologist, and the patient's opinion and needs considered. Post-operatively, the patient continues to have DED but reports it is not worse than pre-LASIK and continues to be complaint with dry eye disease treatment. Conclusions: In patients with existing DED, clinicians are vigilant in progressing with LASIK, due to post-operative dry eye symptoms. Careful patient selection and preoperative ocular surface management is recommended for such patient groups. This case reports highlights the importance of clinicians allowing patients to come to an informed decision regarding their care. This patient-centered approach is a model of care that respects patients' experiences, values, needs and preferences, whilst improving clinical outcomes, better use of resources and increased satisfaction with care.

Keywords: Dry Eye Disease, Corneal Erosion, LASIK, PRK, Patient-Centered Care

1. Background

Laser- assisted *in situ* keratomileusis (LASIK) is a commonly performed corneal refractive surgery with excellent refractive outcomes. As with all surgical procedures there are post–operative complications, one of the most common being Dry Eye Disease (DED). Its symptoms range from mild ocular irritation to severe discomfort, photophobia and vision loss. Clinically, there is evidence of decreased aqueous tear production, decreased tear volume on the ocular surface, increased rate of tear evaporation and increased tear osmolarity (Raoof, D ., Pineda R. et al., 2014). Evidence notes there can often be a mismatch noted between severity of signs and symptoms in patients with dry eyes. With LASIK, data suggests 95% of patients experience symptoms of dry eyes after corneal refractive surgery (Toda I et al., 2018). Although signs and symptoms of DED are most common in the immediate

postoperative period and are usually only transient, a small number of patients can develop chronic, severe dry eyes that can be resistant to traditional dry eye treatments (Quinto, GG., Camacho, W. et al., 2008). Below is a case, reporting the outcome of a patient who was diagnosed with a recurrent corneal erosion secondary to dry eye and went on to have LASIK surgery.

2. Case Presentation

A 29-year- old woman was seen in Ophthalmology clinic for DED. She was diagnosed 24 months previously with a left eye recurrent corneal erosion secondary to DED, induced by isotretinoin use. The recurrent corneal erosion was being treated with Hypromellose eye drops, VitA-POS, tea-tree-based face wash and lid wipes, Omega 3 supplements and heated mask at night. The patient trialed Lymecycline but stopped, as was experiencing unpleasant side effects. Punctal plugs were discussed at follow up, but it was noted the patient had reduced frequency of episodes alongside significant improvement in the ocular surface with improvement in tear film break up time, corneal staining and Meibomian gland function. Although the patient was complaint with treatment, she was finding it tedious to remove her glasses hourly to apply eyedrops. Before developing a recurrent corneal erosion, the patient had considered LASIK for refractive improvement, and now with the added effort of hourly drops for symptomatic DED, the patient felt strongly about undergoing LASIK. Her ophthalmologist advised that LASIK could worsen her current DED, and if proceeding with LASIK, the patient needed to be aware of potential significant DED post-operatively. The patient was verbally advised about the risks versus benefits of LASIK and DED, was provided written leaflets and a follow-up appointment to give her time to come to an informed decision. The patient also sought a second opinion, where she was given similar advice regarding the possibility of worsening DED post-operatively. The patient decided the benefit of refractive improvement outweighed the risks of worsening DED and went ahead with LASIK. It is important to note, in the patient's clinic letter, it is highlighted that the patient had capacity and was adequately informed about the risks and benefits. Furthermore, it emphasizes that the patient is complaint with DED treatment and would be an appropriate candidate to be complaint with DED treatment post-operatively. In the post-operative period, the patient had bandage contact lenses to aid with corneal healing, which were removed one week post operatively. Now, nine months post-LASIK the patient reports infrequent episodes of DED symptoms. At follow-up, there was no change to the punctate erosions in the left eye, improvement in tear film break up time, corneal staining and Meibomian gland function. She has had three episodes of waking with ocular pain in the nine-month period and reports still being compliant with using hourly eye drops and heat masks.

3. Discussion

The case is interesting as it highlights the importance of individualized, tailored care. As clinicians, it is our responsibility to inform patients thoroughly of the risks versus benefit, and in non-life-threatening situations, allow the patient to come to an informed decision. Naturally, there are numerous situations in Medicine, where clinicians must take the responsibility of patients' treatment and act in their best interests. Equally, in appropriate circumstances, it is important we value patients' opinions and use their judgement to deliver patient-centered care. This patient was significantly affected by glasses wear, more so than DED, and was willing to take the risks. Fortunately, as the patient is compliant with DED treatment and had bandage contact lenses, she feels her DED symptoms are not worse than pre-LASIK. An alternative for patients with DED considering LASIK, would be photorefractive keratectomy (PRK) treatment. PRK treats scarring and can correct refractive error (Kymionis, GD., Tsiklis, NS. et al., 2006). Studies suggest that fewer dryness symptoms are seen after PRK compared to LASIK and has a similar patient satisfaction to LASIK (Bower, KS., Sia, RK., Ryan, DS. Et al., 2015). Some ophthalmologists argue it is a safer modality as surface ablation does not require a stromal corneal flap created during LASIK, thus fewer collage fibers are altered, reducing the risk of biomechanical instability (Stein, R., 2000).

4. Conclusion

LASIK in patient with DED remains a watchful topic. Here, the patient's quality of life was significantly affected by glasses use, thus the possibility of worsening DED was accepted by the patient. This case reports exemplifies the benefits of clinicians using careful patient selection, transparency of information, clear communication and

regular follow up, to deliver individualized tailored care. This enhances the doctor-patient relationship, respects patients' experiences, needs and preferences, and improves clinical outcomes, with better use of resources and increased satisfaction with care.

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Pulmonary Embolism Detection in COVID-19 Patients

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Abstract
Background: A clinically important impact of Coronavirus Disease 2019 (COVID-19) is the increased likelihood of thromboembolism, mainly pulmonary embolism (PE). To screen for these complications a biochemical marker, D-dimer, is usually done. There is a plethora of research validating the use of D-dimer cutoff levels in non-COVID-19 patients, however less so in the COVID-19 population. Aim: To determine the number of suspected COVID patients with D-dimer ≥ 0.5 and PE reported on CTPA. Methods: Non-interventional single-centre retrospective clinical correlational study. Patient cohort was patients admitted with suspected COVID-19 over a 5-week period. N=690. Results: 76.5% of suspected COVID-19 patients were PCR positive. 40% of these patients had a CTPA completed with 19% reported to have a PE. 52% of patients had a D-dimer value ≥ 0.5 10.6% patients had a PE with a D-dimer ≥ 0.5. Conclusion: Nationally, hospitals are adopting existing D-dimer cut off levels to rule out PEs, however this leads to a large proportion of admitted COVID-19 patients having possibly unnecessary computed tomography pulmonary angiogram. This study highlights that majority of patients with D-dimers above the cut off level have negative PEs and contributes to the notion that standard D-dimer cutoffs are insufficiently accurate to be used as a standalone test in diagnosis in the context of an underlying SARS-CoV-2 infection.

Keywords: Coronavirus Disease 2019, COVID-19, Pulmonary Embolism, CTPA

1. Introduction

1.1 Background

The first case of severe acute respiratory syndrome coronavirus 2 (SARS–CoV–2) was described in December 2019 and by March 2020 it became the root of a global health emergency (Schulman, Hu and Konstantinides, 2020). Already, there is a vast amount of research investigating the mechanisms of the disease process, its effects on our bodies and the optimal treatments, but there remains much unknown. Infection with SARS–CoV–2 can be asymptomatic, but in some it leads to a deregulated immune response with multiorgan failure and critical illness (Al-Ani, Chehade and Lazo-Langner, 2020., Huang et al., 2020., Chen et al., 2020). Aside from the fundamental respiratory symptoms of the disease, there is evidence that patients are in a hypercoagulable state. This increases the risk of thromboembolism and overall has increased mortality risk (Al-Ani, Chehade and Lazo-Langner, 2020., Danzi et al., 2020). The rate of thromboembolism in patients with SARS-CoV-2 is varied in literature. Some

studies suggest 20-30% in confirmed cases while others can be as high as 40-70% (Minet et al., 2015., Malato et al., 2010). Studies suggest that the more severe the disease and involving needs for admission correlates with increased likelihood of hypercoagulation and thromboembolic complications. Some studies show a higher risk of mortality in Coronavirus Disease 2019 (COVID-19) patients with thromboembolism whereas other studies deny an association (Abou-Ismail et al., 2021., Qin et al., 2020). With such varied reporting, the rate of thromboembolism in COVID–19 remains unidentified. It was noted many patients were undergoing computed tomography pulmonary angiography (CTPA) for elevated D- Dimers, but majority reported as negative for PE. The objective of this study is to examine the prevalence of pulmonary embolism (PE) reported in patients with suspected COVID -19.

1.2 Pathogenesis of COVID-19

COVID-19 relies on the interaction between thrombosis and inflammation, causing a hypercoagulable state. SARS– CoV–2 enters the alveolar epithelium via angiotensin converting enzyme 2 (ACE2) receptors, causing excessive inflammatory cytokine and chemokine release. This further activates epithelial cells, monocytes, and neutrophils. Additionally, endothelial cells are directly infected through the ACE2 receptor, and the coagulation cascade is triggered, producing thrombin and fibrin clot. Platelets and the protease- activated receptor pathway is activated, which further stimulates inflammation. The interaction between thrombosis and inflammation puts the body in a high proinflammatory state, leading to local coagulation points (Malato et al., 2010). Research shows in COVID–19, inflammatory indicator IL-6 is elevated. There is correlation between raised IL-6 and raised fibrinogen levels, further supporting the theory of inflammatory thrombosis. They hypercoagulable state leads to further macrovascular and microvascular thrombosis (Abou-Ismail et al., 2021., Qin et al., 2020., Levi, van der Poll and Büller, 2004). Several studies found that most patients with COVID-19 infection suffered from lymphopenia, especially CD4+ cell reduction, and which is more obvious in severe patients. The weakening of the immune system will increase inflammatory response, promote cytokine storm production, worsen the damaged tissues, and increase risks of thromboembolism (Huang et al., 2020. Malato et al., 2010., Xu et al., 2020).

1.3 Risk Factors for Thrombosis in COVID-19

Increased age, obesity, immobilization, smoking and co-morbidities such as previous thromboembolism, chronic kidney disease, malignancy, heart/respiratory failure and being of an ethnic monitory background are risk factors for thromboembolism in COVID-19. This combined with hypoxia, sepsis, pre-eclampsia and post-partum infection can further increase the risk of thromboembolism (Xu et al., 2020). A recent study suggests that in obesity, adipose tissue acts as a potent inflammatory reservoir for the replication of SARS-CoV-2, where the inflammatory response is more prominent in obese compared with lean patients (Vaughan et al., 2020). For those critically unwell with COVID-19, a surge of inflammatory mediations in adjunct with steroid administration as part of treatment can lead to increased coagulation and increase thrombosis complications. Studies report that acute respiratory distress syndrome (ARDS) patients secondary to COVID-19 have more thrombosis complications, mainly pulmonary embolisms, compared those with ARDS secondary to non-COVID-19 pathology (Helms et al., 2020).

1.4 Biometrics associated with thromboembolism

Biochemical tests can be taken as a reference in the risk assessment for thromboembolism. Abnormal coagulation parameters in COVID–19 patients are usually associated with poor prognosis (Terpos et al., 2020). Furthermore, significantly elevated D-Dimer is correlated with increase death secondary to thromboembolism in COVID -19. A significant increase in D-dimer is a sign of activation of coagulation and fibrinolysis and is a good indicator for identifying high risk populations with possible thromboembolism (Tang et al., 2020). One study concluded that D-dimer levels >1.5μg/mL had a sensitivity of 85% and a specificity of 88.5% with a negative predictive value of 94.7% for thromboembolism (Cui et al., 2020). A meta-analysis of six Chinese studies showed that the mean D-dimer level was 0.44 μg/mL higher (95% CI: 0.23–0.66) in patients with severe versus non-severe disease, and 5.91 μg/mL higher in non-survivors than in survivors (Jin et al., 2020). However, it should be considered that D-

dimer can also be elevated in other conditions, such as pregnancy, postoperatively, malignancy, and sepsis, which needs to be measured with the clinical context (Middeldorp et al., 2021).

2. Aim

To determine the number of suspected COVID patients with D-dimer ≥ 0.5 with a CTPA reporting PE

3. Methods

This is a non-interventional single-centre retrospective clinical correlational study. The inclusion period for this study was patients admitted to a district general hospital with suspected COVID-19 between 6th December 2020 and 16th January 2021. The recorded data sets were sex, D-dimer, C-reactive protein (CRP), COVID PCR result, CTPA request, CTPA result, heart rate on admission and death. Sex, D-dimer, CRP and COVID PCR results were extracted from CyberLab. CTPA request and results from PACS system. Heart rate was extracted from vitalPACS and death was identified using EPRO. Statistical analysis was conducted using Microsoft Excel. N=690.

4. Results

Of 690 patients, the average age was 61.9 years, with the youngest being 20 years and the eldest being 101 years. 42.9% (296) were female and 57.1% (394) were male. The lowest admission CRP was <1 and the highest being 760. 76.6% (528) of patients were PCR COVID -19 positive and 23.5% (162) were PCR negative. 1.1% (8/690) died during admission with 88% (7/8) of them being PCR positive and 12.5% (1/8) of them having a PE.

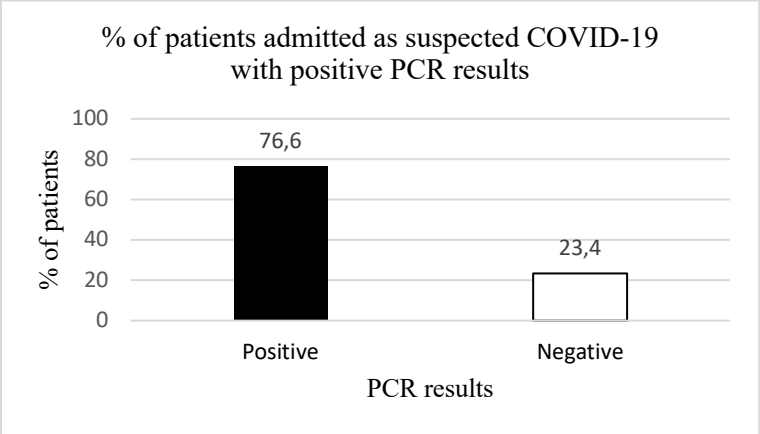

Figure 1. Percentage of patients admitted as suspected COVID-19 with positive PCR results.
76.6% (528/690) of suspected COVID -19 patients were PCR positive. 23.4% (162/690) were PCR negative.

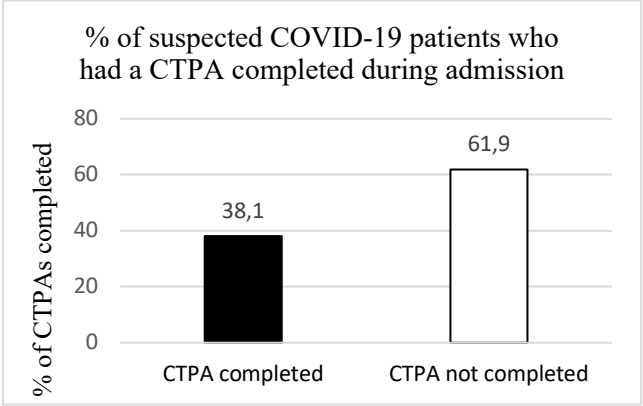

Figure 2: Percentage of suspected COVID-19 patients who had a CTPA completed during admission
38.1% (263/690) of patients admitted with suspected COVID – 19 had a CTPA completed. 61.9% (427/690) did not have a CTPA completed.

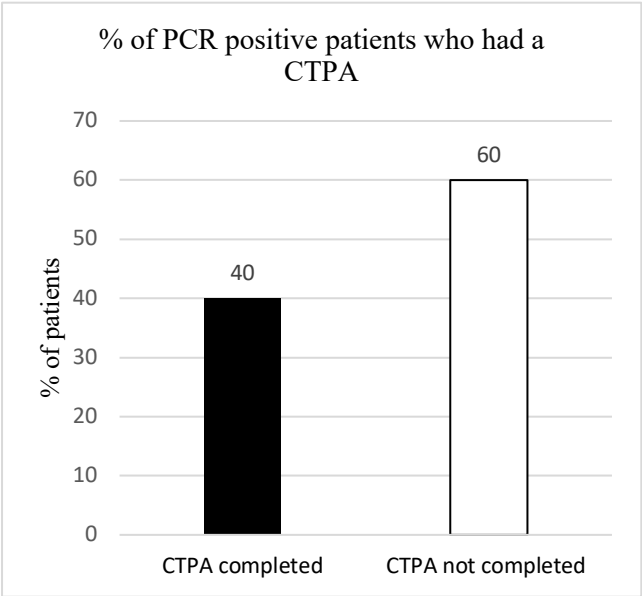

Figure 3: Percentage of PCR positive patients who had a CTPA

40% of PCR positive patients (211/258) had a CTPA completed and 60% (317/528) did not have a CTPA completed.

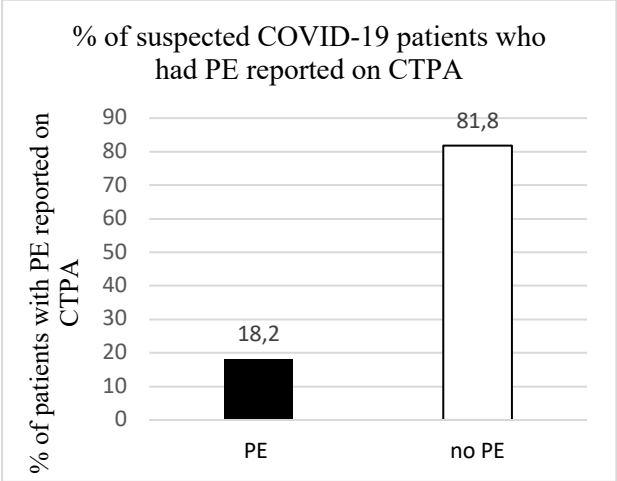

Figure 4: Percentage of suspected COVID-19 patients who had PE reported on CTPA

18.2% (48/263) of those who had CTPA had a PE reported. 81.8% (215/263) had no PE reported.

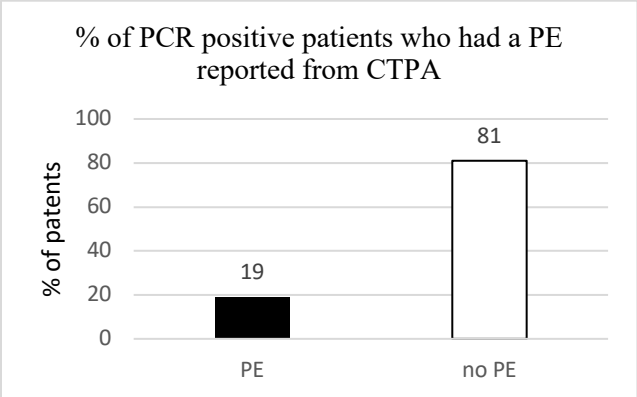

Figure 5: Percentage of PCR positive patients who had a PE reported from CTPA

19% (40/211) had a PE reported on CTPA. 81% (171/211) had no PE reported.

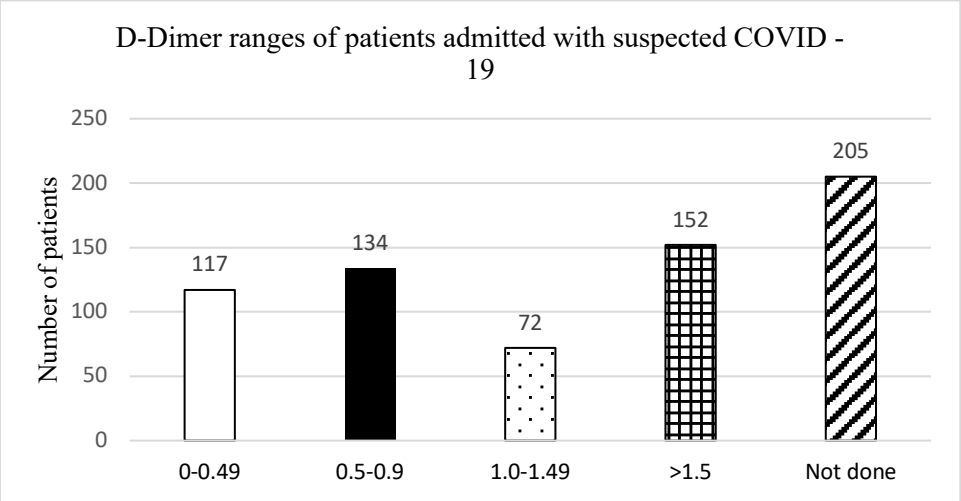

Figure 6: D-Dimer ranges of patients admitted with suspected COVID -19

117 patients had a D-dimer value between 0 – 0.49. 134 patients had a D-dimer value between 0.5-0.9. 72 patients had a D-dimer value between 1.0-1.49. 152 patients had a D-dimer value >1.5. 205 patients did not have a D-dimer requested throughout the admission.

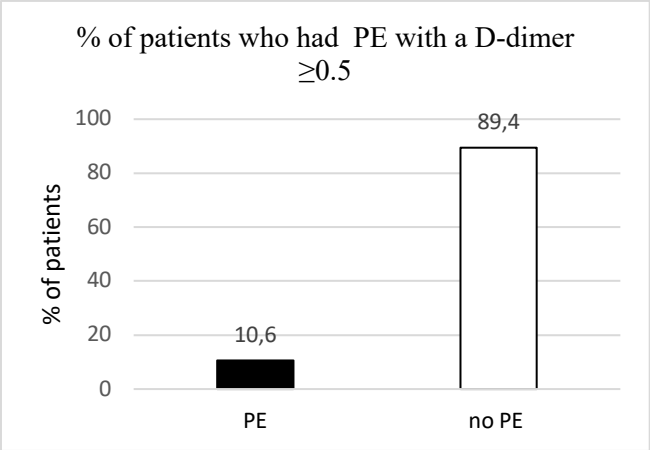

Figure 7. Percentage of patients who had PE with a D-dimer ≥0.5

10.6% (36/358)of patients with a D-dimer ≥0.5 had a PE reported on CTPA. 89.4% (320/358) did not have PE reported with a D-dimer <0.5.

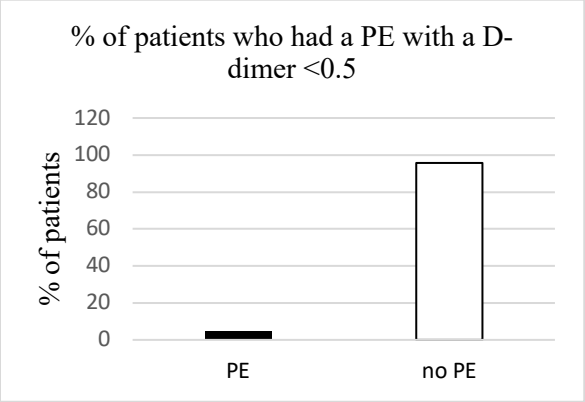

Figure 8. Percentage of patients who had PE with a D-dimer <0.5

4.3% (5/117) of patients with a D-dimer <0.5 had a PE and 95.7% (112/117) patients with a D-dimer <0.5% did not have a PE.

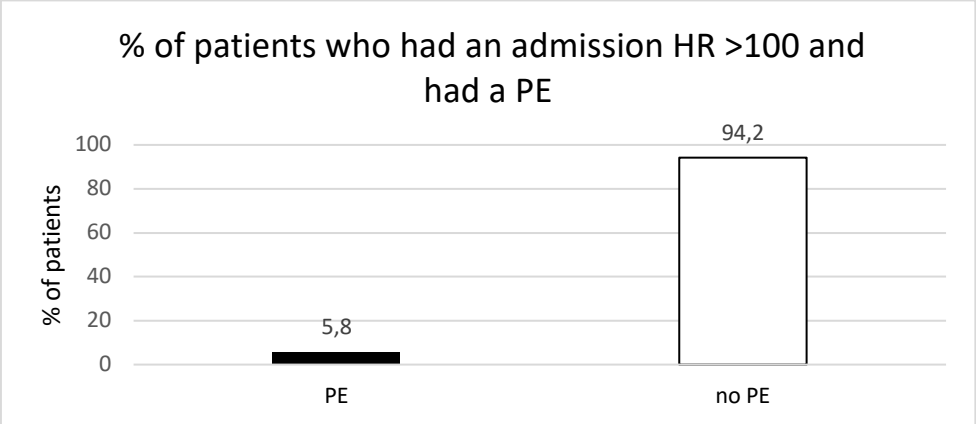

Figure 9. Percentage of patients who had an admission HR >100 and had a PE
5.8% (4/70) of patients with an admission HR >100 had a PE and 94.2% (66/70) did not have a PE.

5. Discussion

This hospital's local trust guidelines suggest that if the D-Dimer value is ≥0.5, a hypercoagulable state should be suspected, however only 10.6% of patients with a D-dimer ≥0.5 had a PE reported on CTPA. Considering the radiation dose of a CTPA is close to that of an invasive pulmonary angiography and there are risks associated with contrast administration, there is a need for a wider screening strategy for PE. An example of an existing strategy is the YEARS criteria (van der Hulle et al., 2017). It requires information such as clinical signs of DVT, evidence of hemoptysis and whether PE is the most likely diagnosis. Alongside this, one must consider the clinical symptoms and signs of PEs, such as tachycardia, pleuritic chest pain, shortness of breath and desaturations (Rosovsky et al., 2020, MDCalc, n.d.). In the context of COVID -19 many of these symptoms overlap. In a non – infective state, those that are symptomatic +/- have an elevated D-dimer should have a subsequent CTPA. However, it is unknown whether similar D-dimer thresholds can be applied in COVID-19 patients, because of the hyperinflammatory state with endothelial activation and as a result,
High D-dimer level.

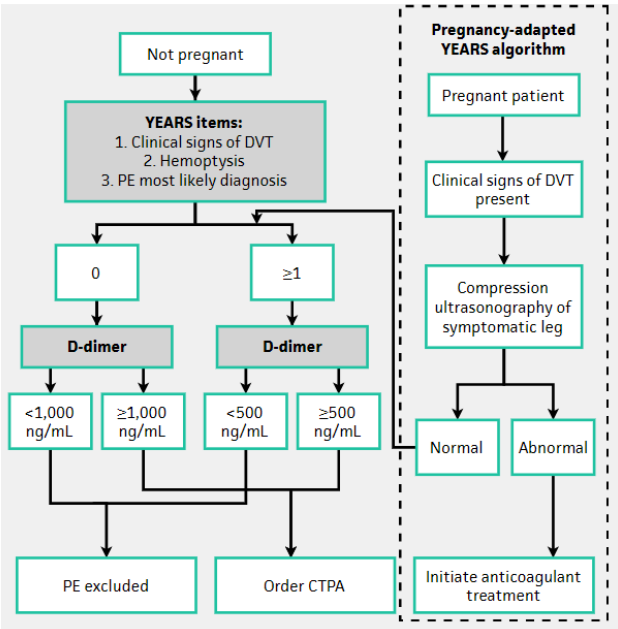

Figure 10: YEARS Criteria
Flow diagram depicting how to use the YEARS algorithm if suspecting pulmonary embolism (19).

5. Conclusion

The SARS-CoV-2 pandemic raises new challenges in the diagnosis of a PE. The pro-inflammatory state puts patients in a hypercoagulable state but also will increase their D-dimer. In non-COVID patients, simple and minimally invasive diagnostic algorithms can safely rule out PE, however similar algorithms are urgently needed for COVID-19 patients. Currently, clinicians err on the side of caution and will likely go for CT based imaging if D-dimer levels are above 0.5 µg/mL and the patient is symptomatic, however the radiation dose and effects of contrast must be considered. Mouhat et al. conclude a D-dimer cut-off of 2.59µg/mL in COVID-19 patients should be used to consider patients for a CTPA (Mouhat et al., 2020). However, further validation is required and currently it is not clinically relevant and cannot be safely applied. A strategy of overcoming this would be to use an age-adjusted D-dimer. Age adjusted D-dimers were initially used as in elderly patients a cutoff of 0.5µg/mL is rarely truly negative. Retrospective validation suggests that 'and age per 10' cutoff in patients above 50 years is safe, i.e. a patients aged 60 years would have an age adjusted D-dimer of 0.6µg/mL. Ultimately, whether similar D-dimer thresholds can be applied to COVID-19 patients is largely unknown, but this study contributes to the notion that standard D-dimer cutoffs are insufficiently accurate to be used as a standalone test in diagnosis of PE in the context of an underlying SARS-CoV-2 infection

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Primary *Dysmenorrhea* Intensity Between Stretching Abdominal Therapy and Acupressure to Adolescent Girls

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Abstract
Menstrual pain or dysmenorrhea is known as cramping pain in the lower abdomen during menstruation experienced by some women. Abdominal stretching exercises and acupressure can reduce dysmenorrhea. This research aims to determine the difference in the intensity of primary menstrual pain (dysmenorrhea) between abdominal stretching therapy and acupressure for adolescent girls in a Senior High School in Denpasar. The method applied in this research is a Quasi-Experimental two-groups pretest-posttest design. The research sample was grouped into two, namely 70 high school students in the abdominal stretching therapy and 70 students in acupressure therapy. The data were collected using the Numerical Rating Scales or NRS. The data were then analysed using the Wilcoxon test and Mann Whitney test. The result of the research showed that there was a significant difference in dysmenorrhea before and after abdominal stretching therapy (p=0.000). Also, there was a significant difference in dysmenorrhea before and after acupressure therapy (p=0.000). There was no difference in dysmenorrhea before applying abdominal stretching therapy and acupressure with a p-value=0.335. Also, there was no difference in dysmenorrhea after both therapies were undergone in two groups (p=0,111). The difference test on the difference between the pre-test and post-test obtained p-value = 0.012. Hence, there was a significant difference in decreasing dysmenorrhea between abdominal stretching therapy and acupressure (p=0.012). Conclusion: there is a significant difference in reducing dysmenorrhea between abdominal stretching therapy and acupressure. Suggestion: further research is necessary to conduct by using time series design.

Keywords: Primary *Dysmenhorrea,* Abdominal Stretching, Acupuncture

1. Introduction

Dysmenorrhea is cramping pain before, during, and after menstruation. This disorder usually occurs 24 hours before the onset of menstrual bleeding and is felt for about 24 up to 36 hours. Dysmenorrhea in women is a symptom and not a disease due to uterine hyper contractility caused by prostaglandins. Prostaglandins could only cause pain, and it occurs when the level of progesterone in the blood is low (Barcikowska, et al. 2020). Severe

dysmenorrhea in women can affect them to carry out any activities and reduce their quality of life. Besides, dysmenorrhea is known as the main reason for the recurrent absence of female students from school. A study found that dysmenorrhea caused 14% of adolescent girls to often miss school(Ridwan & Herlina, 2015). The incidence of dysmenorrhea occurring in several countries is quite high such as in the United States, it is found that 60-91% of women in all regions experience dysmenorrhea. Their productivities are also tormented by pain during menstruation. At the moment, it is estimated that the prevalence of clinically significant symptoms is around 12.6%-31% of women at the age of menarche.

Abdominal stretching exercise is a muscle stretching exercise, especially in the abdominal done for 10 minutes. It is beneficial to increase muscle strength, endurance, and flexibility so that it is expected to lower menstrual pain(Bustan, et al. 2018). The abdominal stretching exercise itself is not much different from gymnastics. It can help increase oxygenation or the process of exchanging oxygen and carbohydrates in the cells and stimulate the flow of the lymph drainage system. As a result, it increases muscle flexibility by returning the muscles to their natural length. Additionally, it can maintain muscles function properly, restore the elasticity or flexibility of body tissues, and reduce muscle cramps. Abdominal stretching exercises can be leveraged as a non-pharmacological therapy to reduce the intensity of dysmenorrhea.

Another therapy to reduce dysmenorrhea is acupressure. Acupressure techniques can lower pain sensations by increasing endorphins, hormones that can naturally relax the body, and block pain receptors to the brain (Shady, et al. 2020). The pressure on acupressure points can affect endorphins production in the body. Endorphins are pain killers that the body produces itself. Endorphins are peptide or protein molecules made of a substance called beta-lipotropin found in the pituitary gland. Endorphins control the activity of the endocrine glands in which those molecules are stored. Endorphins can affect pain-sensing areas in the brain in a similar way to opiate drugs like morphine. Chen & Chen (2004) stated that acupressure therapy at the SP6 point reduces pain levels during dysmenorrhea. This point is located about three or four fingers above the internal malleolus, right at the end of the shinbone. The purpose of this research was to figure out the difference in the intensity of primary menstrual pain (dysmenorrhea) between abdominal stretching therapy and acupressure on adolescent girls in Denpasar Senior High School.

2. Method

This research is Quasi-Experimental with two groups pretest and posttest, and a prospective approach. In this research, the intensity of menstrual pain was measured twice, namely before the pretest, and after the treatment in the next menstrual cycle (posttest). The research used two treatment groups: group 1 with abdominal stretching therapy and group 2 with acupressure therapy. The sample of the study was tenth grader female adolescents in Denpasar Senior High School with inclusion criteria such as having primary dysmenorrhea and not taking analgesic drugs. The sample consists of 70 abdominal stretching therapy groups and 70 acupressure therapy groups. Abdominal stretching therapy in the form of abdominal muscle stretching exercises performed for 10 minutes with the following movements: cat stretch, lower trunk rotation, buttock/hip stretch, abdominal strengthening or curl up, lower abdominal strengthening and the bridge position. Acupressure therapy is undergone by massaging the highest prominence when the thumb and forefinger are brought together (point Li4/Hegu) with constant pressure for about 30 seconds. Abdominal stretching and acupressure therapy were done once a day which starts on the 14th day until the 28th day of menstruation.

The measurement of menstrual pain used a numerical rating scale (NRS) on a 0-10 scale. Scale 0 for complaints of menstrual pain or cramps in the lower abdomen. Scale 1-3 when the sample feels cramps in the lower abdomen, but they can bear it, still do activities, and concentrate on studying. Scale 4-6 is used if the respondents feel lower abdominal cramps that radiate to their waist, loss of appetite, some activities are hampered, and difficult to concentrate studying. On a scale of 7-9, there is a severe cramp in the lower abdomen that spreads to the waist, thighs or back, loss of appetite, gets nausea, fatigue, unable to move, and unable to concentrate on studying. Also, a scale of 10 indicates severe cramps in the lower abdomen spread to the waist, legs, and back, loss of appetite, getting nausea, vomiting, headache, feeling faint, and unable to get out of bed.

Then, the data were first descriptively analysed to determine the data distribution and continued with the data normality test. This study used the Smirnov Kolmogorov test for the data normality test with the limit of significance was p≥0.05 (Dahlan, 2019). If the data is normally distributed, it is then continued with paired t-test in the group and unpaired t-test in both groups, otherwise, if the data is not normally distributed, the Wilcoxon and Mann-Whitney test will be applied. The used limit of significance is p≤0.05. The ethical clearance of this research was obtained from the Ethics Commission of Poltekkes Kemenkes Denpasar.

3. Results

The results are divided into Table 1 – 6 showing the information on respondents' age and age at menarche, respondents' menstrual cycle, presence of stolsel (blood clot), period length, and dysmenorrhea duration, dysmenorrhea before and after the therapy, data normality test, the difference of dysmenorrhea before and after the applied therapy to the abdominal stretching and acupressure group, and the difference of primary dysmenorrhea between abdominal stretching and acupressure

Table 1: Respondents' Age and Age at Menarche

No	Characteristics	Abdominal Stretching Group	Acupressure Group
1	Age		
	Mean	15,20	15,17
	Median	15,00	15,00
	Std. Deviation	0,49	0,48
	Minimum	14,00	14,00
	Maximum	17,00	16,00
2	Age at Menarche		
	Mean	12,08	12,17
	Median	12,00	12,00
	Std. Deviation	1,11	0,86
	Minimum	10,00	10,00
	Maximum	15,00	14,00

Table 1 shows that the respondents' age in the abdominal stretching group is a maximum of 17 years old, the mean is 15,20, and the median is 15,00. Besides, the maximum age in the acupressure group is 16 years old, the mean is 12.17, and the median is 12.00. Additionally, the maximum age range of menarche in the abdominal stretching group is 15 years, the mean is 12.08, and the median is 12.00 while in the acupressure group, the maximum age is 14 years, the mean is 12.17, and the median is 12.00.

Table 2: Respondents' Menstrual Cycle, Presence of Stolsel (Blood Clot), Period Length, and Dysmenorrhea Duration

No	Characteristics	Abdominal Stretching Group		Acupressure Group	
		f	%	f	%
1	Menstrual Cycle				
	<21 days	16	22,9	13	18,6
	21-35 days	52	74,3	53	75,7
	>35 days	2	2,9	4	5,7
	Total	70	100,0	70	100,0
2	Period Length				
	1-2 days	1	1,4	0	0
	3-5 days	34	48,6	43	61,4
	6-7 days	26	37,1	24	34,3
	>7 days	9	12,9	3	4,3
	Total	70	100,0	70	100,0
2	Stolsel (Blood Clot)				
	Not exist	19	27,1	20	28,6
	Exist	51	72,9	50	71,4

	Total	70	100,0	70	100,0
4	Dysmenorrhea Duration				
	1 day	26	37,1	27	38,6
	2 days	32	45,7	31	44,3
	3 days	10	14,3	11	15,7
	>3 days	2	2,9	1	1,4
	Total	70	100,0	70	100,0

The data in Table 2 shows that mostly the menstrual cycle is 21-35 days (74.3%) in both the abdominal stretching group and the acupressure group (75.7%). Also, the period length is mainly 3-5 days, namely 48.6% in the abdominal stretching group and 61.4% in the acupressure group. In addition, most respondents experienced menstruation with a blood clot or S*tolsel*, which is 72.9% in the abdominal stretching group and 71.4% in the acupressure group. Moreover, dysmenorrhea duration experienced by respondents was mostly 2 days, namely 45.7% in the abdominal stretching group and 44.3% in the acupressure group.

Table 3: Dysmenorrhea Before and After the Therapy

	Group	Min	Max	Mean	Median	Std. Dev
Dysmenorrhea Pretest	Abdominal Stretching	1,00	9,00	4,29	4,00	2,08
	Acupressure	1,00	9,00	3,97	3,00	1,92
Dysmenorrhea Posttest	Abdominal Stretching	0,00	7,00	2,21	2,00	1,82
	Acupressure	0,00	9,00	2,61	2,00	1,76
Decreased Dysmenorrhea	Abdominal Stretching	0,00	7,00	2,07	2,00	1,74
	Acupressure	0,00	6,00	1,36	1,00	1,39

Table 3 points the median of abdominal stretching therapy was higher (4.00) than acupressure therapy regarding menstrual pain before the therapy. Also, menstrual pain after having abdominal stretching therapy decreased by 2 levels, whereas acupressure therapy decreased by 1 level.

Table 4: Data Normality Test

Group		Kolmogorov Smirnov	
		Statistics	*p-value*
Dysmenorrhea Pretest	Abdominal Stretching	0,203	0,000
	Acupressure	0,222	0,000
Dysmenorrhea Posttest	Abdominal Stretching	0,162	0,000
	Acupressure	0,179	0,000
Decreased Dysmenorrhea	Abdominal Stretching	0,155	0,000
	Acupressure	0,230	0,000

Table 4 shows that the pre-test, post-test, and decreased dysmenorrhea data in the two groups had $p < 0.05$ meaning that the data were not normally distributed. Hence, according to these results, the Wilcoxon and Mann-Whitney non-parametric statistical tests were then conducted.

Table 5: The Difference of Dysmenorrhea Before and After the Applied Therapy to the Abdominal Stretching and Acupressure Group

Group		n	Median	Std. Deviation	Negative Ranks	Ties	Z	*p value*
Abdominal Stretching	Pretest	70	4,00	3,00	51	17	-6,267	0,000
	Posttest	70	2,00	2,00				
Acupressure	Pretest	70	2,08	1,92	50	20	-6,265	0,000
	Posttest	70	1,82	1,76				

The data in table 5 stated that pre and post dysmenorrhea in the abdominal stretching therapy group showed 51 respondents out of 70 had decreased dysmenorrhea, whereas 17 people remained. Wilcoxon test results obtained p = 0.000 so that there is a significant difference in dysmenorrhea before and after abdominal stretching therapy. Besides, 50 respondents in the acupressure group experienced a decrease in dysmenorrhea after doing therapy and 20 people still got dysmenorrhea. The results of the different tests obtained p = 0.000 which means there is a significant difference in dysmenorrhea before and after acupressure therapy.

Table 6: The Difference of Primary Dysmenorrhea Between Abdominal Stretching and Acupressure

Group		n	Median	Std. Deviation	Mean Rank	Mann-Whitney U	*p value*
Pretest	Abdominal Stretching	70	2,00	1,74	73,74	2223	0,335
	Acupressure	70	1,00	1,39	67,26		
Posttest	Abdominal Stretching	70	2,2286	1,81117	65,14	2074,5	0,111
	Acupressure	70	2,6000	1,77258	75,86		
Decreasing	Abdominal Stretching	70	2,0571	1,74361	78,9	1862	0.012
	Acupressure	70	1,3714	1,38492	62,1		

Table 6 indicates that the results of the different tests before the given therapy in the two groups obtained p-value = 0.335 (p> 0.05) showing no difference. The analysis of dysmenorrhea differences resulted in no difference after therapy with a p-value = 0.111. Additionally, the difference test between the pre-test and post-test obtained p-value = 0.012 so that there is a significant difference according to these results.

4. Discussion

The age range of respondents is 14-17 years, and most of them are 15 years old, namely 80% in the abdominal stretching group and 74.35% in the acupressure group. The respondents of this research were teenagers. According to WHO, adolescents are residents in the age range of 10 until 19 years old. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 25 of 2014, adolescents are residents in the age range of 10-18 (Pusdatin Kemenkes RI, 2014). The age range of respondents' menarche is 10-15 years and most of whom are 13 years old (30%) in the abdominal stretching group and 12 years old (48.6%) in the acupressure group. Markosyan & Arzumanyan (2017) stated that the average age of menarche was 11.3 ± 0.8. Also, Martinez (2020) wrote about Trends and Patterns in Menarche in the United States from 1995 to 2013–2017, telling that the mean age of menarche decreased from 1995 (12.1) to 2013–2017 (11.9). In addition, Markosyan & Arzumanyan (2017) found the average age of menarche was 11.3 ± 0.8 years for a total group of 450 girls.

Most of the menstrual cycle in this research is 21-35 days (74.3%) in the abdominal stretching group and 75.7% in the acupressure group. It is a regular menstrual cycle. Saleh, et al. (2016) learnt a menstrual cycle of 24.63 ± 4.26. This research also showed that most of the period length is 3-5 days, namely 48.6% in the abdominal stretching group and 61.4% in the acupressure group. These data indicate that the duration of menstruation is generally regular. The length of menstruation was 5.71 ± 1.1 8. In addition, the duration of dysmenorrhea experienced by most respondents was two days, namely 45.7% in the abdominal stretching group and 44.3% in the acupressure group.

Pretest and posttest Dysmenorrhea in the abdominal stretching therapy group showed that out of 70 respondents, 51 people had decreased dysmenorrhea and 17 people did not. Also, Wilcoxon test results obtained p = 0.000 so that there is a significant difference in dysmenorrhea before and after having abdominal stretching therapy.

According to research conducted by Gamit, et al. (2014), an exercise that is effective in reducing dysmenorrhea is abdominal stretching. It can increase the strength of the abdominal muscles, abdominal flexibility and endurance in certain circumstances, breathing relaxation, release tension and increase pulmonary ventilation so that blood oxygen can decrease the scale of dysmenorrhea. Saleh et al. (2016) found that stretching was effective in reducing primary dysmenorrhea (P<0.001).

For the Acupressure therapy group, 50 respondents experienced a decrease in dysmenorrhea after therapy and 20 of them did not. The results of the different tests obtained p = 0.000 indicating that there is a significant difference in dysmenorrhea before and after acupressure therapy. The pressure on acupressure points can affect the production of endorphins in the body. Endorphins are pain killers that the body produces itself. Endorphins are peptide or protein molecules made of a substance called beta lipotropin found in the pituitary gland. Endorphins control the activity of endocrine glands in which these molecules are stored (Kashe, et al. 2010). Gerzson, et al.l (2014) found in the literature review that acupressure was effective in reducing dysmenorrhea in addition to pilates and TENS therapy.

The results of the different tests for dysmenorrhea before therapy in both groups obtained p-value = 0.335 (p> 0.05) showing no difference. Therefore, it indicates that the condition of dysmenorrhea in both groups is similar. Also, the results of the analysis of differences in dysmenorrhea after therapy obtained p>0.05 meaning there was no difference either. These results indicate that acupressure therapy and abdominal stretching have the same effect to decrease or reduce dysmenorrhea.

The average decrease of dysmenorrhea in abdominal stretching therapy was 2.0571, and it was more than acupressure therapy that was only 1.3714. The difference test on the difference between the pre-test and post-test obtained p-value = 0.012. These results indicate there is a significant difference. Shahr-jerdet al. al (2014) found the same finding that stretching exercises were effective in reducing pain intensity, pain duration, and the number of painkillers used by adolescent girls experiencing primary dysmenorrhea (p<0.001). The results of this study are in line with Carroquino-Garcia et al. (2019) that figured out therapeutic exercise reduced pain intensity in patients with primary dysmenorrhea.

Conclusion

Menstrual pain (dysmenorrhea) on abdominal stretching therapy decreased from an average of 4.2857 on the pre-test to 2.2286 on the posttest. In addition, menstrual pain (dysmenorrhea) in the acupressure therapy group decreased from an average of 3.9714 on the pre-test to 2.6000 on the post-test. Hence, there was a significant difference before and after abdominal stretching therapy (p=0.000) and there was also a significant difference before and after acupressure therapy (p=0.000). Besides, there was no difference before therapy between abdominal stretching therapy and acupressure with a p-value = 0.335. And, there was no difference in dysmenorrhea after therapy between the abdominal stretching and acupressure group (p=0,111). Thus, there was a significant difference in decreasing dysmenorrhea between abdominal stretching therapy and acupressure (p=0.012).

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Vector 3D Reconstruction of the Nerves of the Ventral Region of the Neck from Anatomical Sections of Korean Visible Human at the Laboratory of Digital Anatomy of Paris Descartes

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Abstract
Objective: To carry out a 3D vector reconstruction of the nerves of the ventral region of the neck from anatomical sections of the "Korean Visible Human" for educational purposes. Materials and Methods: The anatomical subject was a 33-year-old Korean man who died of leukemia. He was 164cm tall and weighed 55kgs. A cryomacrotome sectioned the frozen body into 5960 sections. Sections numbered 1500 to 2000 were used for this study. A segmentation by manual contouring of each nervous anatomical element of the ventral region of the neck was done using Winsurf version 3.5 software on a laptop PC running Windows 10 equipped with an 8 gigabyte RAM. Results: Our vector 3D model of nerves in the ventral neck region includes the brachial plexuses, vagus nerves, inferior and superior laryngeal nerves, glossopharyngeal nerves, hypoglossal nerves and spinal nerves. This vector model has been integrated into the Diva3d virtual dissection table. It was also uploaded to the Sketchfab website and 3D printed using an ENDER 3 printer. Conclusion: Our 3D reconstruction of the nerves of the ventral region of the neck is an educational tool for learning the nerves of the ventral region of the neck and can also serve as a 3D atlas for simulation purposes for training in therapeutic gestures.

Keywords: Nerves of the Ventral Region of the Neck, Korean Visible Human, 3D Vector Reconstruction, Diva3d Virtual Dissection Table, Teaching

1. Introduction

We have now entered the digital age. It is a real technological revolution which morphological science is no exception. Indeed, 3D modeling of human anatomy is a remarkable educational tool for teaching and understanding morphology. The future of surgery is also linked to this modeling to perform simulations, repeat surgeries or access augmented reality: modern surgery is surgery guided by the image and the 3D model. Training in human anatomy is essential at all stages of the practice of medicine: clinical examination, interpretation of medical images and surgery are based on knowledge of the anatomy of the human body. The acquisition of these skills is first theoretical and then practical with dissection. Admittedly, cadaveric dissection is the gold standard of knowledge in anatomy, on the other hand it has significant drawbacks: the lack of corpses which cannot meet the demand of medical schools, the limited location of the activity (theater anatomical) and the fact that the dissection is unique because it relies on a destructive and irreversible process on human tissue. For all these reasons, the 3D reconstruction of anatomical structures promotes new teaching methods widely used in the world, mainly successful for their new realistic and interactive interfaces. It is a wonderful tool for students keen to learn about the human body, but also for anatomy teachers and for interactive clinical simulation for practitioners (Ackerman 1999) and (Cho, Calamate, & Chi. 2012). Finally, it is a revolution for surgeons to help with preoperative planning, simulation and augmented reality when performing surgery. 3D digital anatomy opens up a new way of teaching anatomy thanks to the digital nature of data allowing quantitative morphological analysis in the context of computational anatomy (Chung, Shin, Brown. 2015). It also opens up a new way for young people to learn anatomy: by manually drawing the boundaries of anatomical structures on slices, they build 3D models that enhance deep learning, through the use of virtual reality techniques with their strong emotional impact on the learning process.

We initiated this study with the aim of performing a three-dimensional reconstruction of the nerves in the ventral region of the neck. 2.

2. Methodology

Figure 1 measures the methodology of our 3D reconstruction of the nerves in the ventral region of the neck. We performed manual segmentation by contouring each nerve structure belonging to the ventral face of the neck on 500 anatomical sections of Korean Visible Human (Figure 2). These anatomical sections were taken from a 33-year-old Korean man who died of leukemia. This man had donated his body to science. A cryomacrotome (Figure 3) made it possible to make 0.2 mm thick sections on the frozen body, ie, 5960 sections. Sections numbered 1500 to 2000 were used for our study. Then we exported the 3D objects in cad format. And then we refined and improved the 3D objects with Blender version 2.7b. This required including the use of the "Skin" modifier to achieve a more realistic display of nerves. Then we classified the list of anatomical objects with Acrobat toolkit®. Finally, we built a 3Dpdf interface with the JavaScript language (Acrobat®).

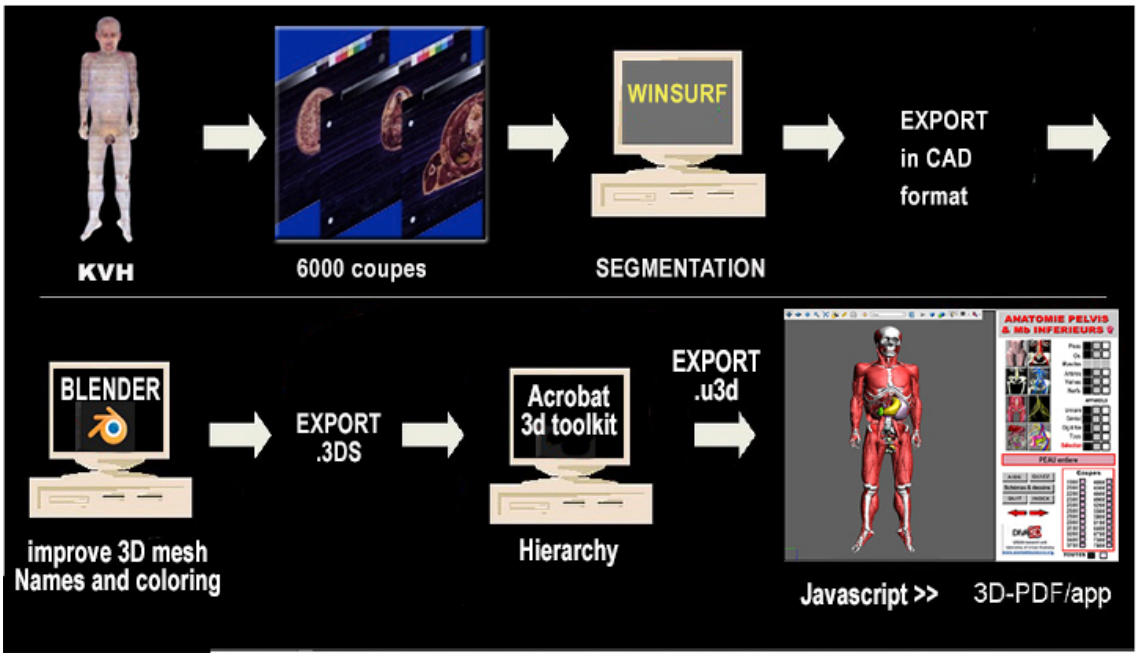

Figure 1: Methodology used to create the 3dpdf file from the anatomical sections.

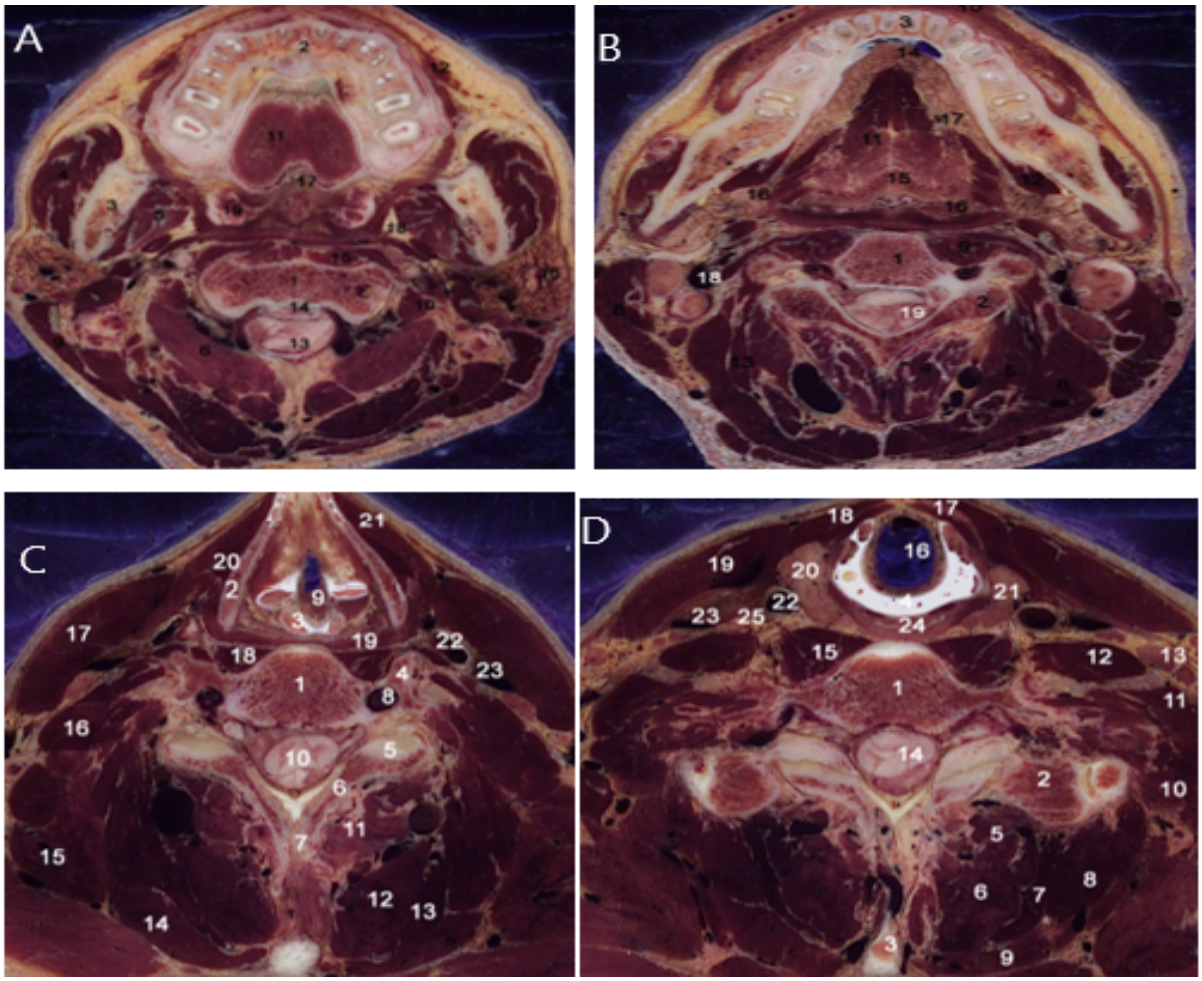

Figure 2: ABCD: Anatomical sections of KVH used for our study

A: Horizontal anatomical section of KVH passing through the axis

1. Axis body; 2. Mandible; 3. Rising branch of the mandible; 4. Masseter muscle 5. Stylopharyngeal muscle; 6. Rectus rectus posterior muscle of the head; 7. Semispinous muscle of the head; 8. Splenius muscle of the head; 9. Sternocleidomastoid muscle; 10. Long muscle of the neck; 11. Language; 12. Orbicular muscle of the lips; 13. Cerebellum; 14. Spinal cord; 15. Long muscle of the neck; 16. Thyroid gland; 17. Basis of the language; 18. Submandibular gland

B: Horizontal anatomical section of KVH passing through C3

1. Body of the third cervical vertebra; 2. C3 joint process; 3. Mandible; 4. Spiny transverse muscle of the neck; 5. Semispinous muscle of the head; 6. Splenius muscle of the head; 7. Trapezius muscle; 8. Sternocleidomastoid muscle; 9. Long neck muscle; 10. Depressor muscle of the lower lip; 11. Genioglossus muscle; 12. Mylohyoid muscle; 13. Elevator scapular muscle; 14. Lingual brake; 15. Epiglottis; 16. Piriform sinus; 17. Lingual artery; 18. Internal jugular vein; 19. Cervical spinal cord

C: horizontal anatomical section of KVH passing through C5

1. Vertebral body; 2. Thyroid cartilage; 3. Arytenoid cartilage; 4. Transversal process; 5. Joint process; 6. Blade; 7. Thorny process; 8. Transverse vasculo-nervous pedicle; 9. Larynx; 10. Cervical cord; 11. Transverse spinous muscle of the neck; 12. Semispinous muscle of the head; 13. Splenius muscle of the head; 14. Trapezius muscle; 15. Elevator scapular muscle; 16. Posterior scalene muscle; 17. Sternocleidomastoid muscle; 18. Long neck muscle; 19. Lower pharyngeal constrictor muscle; 20. Thyrohyoid muscle; 21. Sterno-cleido-hyoid muscle.

D: Horizontal anatomical section of KVH passing through C6.

1. Vertebral body of C6; 2. Transversal process of C6; 3. Spinous process of C6; 4. Cricoid cartilage; 5. Transverse neck muscle; 6. Semispinous muscle of the neck; 7. Semispinous muscle of the head; 8. Muscle small complexus; 9. Trapezius muscle; 10. Dorsal scalene muscle; 11. Middle scalene muscle; 12. Long muscle of the head; 14. Cervical cord; 16. Cervical trachea; 18. Omohyoid muscle; 20. Left thyroid lobe; 21. Right thyroid lobe; 22. Common carotid artery; 23. Internal jugular vein; 24. Esophagus; 25. Vagus nerve

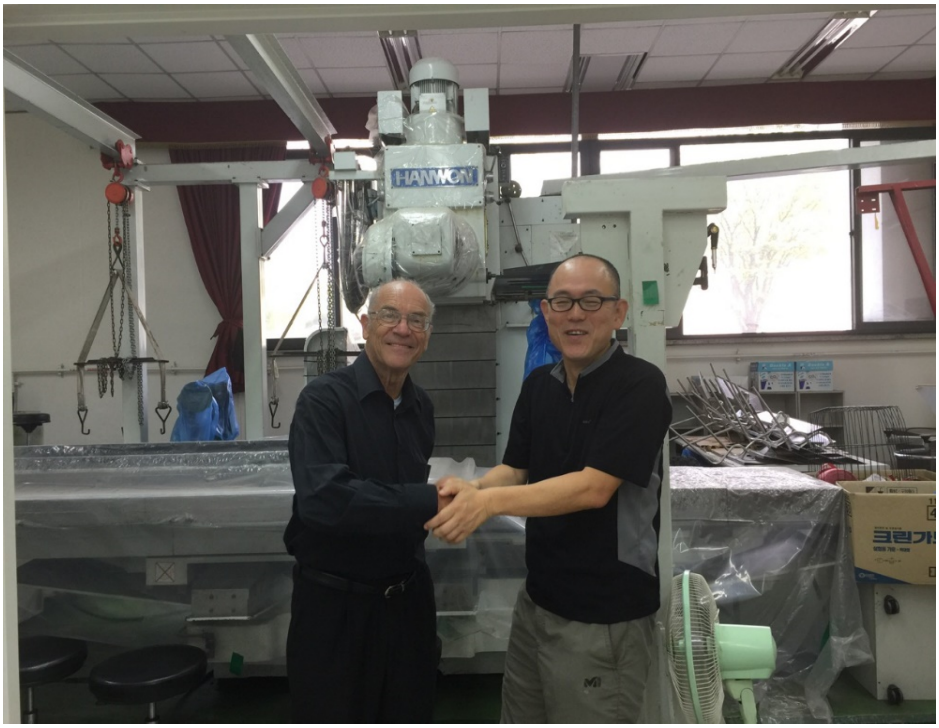

Figure 3: Cryomacrotome used to cut the body of Korean Visible Human with M. Uhl on the left and M. Chung on the right (Ajou University, Seoul, Korée)

3. Results

The applied methodology allowed us to obtain reconstruction of all the nerves in the ventral region of the neck.

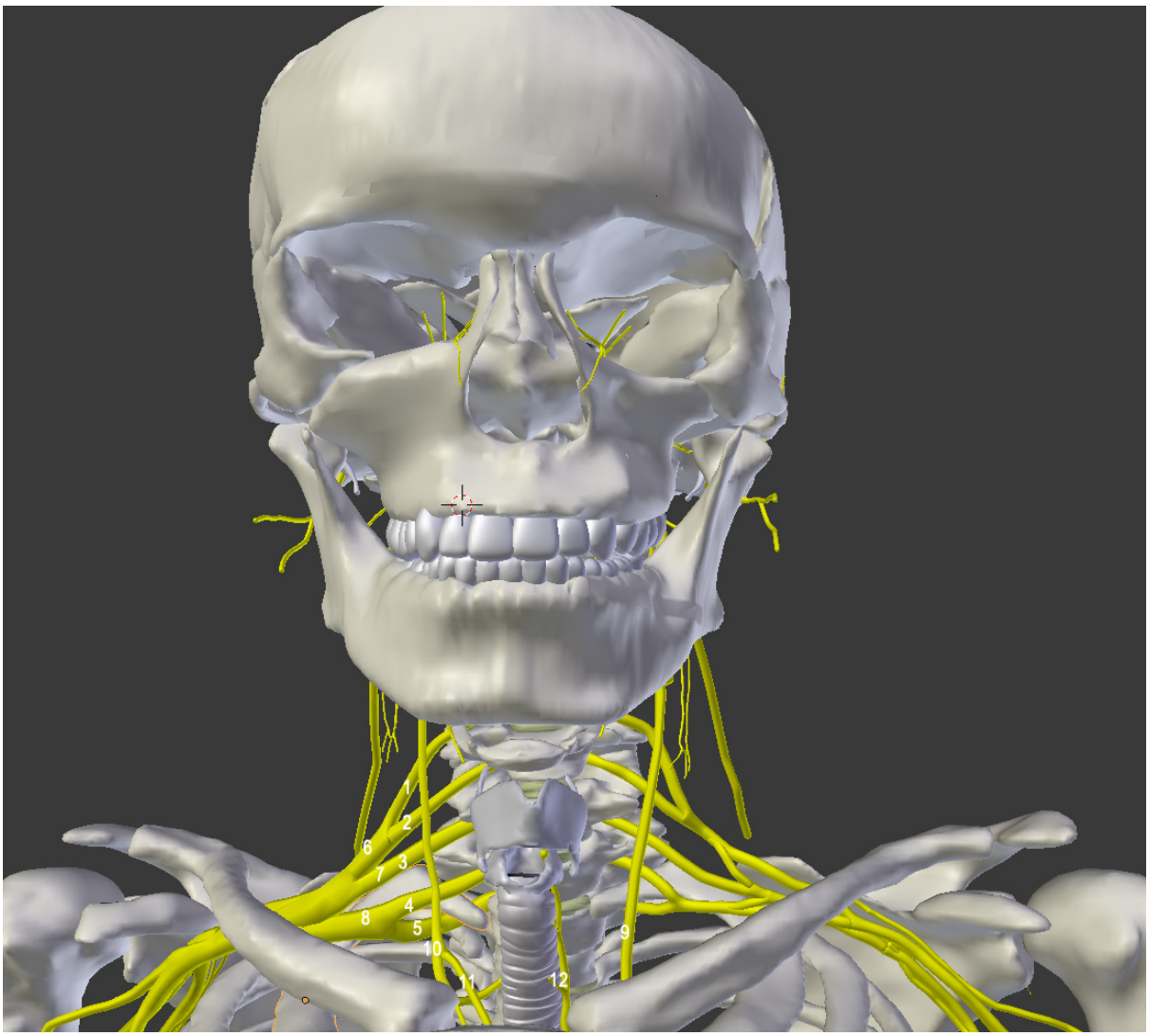

Figure 4: Ventral view of the neck nerves (Blender® screen interface)

1.Ventral branch of the fifth cervical nerve or C5; 2. Ventral branch of the sixth cervical nerve or C6; 3. Ventral branch of the seventh cervical nerve or C7; 4. Ventral branch of the eighth cervical nerve or C8; 5. Ventral branch of the first thoracic nerve or T1; 6. Upper trunk; 7. Medium trunk; 8. Lower trunk; 9. Left vagus nerve; 10. Right vagus nerve; 11. Right caudal laryngeal nerve; 12. Left caudal laryngeal nerve.

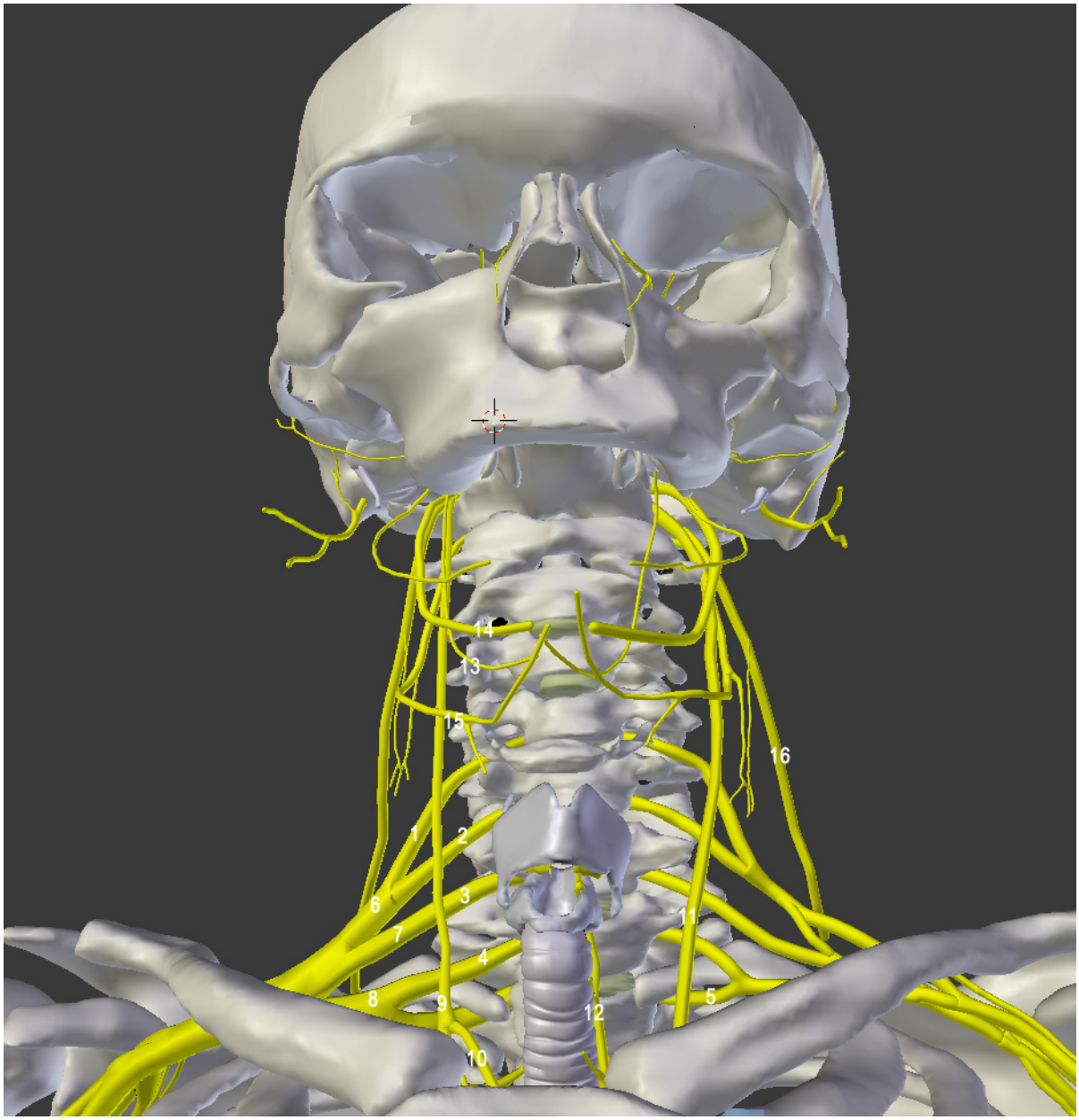

Figure 5: Inferior or caudal view of the nerves of the neck without the mandible

1. Ventral branch of the fifth cervical nerve or C5; 2. Ventral branch of the sixth cervical nerve or C6; 3. Ventral branch of the seventh cervical nerve or C7; 4. Ventral branch of the eighth cervical nerve or C8; 5. Ventral branch of the first thoracic nerve or T1; 6. Upper trunk; 7. Medium trunk; 8. Lower trunk; 9. Left vagus nerve; 10. Right vagus nerve; 11. Right caudal laryngeal nerve; 12. Left caudal laryngeal nerve. 13. Cranial laryngeal nerve; 14. Right glossopharyngeal nerve (IX); 15. Right hypoglossal nerve (XII); 16. Left spinal nerve (XI).

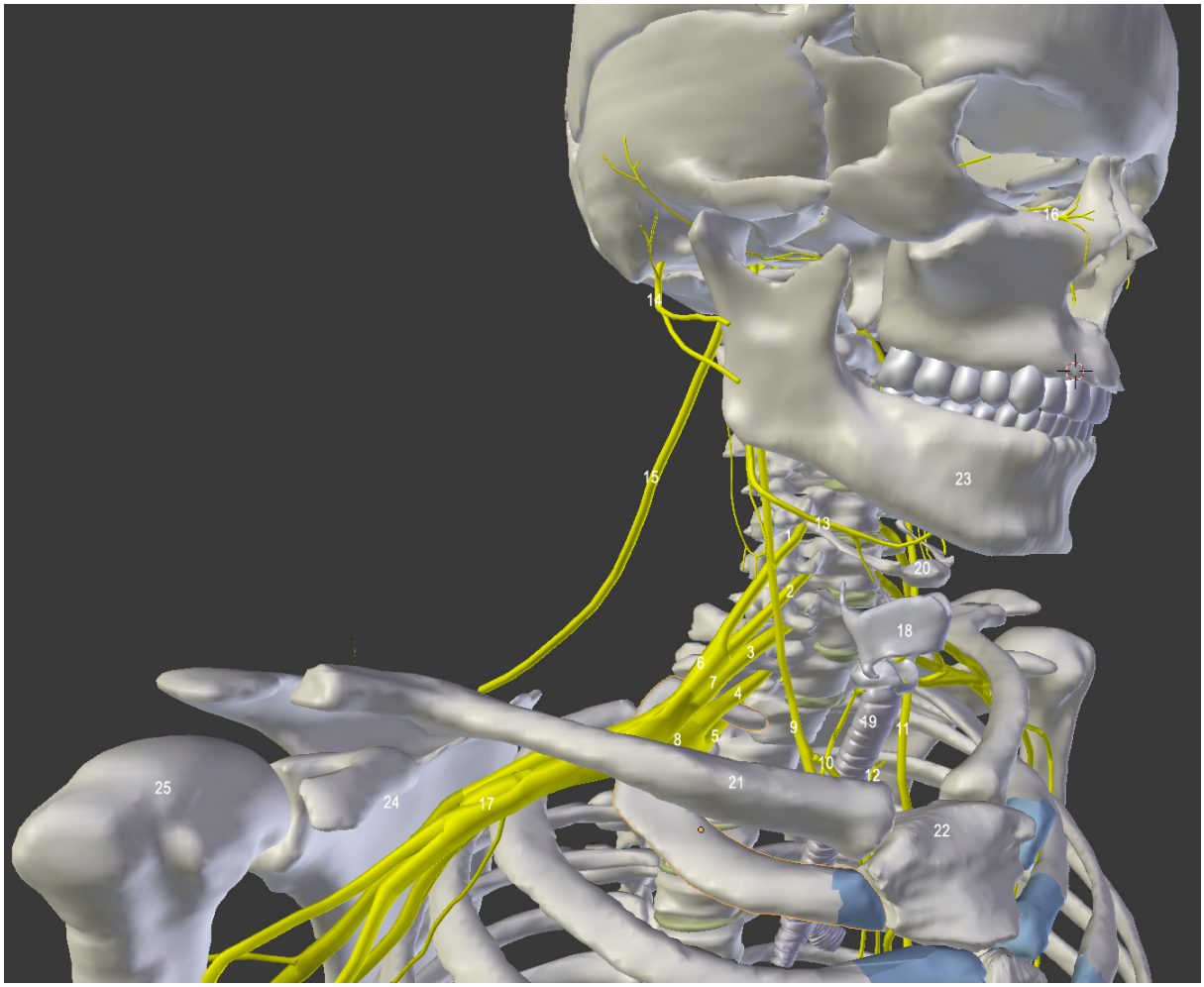

Figure 6: Left lateral view of the nerves of the neck

1. Ventral branch of the fifth cervical nerve or C5; 2. Ventral branch of the sixth cervical nerve or C6; 3. Ventral branch of the seventh cervical nerve or C7; 4. Ventral branch of the eighth cervical nerve or C8; 5. Ventral branch of the first thoracic nerve or T1; 6. Upper trunk; 7. Medium trunk; 8. Lower trunk; 9. Left vagus nerve; 10. Right vagus nerve; 11. Right caudal laryngeal nerve; 12. Left caudal laryngeal nerve. 13. Cranial laryngeal nerve 14. Right glossopharyngeal nerve (IX); 15. Right hypoglossal nerve (XII); 16. Left spinal nerve (XI); 17. Axillary region; 18. Thyroid cartilage; 19. Trachea; 20. Hyoid bone; 21. Right clavicle; 22. Manubrium sternal; 23. Mandible; 24. Scapula; 25. Humeral head

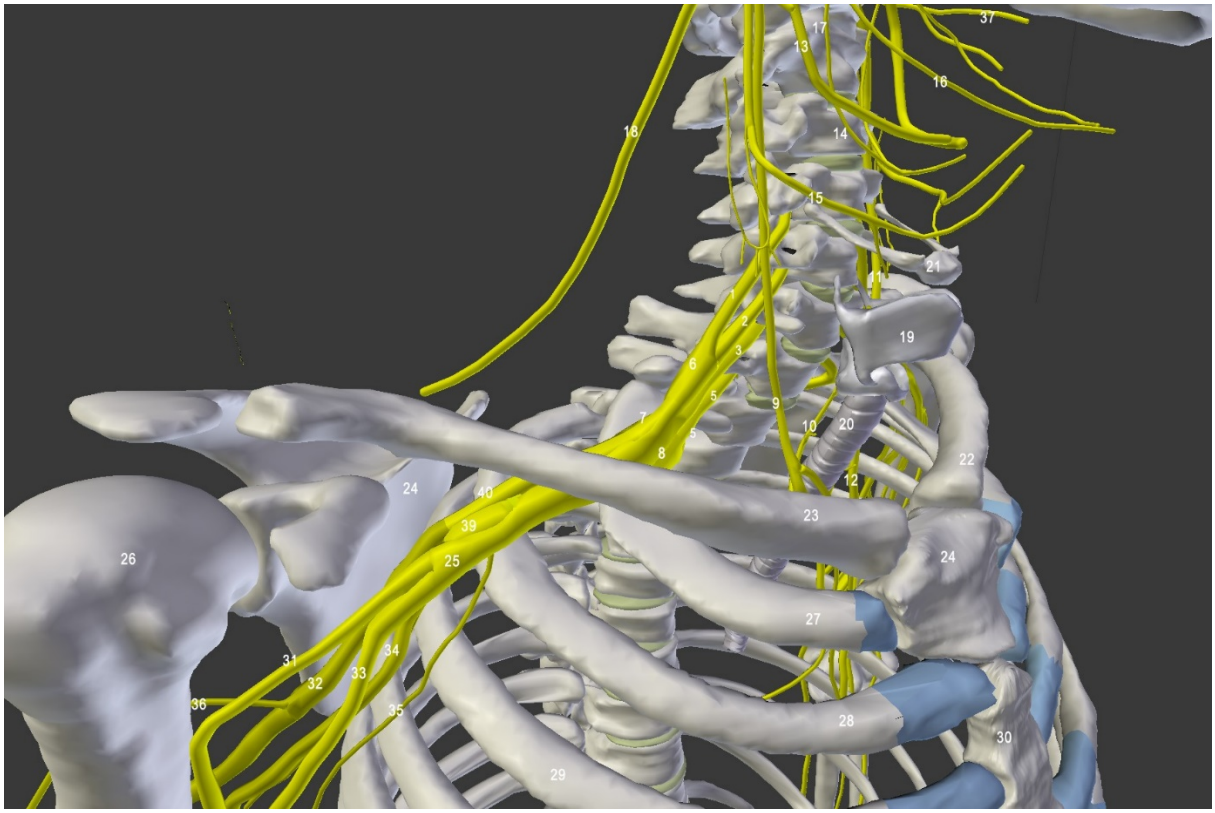

Figure 7: Left lateral view of the nerves of the neck (severed head)

1.Ventral branch of the fifth cervical nerve or C5; 2. Ventral branch of the sixth cervical nerve or C6; 3. Ventral branch of the seventh cervical nerve or C7; 4. Ventral branch of the eighth cervical nerve or C8; 5. Ventral branch of the first thoracic nerve or T1; 6. Upper trunk; 7. Medium trunk; 8. Lower trunk; 9. Right vagus nerve; 10. Right caudal laryngeal nerve; 11. Left vagus nerve; 12. Left caudal laryngeal nerve; 13 Right trigeminal nerve (branch ..) 14. Right trigeminal nerve (mandibular branch); 15. Right hypoglossal nerve (XII); 16. Right trigeminal nerve (maxillary branch) 17 Left trigeminal nerve (ophthalmic branch.) 18 Left spinal nerve (XI); 19. Thyroid cartilage; 20.Trachea; 21. Hyoid bone; 22. Left clavicle; 23. Right clavicle; 24. Manubrium sternal; 25. Side beam; 26. Humeral head; 27. Ventral arch of the 1st Coast; 28. Ventral arch of the 2nd Coast; 29. Ventral arch of the 3rd Coast; 30. Sternal body; 31.Musculo-cutaneous nerve; 32. Radial nerve; 33.Median nerve; 34. Ulnar nerve; 35.Long thoracic nerve; 36. Axillary nerve; 37. 38.Scapula; 39. Medial bundle; 40. Dorsal or posterior bundle our 3D reconstruction was inserted into the DIVA3D virtual dissection table (Figure 88) and was emitted on the Sketchfab® (Figure 9).

Figure 8: Virtual dissection table interface screen. On the left the 3D window. On the right, the function buttons to choose the display and the mode to be selected by zone, device, system, organ and / or unit.

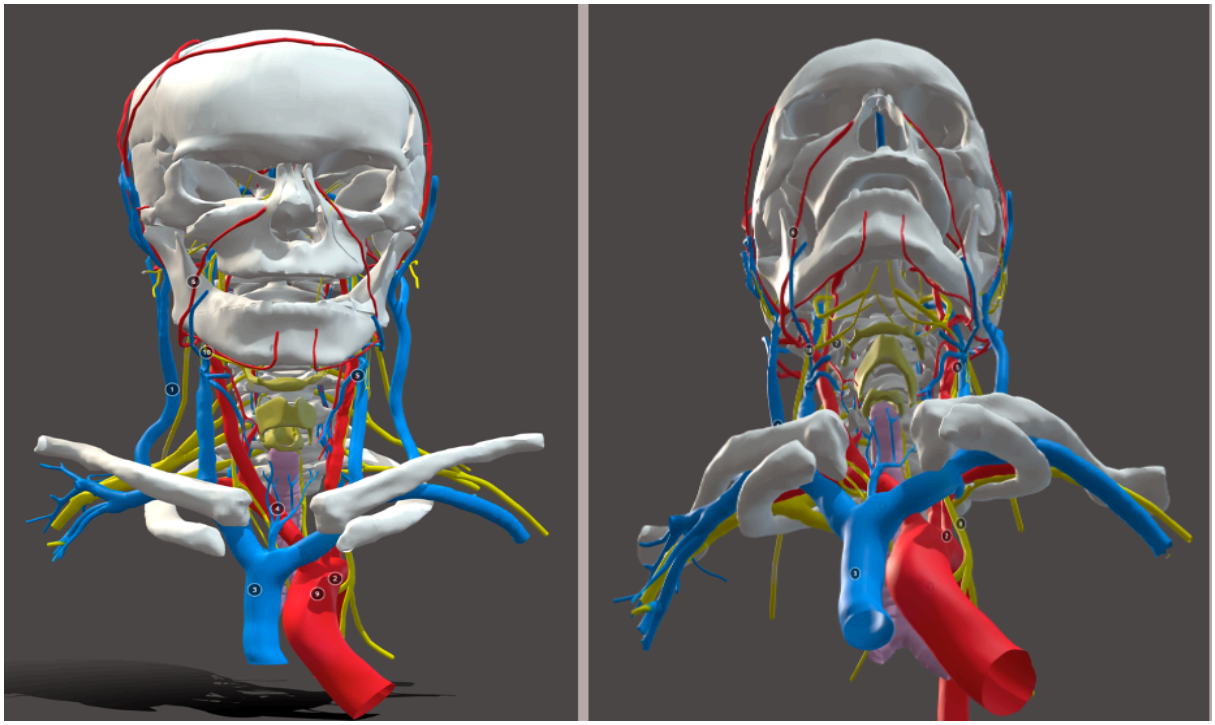

Figure 9: 3D model of KVH's neck and head displayed with Sketchfab® software Available at: https://skfb.ly/6QYxZ (Right ventral view and left caudal view)

We printed our model with a cheaper printer and painted it with acrylic paint (Figure 10).

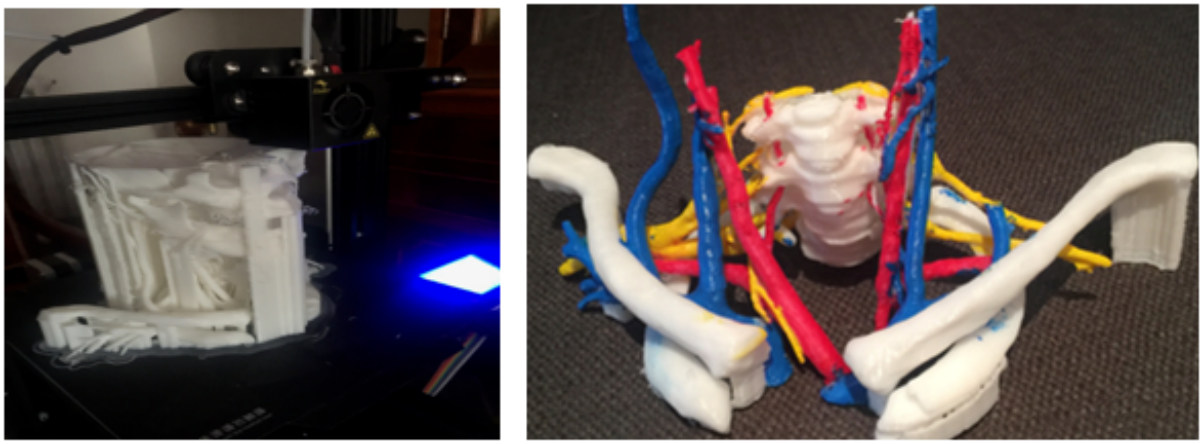

Figure 10: Left: our 3D model of the ventral neck and head region being printed (with printing supports). Right: 3D printing of our model painted manually with acrylic paint (ventral view - manual colorization)

4. Discussion

Certainly the Korean team and we have all worked on real anatomical sections unlike the other authors. However, our methodologies are different. The Korean methodology used four steps for their modeling. The first step was to segment the anatomical sections using Photoshop® software using the magic tub (Figure 11). This stage lasted 8 years. The second step was to automatically model the anatomical sections using Mimics® software and the third step was to enhance and simplify the drill bits using Maya®. The fourth step was to export the 3D models to Acrobat Pro as a 3DPDF file. The downside of this methodology is that it segments only one in five cuts and uses three high-cost paid software that requires a long learning time. Indeed, Photoshop® is the most expensive 2D image software. Mimics® is modeling software that costs 3000 euros and MAYA® is reconstruction and animation software at 2000 euros.

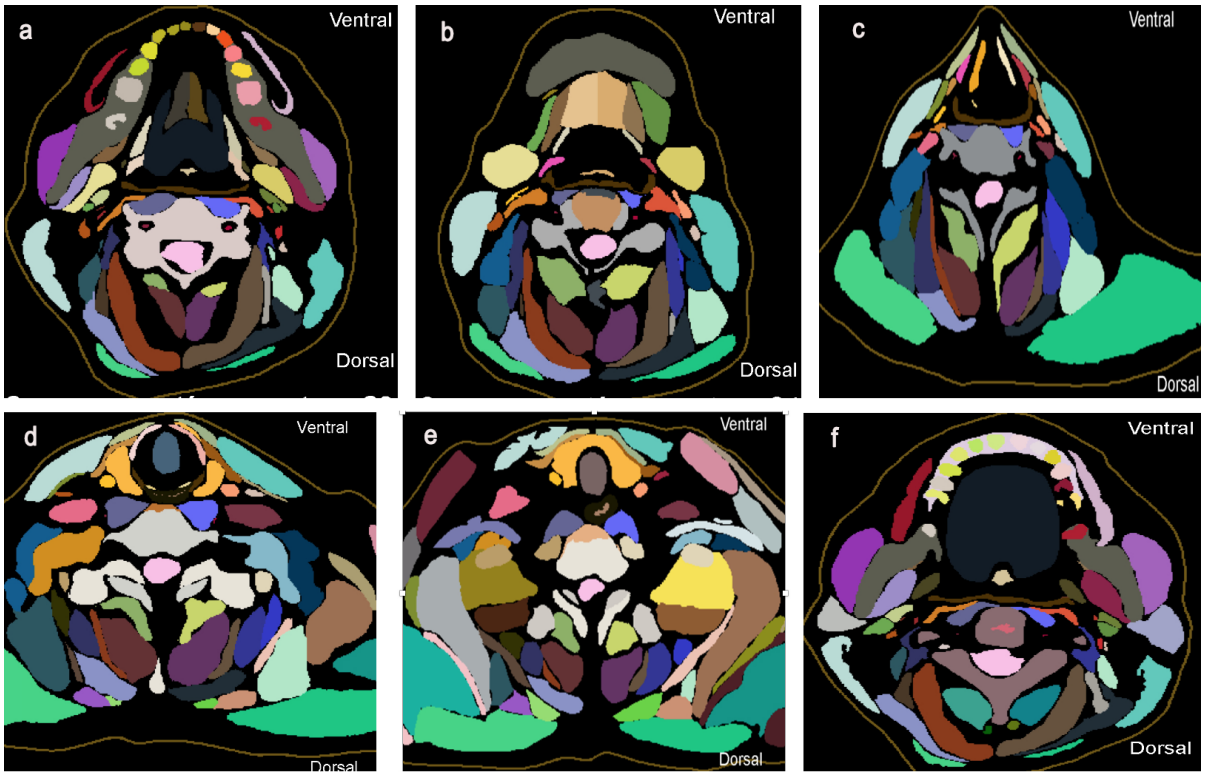

Figure 11: Segmented cuts using Photoshop® To. Segmented cut through C3; b. Segmented cut passing through C4; vs. Segmented cut passing through C5; d. Axial section passing through C5; e. Segmented cut passing through C7; f. Segmented sections passing through C7-T1;

Our methodology uses the same cuts with the following five steps: (Figure 1) • Segmentation and 3D vector modeling of the nervous elements of the ventral region of the neck with Winsurf® software version 3.5 (Moody and Lozanoff 1997) from anatomical sections. • Export of the Winsurf® mesh in cad format • Refinement, cleaning and arrangement of the mesh with Blender® • Classification of anatomical elements with Acrobat 3D toolkit® • Construction of the final user interface with Acrobat pro® Unlike the Korean methodology, we used the free and easy to learn Winsurf® software. In fact, the very easy-to-use Winsurf® software allows real-time control of the 3D result during 2D contouring, and therefore makes it possible to correct errors made. Although the Winsurf ® software has allowed us to reproduce the nerves in the ventral region of the neck fairly faithfully, it still has some flaws. The main disadvantage of this software is the length of work required to achieve the desired result. Indeed, this is a tedious contouring job. Unfortunately, there is no perfect solution to reduce this working time if it is not for great motivation and an unprecedented personal investment. The second drawback relates to the contouring work itself: Indeed, the 3D reproduction of certain low-caliber anatomical entities was particularly complicated. The only possible solution would then be to embark on a cut-by-cut contouring in order to be sure not to "lose your nerves along the way." It was also very difficult to get the final resolution as presented in the "Results" section. Indeed, when contouring is cut by the nerves of the neck, for example, or when the number of points

allocated to the object of interest is too large, the end result may be disappointing. Indeed, the anatomical entities will look like a "stack of plates," which decreases the final resolution and would therefore call into question our objective of creating a 3D atlas for application in the academic and surgical fields. There is a feature on Winsurf®, called "Smooth Object" which significantly smoothes the end result without affecting the shape of the organ. However, this process should not be abused as it could greatly accentuate any defects present in the reconstruction.

If despite everything the smoothed result is not satisfactory, it is recommended to restart the contouring of this object, avoiding repeating the same errors: always contour in the same direction (clockwise) starting at the same place from one cut to another, find the right balance in the choice of the number of points per object (neither too large because of poor precision, nor too small because there is a risk of a stack of trim in the end) ... In addition, we encountered a very great difficulty in the contouring of certain nerves. In fact, as mentioned in the “Methodology” section, these cuts were made in an axial plane; therefore longitudinal (or sagittal) structures are particularly difficult to reproduce. Thus, we used the Blender software to perfect the reconstruction obtained by Winsurf. Our 3D reconstruction of the nerves in the ventral region of the neck was redone using Blender® with “skin” technology due to the poor cosmetic quality of the result obtained on Winsurf®. Thus we carried out a detailed and explicit reconstruction of the cervical nerves.

Therefore our 3D model of the cervical nerves represents a real educational tool. Figure 10 shows the impression of our 3D model of the ventral neck region. It was done with a cheaper printer and lasted three days. We painted the anatomical structures with acrylic paint. Our printed model is an educational tool that can be used during tutorials and student practice. Our 3D reconstruction of the nerves in the ventral neck region was inserted into the DIVA3D virtual dissection table (Figures 8-9). Our DIVA3D virtual dissection table is a powerful teaching tool and constitutes an educational innovation. Indeed, it revolutionizes the teaching and learning of human anatomy. It offers full-body 3D anatomy and teaches anatomy on a 3-finger touch screen. Students can visualize anatomical structures just like on a cadaver. It therefore allows the learning of human anatomy beyond what a real body could provide. The richness of the content and the level of detail have aroused the interest of Masters in Anatomy and students of the Faculty of Medicine of Bamako. It is mainly used in our tutorials and practicals because it allows students to manipulate young and well-preserved virtual tissues instead of aged and damaged corpses. Thus, our students are impressed with the quality and visual impact of the fabrics. Figures 8-9 show the interface screen of our virtual dissection table. On the left the 3D window. On the right, the function buttons to choose the display and the mode to be selected by zone, device, system, organ and / or unit. Were it not for the absence of segmentation of certain organs, it would be comparable to the Anatomage table which represents the first virtual dissection table in the world and the most advanced on the market with an operating table design combined with a powerful radiology software. Conclusion: Our 3D modeling of the nerves of the ventral neck region is an original educational tool that easily teaches the nerves of the neck and can also be used as a 3D atlas for simulation purposes for training in medical procedures.

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Job Satisfaction of Health Assistants in Selected Upazila Health Complexes of Bangladesh

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Abstract
Health assistants play an important role in providing primary health care among the rural population in Bangladesh. Their improper working performance can hamper the entire nations' health care. Proper productivity is related to the job satisfaction and job satisfaction is the result of attitude and behavior. The purpose of this study was to assess the job satisfaction level among health assistants working in selected Upazila Health Complex (UHC). 203 health assistants were interviewed through purposive sampling technique from four UHCs in the Dhaka district. Out of 203 respondents, 114 were female and 89 were male where Mean± SD was 38.80 ±7.62. The highest 109 (53.7%) participants had 1-10 years of working experience and 104 (51.2%) respondents had monthly income between 18000 -23000 BDTK. The percentage of neutral, satisfied and unsatisfied participants' was 65%, 28% and 7%, respectively. There was significant ($P < 0.05$) relationship between job satisfaction and getting medical allowance, training opportunity and salary. Job nature such as security, meaningless, pride and enjoying, support colleagues such as supervisor and coworkers, acceptance by both the community and oneself were identified as the satisfied items where low and fair opportunities for promotion, low increment, and low pay, no praise, high work pressure, and null administrative capacity were found as dissatisfied factors of job. On the basis of these findings, policy makers and concerned authorities could take necessary steps for increasing the level of job satisfaction of health assistants.

Keywords: Job Satisfaction, Primary Health Care, Health Assistant

1. Introduction

Job satisfaction is a thematic phenomenon that results in consistency in attitude and behavior (Salma & Hasan, 2020). Wide range of intrinsic and extrinsic factors are responsible for job satisfaction such as nature of the

work, working environment, organizational policies, professional developmental opportunities, colleagues, creativity, autonomy, promotion and incentives (Sveinsdottir, Biering & Ramel, 2006) . The absence of any of these factors can alter the quality of working environment and affecting job satisfaction in an organizational environment (Khamlub et al., 2013). In the health care sector, job satisfaction among healthcare professionals plays a crucial role in maintaining a nation's entire health care system (Haroon Or Rashid et al. 2019; Geleto, Baraki, Atomsa & Dessie, 2015).

Bangladesh is a signatory country to the concept of primary health care (PHC) since 1978, where achieving the goal of health for all (HFA) was laid as the strategy (World Health Organization, 2017). The task of providing primary health care is the responsibility of health assistants. In Bangladesh, health assistants deliver basic health care at the doorstep in the rural areas and urban slums as the domiciliary health workers under Upazila Health System (UHS). Community clinic at the ward is the grass root level of UHS (World Health Organization, 2017) where each ward is covered by one HA. Approximately 20,815 health assistants are working under UHS as of now (Health Bulletin, 2012).

Shortage of health work force is a global problem, especially in a middle-income country like Bangladesh, where 63% of the people living in rural areas (The World Bank, 2019) have inadequate access to domiciliary health workers (World Health Organization, 2014). Research suggests that having fewer health professionals may create a higher workload on existing employees, which in turn influences the contentment of occupation (Salma & Hasan, 2020). Along with the work-force, other detrimental factors, such as, long working hours, unsafe workplaces, inadequate career structures, poor remuneration/unfair pay, poor access to needed supplies and limited or no access to professional development opportunities play significant role in the overall job satisfaction (Geleto, Baraki, Atomsa & Dessie, 2015; Elarabi & Johari, 2014). Literature (Haroon Or Rashid et al. 2019; Kumar et al., 2013) found a strong positive relationship between job satisfaction and performance. In other words, an organization's productivity is dependent on the satisfaction of its employees. In medical settings, health professionals' productivity is reflected through good quality medical care and patients' gratification (Geleto, Baraki, Atomsa & Dessie, 2015; Kumar et al. 2013).

On the other hand, low job satisfaction is linked with the low performance of medical staff (Kumar et al., 2013) which may results absenteeism, turnover or psychological pressure (Salma & Hasan, 2020; Kumar et al., 2013). Migration of health worker from the rural to city areas or to the foreign country could be occurred due to job dissatisfaction of employees which may lead to shortage of skilled manpower (Geleto, Baraki, Atomsa & Dessie, 2015). Further, dissatisfied workers are known to engage in unethical or illegal activities while continuing to work for an organization, such as stealing, voluntarily providing poor service, abusing equipment, or spreading slander (Geleto, Baraki, Atomsa & Dessie, 2015).

In Bangladesh, many studies about job satisfaction among doctors and hospital staff have been carried out so far, but research on the job satisfaction of health assistants, the first responders in healthcare needs at the community level, has been scarce. Therefore, this study had attempted to assess the level of job satisfaction among health assistants at the selected Upazila of Bangladesh in order to recommend some interventions and programs to the concerned authority for upholding health assistants' professional life.

2. Method

This cross-sectional study was conducted among 203 health assistants who were working under four Upazila Health Complexes of Bangladesh namely Keraniganj, Nawabganj, Dohar and Sonargaon. Non-probability purposive sampling was used for selecting both the study place and participants. To find the appropriate number of participants, a standard equation was applied (Hoque, 2019) and the results showed that 364 participants might be suitable for conducting the study. However, due to time constraints and unavailability of participants, 203 health assistants were selected as respondents of this study. Regardless of age, gender and working experience, all the able-bodied health assistants willing to take part were included in the study. This study lasted for about one year from 1 January 2019 to 31 December 2019.

In order to collect data, a face-to-face interview was conducted upon the selected participants during their Upazila Health Complexes' monthly meeting through using a structured questionnaire blended with Job Satisfaction Survey (JSS) scale. This scale had 27 items with 5-point rating response namely "Totally Disagree," "Fairly Disagree," "Neutral," "Fairly Agree" and "Totally Agree." Agreement with positively-worded items and disagreement with negatively-worded items were represented as satisfaction, whereas disagreement with positive-worded items and agreement with negative-worded items were represented as dissatisfaction. The total score was ranging from 27 to 135 while 27 to 85 was considered as dissatisfaction, 100 to 135 was regarded as satisfaction, and between 86 to 99 was identified as neutral.

Necessary permission was taken from the participants before proceeding to data collection. After completion of data collection, the data were checked and verified for any omission, error or irrelevance before tabulation. Data were coded, entered and analyzed using SPSS (statistical package for social science) software. The findings of the study were presented by frequency and percentage in tables and pie charts. Mean and standard deviations for continuous variables and frequency distributions for categorical variables were used to describe the characteristics of the total sample. Prior to begin the study, permission was sought from the ethical review committee of National Institute of Preventive and Social Medicine (NIPSOM).

3. Results

Table 1: Descriptive Statistics of the study participants (N = 203)

Variable	Category	Frequency	Percentage
Age (In years)	23-30	44	21.7
	31-38	65	32.0
	39-46	59	29.0
	47-54	35	17.3
	Mean±SD = 38.80 ±7.62		
Gender	Female	114	56
	Male	89	44
Marital Status	Married	156	76.9
	Divorced	21	10.3
	Widow	11	5.4
	Unmarried	9	4.4
	Widower	6	3
Educational Status	SSC	1	2
	HSC	42	85
	Graduate	114	56
	Others	1	2
Working Experience	1-10 year	109	53.7
	11-20 year	59	29.1
	21-30 year	33	16.3
	<30 year	2	1.0
Type of Family	Joint	122	59.8
	Nuclear	81	39.7
	Others	1	.5
Monthly family income (In BDT)	13,000-18,000	5	2.5
	18,001-23,000	104	51.2
	23,001-28,000	38	18.8
	> 28,000	21	10.3
Religion	Islam	167	82.3
	Hindu	35	17.2
	Christian	1	0.5
Number of family members	2-3	19	9.4
	4-5	125	61.6
	6-7	34	16.7
	8-10	25	12.3

Mean age of the study population was 38.80 years, where 32% of the respondents were from the age group of 31-38 years and 17.3% were from the age group of 47-54 years (Table 1). Study population was predominantly female (56%). In regards to the marital status, 76.9% respondents were married. Graduation was marked as their highest educational qualification by 56% of the study population. In terms of working experience, 53.7% of respondents had working experience up to 10 years. Joint family was identified as the type of family by 59.8% of participants and 51.2% had a monthly family income of BDT 18,001-23,000 with 61.6% having 4 to 5 family members. Islam was found to be the dominant religious belief by 82.3% of the participants.

Table 2: Distribution of respondents according to work place environment related characteristics

Attributes	Category	Frequency	Percentage
Salary (In BDT)	10,000-20,000	33	16.26
	20,001-30,000	119	58.62
	30,001-40,000	51	25.12
Facing problems to bear family and child education expenses	Always	80	39.4
	Never	7	3.4
	Often	60	29.6
	Sometimes	56	27.6
Encourage process	Nothing	91	44.8
	Only encouragement	111	54.7
	Special vacation	1	0.5
Evaluation process	In monthly meeting	110	54.2
	Nothing	62	30.5
	Through thanks giving	23	11.4
	by ACR	8	3.9
Working hours	6	124	61
	7	6	3
	8	73	36
Resolving conflict	Very good	31	15.3
	Good	143	70.4
	Neutral	29	14.3
Maintaining rules and regulations	Very strictly	42	20.7
	Strictly	143	70.4
	Neutral	18	8.9
Feeling accomplishment	Very good	3	1.5
	Good	68	33.5
	Neutral	132	65.0
Working place condition	Good	49	23.6
	Neutral	138	67.4
	Bad	16	8

Respondents' distribution according to their work place environment related characteristics can be noticed from Table 2. Among 203 respondents, 58.62% had monthly salaries between BDT 20,001 and BDT 30,000. In the case of facing problems to bear family and child education expenses, 39.4% respondents always faced problems, 54.7% were "only encouraged" to do better at work place, 54.2% said that there were monthly meeting for evaluation. In the case of working hours, 61% had 6 hours per day working hour, 70.4% had "Good" experience regarding resolving conflict, 70.4% had strict maintenance of rules and regulation in their organization, 33.5% had a good feeling of accomplishment in their work place followed by 23.6% having good working place.

Table 3: Opinion about job and career prospect related characteristics

Variable	Always	Often	Sometime	Rarely	Never
Get proper working plan from supervisor	125 61.6%	57 28.1%	17 8.4%	4 2%	0 0.0
Faces any problem during communication with community	0 0.0%	15 7.4%	103 50.7%	37 18.2%	48 23.6%
Work influenced by political issues	0 0.0%	0 0.0%	52 25.6%	4 2%	147 72.4%
Work influenced by religious issues	0	0	19	2	182

	0.0%	0.0%	9.4%	1%	89.7%
Participation in any decision making	1 0.5%	31 15.3%	96 47.3%	71 33.0%	4 2%
Preserving morale during work	100 49.3%	56 27.6%	42 20.7%	5 2.2%	0 0.0%
Training opportunity	4 2%	41 20.2%	99 48.8%	58 28.6	1 0.5%

Data are presented as n (%)

Among the respondents, 61.6% always received a proper working plan from their supervisor, 50.7% sometimes faced any problem during communication with community, 72.4% never had their work influenced by political issues, 89.7% never had their work influenced by religious issues, 47.3% sometimes participated in the decision making process, 49.3% always preserved moral during work and 48.8% sometimes had training opportunity (Table 3).

Table 4: Distribution of the respondent according to JSS scale with Mean and SD

Variable	Mean	Std. Deviation
Satisfied Items		
1. Job is enjoyable	4.41	0.649
2. Feels a sense of pride in doing this job.	4.41	0.540
3. Likes the supervisor	4.18	0.564
4. Job's security is very good	4.56	0.777
5. The respect that the community shows to the health assistants is satisfactory	4.13	0.956
6. Supervisor quite competent in doing his/her job	4.02	0.626
7.Sometime feels the job is meaningless	4.82	0.668
8. Likes the co-workers	4.12	0.710
Neutral Items		
9. Likes the things that are done at work.	3.94	0.742
10. Communication seems good within this organization	3.48	0.930
11. Supervisor shows interest in the feeling of subordinates.	3.99	0.692
12. Have enough time to do family work	3.30	0.930
13. The work is appreciated by the supervisor	3.85	0.825
14. There is no bickering and fighting at work	3.36	1.101
15. Duty can be done properly with the given training	3.48	1.026
16. Many rules and regulations make doing a good job to be difficult	3.56	0.832
17. Have to work hard due to incompetence of the co-workers	3.99	1.080
18. Supervisor is unfair	3.46	1.279
19. Not satisfied with all benefits that are provided by organization	3.09	1.189
20. The work is not risky	3.58	1.384
Dissatisfied Items		
21. Little chances for promotion	2.11	0.885
22. Efforts on work are not rewarded the way they should be	2.31	0.973
23. Does not have to do paper work.	2.90	1.262
24. Have to work too much.	2.02	0.786
25. Satisfied with the amount of salary increases yearly	2.11	1.070
26. Payment for work is fair	2.79	1.313
27. Those who do well on the job stand a fair chance of being promoted	2.02	0.786

Table 4 pictures the distribution of the respondents according to the JSS scale with Mean and SD. If a mean score of 3 is taken as the neutral point, the satisfying items were scored 4, that means the satisfying items were, job is enjoyable (M=4.41, SD=0.649), feels a sense of pride in doing this job (M=4.41, SD=0.540), likes the supervisor (M=4.18, SD = 0.564), security of the job is very good (M=4.56, SD=0.777), the respect that community shows to the health assistants is satisfactory (M=4.13, SD = 0.956), supervisor is quite competent in doing his/her job (M=4.02, M=0.626), sometime feels the job is meaningless (M=4.82, SD=0.668), likes the coworkers (M=4.12, SD=0.710). In contrast, the mean score below 3 denotes dissatisfied item, that means; little chance for promotion (M=2.11, SD=0.885), efforts on work are not rewarded the they should be (M=2.31,

SD=0.973), does not have to do paper work (M=2.90, SD=1.262), have to work too much (M=2.02, SD = 0.786), satisfied with the amount of salary increased (M=2.11, SD=1.070) were dissatisfied item. In this study 12 (9-20) items were neutral that means those questions mean score is 3. Of the 203 respondents, 65% were neutral, while 28% and 7% were satisfied and dissatisfied, respectively, with their job (Figure 1).

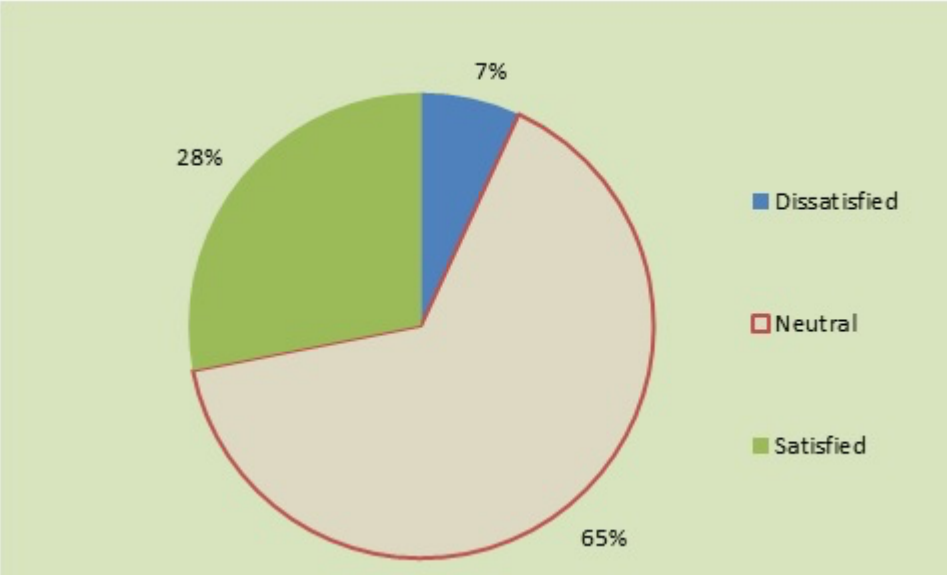

Figure 1: Distribution of study population according to the level of job satisfaction.

Table 5: Statistical relationship between job satisfaction level and family member, monthly salary, getting medical allowance, training opportunity and logistic support

Attributes	**Category**	**Job Satisfaction level**			**P Value**
		Dissatisfied	Neutral	Satisfied	0.049[a]
Get enough medical allowance	Yes	8	35	15	
	No	6	97	42	
Training opportunity	Often	8	28	9	0.006[a]
	Sometime	2	65	33	
	Rarely	4	39	15	
Get proper logistic support	Yes	14	112	51	0.540[a]
	No	10	20	6	
Family member	1-5	7	100	37	0.65[a]
	6-10	7	32	20	
Monthly salary (Mean)	23354.35	14	-	-	0.014[a]
	24221.03	-	132	-	
	23738.61	-	-	57	

a – Chi squared test was done
P value less than 0.05 was considered statistically significant

Job satisfaction level shows statistically significant ($p < 0.05$) relation with getting enough medical allowance, training opportunity, and monthly salary (Table 5).

4. Discussion

This cross-sectional study was conducted among purposively selected 203 health assistant in four selected Upazila Health Complexes in Dhaka district, namely Keraniganj, Nawabganj, Dohar and Sonargaon. The purpose of this study was to assess the level of work satisfaction of health assistants; therefore, this study focused on various aspects of work that may affect job satisfaction and dissatisfaction.

The current study participants had a monthly salary of between BDTK 10-40,000 and with the exception of 3.4%, almost all of them had more or less difficulty maintaining family and child expenses. Having too many

family members may be the reason for this result as statistics show that about 90% of the participants had more than 4 family members. On the other hand, most of the participants in the present study chose the neutral option as their opinion about the workplace situation and feeling successful. These inquiries are somewhat dubious because almost all of them get encouragement only after working 6-8 hours in addition to strictly maintaining the rules of the organization. Also, maximum participants took part in occasional decision-making and training opportunities. Although their entire work environment was free from political and religious influences, and all of them were getting proper direction about work from their supervisors. As the results are contradicted, therefore, a depth study is recommended to carry out to get a biased free result which could help the concerned authorities to pay more attention to health assistants' salary, fringe benefit, career prospect, and working condition-related factors.

In this study, it is found that almost 65%, 28% and 7 % of the participants were neutral, satisfied and dissatisfied with their job, respectively. These findings are in contrast to a previous study because that study presents a higher dissatisfaction percentage than a satisfaction percentage (Yami et al., 2011). The satisfied items of this study was " job is enjoyable, feel a sense of pride in doing this job, like the supervisor, job's security, the respect that community show to the health assistants, competency of supervisor, something feel that job is meaningless and supportive workers." Various researches have shown that with good and effective supervisor, the level of employee satisfaction was high (Raziq & Maulabakhsh, 2015). Moreover, having friendly and supportive coworkers may lead to increased job satisfaction (Robbins, 1993). Further, a top leadership author identified ten satisfactory items of work that are supported by the current research findings in this regard (Morgan, 2014). On the other hand, low and fair opportunities for promotion, low increment, low pay, no compliments, high workload and null administrative power were identified as unsatisfactory items in this study. Previous authors stated that remuneration, pay and promotion equity influences job satisfaction of an employee to a large extent (Li et al., 2014). Similarly, other studies reported that job dissatisfaction among health workers is primarily due to low wages. In addition, a research suggests that high workload create anxiety which leads to job dissatisfaction (Salma & Hasan, 2020). Praise for good performance from the company or supervisor is inversely related with job dissatisfaction (Robbins, 2003). Therefore, the policymakers and officials related to every aspect of health assistants' job should be aware of dissatisfaction factors and require to act to limit or lessen the factors arising or inducing job dissatisfaction among health assistants.

It is noticed in the running study that there is strong relationship between job satisfaction levels and getting medical allowance, training opportunity and monthly salary which is similar to a study findings conducted in China (Lu et al., 2016). In addition to these, Lu et al (2016) found a significant relationship between job satisfaction and logistic support and family member (Lu et al., 2016) which contradicts the current study findings. Therefore, a further depth study about the association between job satisfaction level and socio-demographic status and working environment are recommended to carry out.

5. Conclusion

Health assistants provide primary health care to the rural community people in Bangladesh. Their role in achieving the Health for All (HFA) agenda is significant because they act as the first person to provide health care to the rural population of Bangladesh. The entire health care could be questionable if they are not productive. Productivity is a subjective thing that depends on job satisfaction. This study found that the nature of the work, the acceptance of the job by the community and oneself, and the supportive supervisors and colleagues satisfied the health assistant. In contrast, salary and fringe benefits, work environment and career prospects were some of the factors that contributed to dissatisfaction with the work of health assistants, such as low and fair opportunities for promotion, low increment, and low pay, no praise, high work pressure, and null administrative capacity. This is expected that these findings would assist policymakers and concerned authorities revise the health policy and help to take appropriate steps to improve the job satisfaction of health assistants.

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Dental Health Care Influence on Dental Hygiene of Elementary School Children

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Abstract
Most of Indonesians suffer from dental caries. This is due to bad dental health maintenance. Although in fact, dental caries is a preventable disease. Dental and oral hygiene that is not maintained will cause various dental diseases that will affect general health, although it does not cause death directly, but is also a risk factor for other diseases including: tonsillitis, pharyngitis, otitis media, low birth weight (LBW) , and even heart disease. We undertook this research by evaluating the influence of dental health care towards elementary school children. The subjects are fifth grade in SD Saraswati 4 Denpasar, Indonesia. There are control and intervention groups in this research. The treatment for control group was given leaflet and intervention group was given dental health care with the provision of dental therapist. We evaluate the influence on knowledge, attitude, practice and Debris Index score. The analysis using bivariate test employed Wilcoxon test and univariate test employed Mann-Whitney test. The results show that in intervention group, there is influence of dental health care on knowledge, attitude, practice and Debris Index score of the students. Meanwhile in control group, there is influence on knowledge and attitude but no influence on practice and Debris Index score. Mann-Whitney test shows that there are significant differences in knowledge and attitude, but no significant practice and Debris Index score in intervention and control group. The Debris Index criteria of the intervention group are 100% good with the treatment of dental health care.

Keywords: Dental Health Care, Children, Debris Index, Dental Caries

1. Introduction

One of the components of general health is dental and oral health. Teeth are one of the digestive organs that play an important role in the process of chewing food, so maintaining dental health is important (Al-qahtani, et al. 2020; Ansari & Mahesar, 2017). Many people neglect to even pay attention to the cleanliness of their teeth and mouth, which causes the teeth to become dirty and cause dental and oral diseases. The most common dental disease suffered by almost all Indonesians is dental caries (Zita et al., 2020). According to WHO, dental caries is a pathological process that originates from the outside after the eruption of teeth which results in softening of the hard tissues of the teeth and continues to form a cavity. It is in fact a preventable disease. Dental caries and

periodontal disease are the most commonly suffered disease and are a major dental health problems because of their high prevalence and incidence in the world including Indonesia and their impact on individuals, society and the cost of treatment (World Health Organization (WHO), 2003; Benjamin, 2010).

Dental and oral hygiene that is not maintained will cause various dental diseases that will affect general health, although it does not cause death directly, but is also a risk factor for other diseases including: tonsillitis, pharyngitis, otitis media, low birth weight (LBW) , and even heart disease. Systemic diseases caused by untreated dental caries such as diabetes mellitus can manifest in the mouth. In addition, it will also interfere with the functions and activities in the mouth which will affect the nutritional status and impact on the quality of life. These conditions will have an impact on growth and development and will significantly impact lives of the children. Children who have poor oral health are twelve times more likely to suffer from missing school compared to those who have good oral health (Lewis, et al., 2000; Kwan, et al., 2005). Research conducted in 2010 on primary school students about dental and oral health care services in the Denpasar area showed that the prevalence of dental caries was 62.16%. The Decay, Missing, Filled Teeth (DMF-T) index averages 2.12, which is in line with the national target for 2010, but the evaluation results also show that the level of dental and oral hygiene of elementary school students with OHI-S is still low, because the average is 1.46, while the national target for 2010 is 1.2.

Most of the Indonesians brush their teeth in the morning and evening showers (76.6%). Meanwhile, proper tooth brushing is only 2.3%. The prevalence of brushing teeth at night before going to bed in children in Indonesia is 22.4% and in North Sulawesi is 32.4%. This habit occurs in groups of people who are vulnerable to dental and oral diseases, namely preschool children, elementary school children, expectant mothers, and the elderly. This is due to the lack of behavior in maintaining dental and oral health (Anil & Anand, 2017; Çolak, et al., 2013).

Dental health is a process using a systemic approach in dental health services. In its implementation, there are several aspects or key behaviors. These aspects form a comprehensive unit in the dental nursing process which is the framework for the delivery of quality dental health care services aimed at all clients and the community. The dental health care process which consists of assessment, dental nursing diagnoses, treatment planning, implementation and evaluation, is aimed at providing dental clinical services, which shows that a dental therapist is responsible for identifying and solving problems within the scope of practice of dental health care services (Prasad et al., 2019).

SD Saraswati 4 Denpasar or Saraswati 4 Elementary School Denpasar, is one of the private schools in Denpasar City. Based on interviews with teachers and students, the elementary school has never received counseling on dental and oral health and only received dental health checks by the Denpasar Selatan 3 Public Health Center, this is due to the limited staff available.

Our research aimed to understand the influence of dental health care towards oral hygiene status of the students in SD Saraswati 4 Denpasar, one of the elementary schools in the working area of Public Health Service III of South Denpasar, Indonesia.

2. Method

This research was performed in 2019. We conducted this research in Quasi-experiment with pre – test and post – test control group design. The groups are divided into two, i.e., intervention group and control group. The variables are knowledge, attitude, practice and Debris Index. Intervention group was given dental health care provision with the therapist. Meanwhile the control group was given leaflet on how to perform tooth brushing. After the treatments, the post – test was conducted to compare the influence of the treatments.

2.1 Participant

The population in this research is elementary school students in SD Saraswati 4, Denpasar grade V. The selection of fifth grade students as the research population is for the preparation of their future dental health. So it is expected that fifth grade students already have the knowledge and skills on how to maintain and prevent dental and oral

diseases. Class A is as intervention group with 38 students and class B with 37 students is as control group. The sample was chosen in purposive sampling.

The inclusion criteria were the students of fifth grade with average age of 10 – 12 and willing to follow every step of the research and signed the informed consent. Meanwhile the exclusion criteria were the students of fifth grade having no complete data (age, gender, score of practice and Debris Index).

2.2 Operational Definition

There are three variables used in this research. The independent variable is dental health care, the dependent variable is Debris Index score and the intervening variables are knowledge, attitude, and practice of dental hygiene.

2.3 Instruments

We performed this research qualitatively using questionnaire, diagnostic set, and examination sheet. The instruments are grouped into questionnaire with personal data such as name, age, address and gender. The questionnaire was used for measuring the score of knowledge, attitude and practice. The diagnostic test was used to examine Debris Index and it was recorded in examination sheet. We also gave tooth brushing kit to the respondents.

2.4 Implementation

In order to obtain the score of knowledge, attitude and Debris Index, pre – test was conducted to intervention and control group without any treatment. Afterwards, they were given different treatments, i.e. leaflet to control group, dental health care to intervention group. Then, the post – test was conducted to evaluate the changes from previous pre – test data. The Debris Index was also evaluated in the end of the research, i.e. in fourth week and it is compared to first week.

2.5 Data Processing and Analysis

The data was processed into narration and table which was processed using SPSS 25. The analysis employs univariate and bivariate analysis. Univariate analysis was conducted to provide a general description of the variables:, knowledge, attitudes, practice and debris Index of elementary school students is presented in the form of frequency distribution tables and percentages.

In the intervention group and the control group before analyzing the differences in knowledge, attitudes, practice, and debris index before and after the intervention, a normality test of the data was carried out first to determine the different test to be used. In the data normality test, because the data obtained are not normally distributed in the Kolmogorov Smirnov one sample statistical test, namely with a p value <0.05, the paired simple T-Test analysis is replaced with a non-parametric Wilcoxon Test.

Normality test was also done to evaluate the analysis test to use. The normality test was done to the difference of score of pre – test and post – test both in the control group and the intervention group. The results of the data normality test with the one sample Kolmogorov Smirnov test found that the data on the average difference in knowledge, attitude, practice and plaque index were not normally distributed, namely with $p < 0.05$, then the independent sample T-Test was replaced with the non-parametric Mann-Whitney Test.

3. Results

The sample selected was class V SD Saraswati 4 Denpasar with class 5A totaling 38 students as the intervention group and class 5B students totaling 37 students as the control group. Pre-test and post-test were administered to see the frequency and percentage of the intervention and control groups on the level of knowledge, attitudes and actions on dental hygiene. Pre-test is done before the treatment was undertaken. After that, the intervention group was given dental health care and the control group was given leaflets.

3.1 Frequency Distribution

The results of students' knowledge in maintaining oral and dental hygiene are shown in Table 1. The qualifications for knowledge, attitude and practice are defined as excellent criteria, namely if the score obtained is 80 - 100, good if the score obtained is 70 - 79, the criteria is fair if the score obtained is 60 - 69 and poor if the score obtained is less than 60.

Table 1: Distribution Based on Student Knowledge in Maintaining Dental and Oral Health in the Control and Intervention Group

Criteria	Control Group				Intervention Group			
	Pre-test		Post – test		Pre-test		Post – test	
	n	%	n	%	n	%	n	%
Excellent	24	64.9	26	70.3	8	21	27	71.1
Good	8	21.6	7	18.9	7	18	9	23.7
Fair	5	13.5	4	10.8	17	45	2	5.3
Poor	0	0	0	0	6	16	0	0
Total	37	100	37	100	38	100	38	100

Table 2 shows the measurement of students' attitudes in maintaining oral health in the control and intervention groups.

Table 2: Distribution Based on Student Attitude in Maintaining Dental and Oral Health in the Control and Intervention Group

Criteria	Control Group				Intervention Group			
	Pre-test		Post – test		Pre-test		Post – test	
	n	%	n	%	n	%	n	%
Excellent	32	86.5	35	94.6	25	65.8	36	94.7
Good	5	13.5	2	5.4	8	21.1	1	2.6
Fair	0	0	0	0	5	13.2	1	2.6
Poor	0	0	0	0	0	0	0	0
Total	37	100	37	100	38	100	38	100

Table 3 shows the measurement of students' practice in maintaining oral health in the control and intervention groups.

Table 3: Distribution Based on Student Practice in Maintaining Dental and Oral Health in the Control and Intervention Group

Criteria	Control Group				Intervention Group			
	Pre-test		Post – test		Pre-test		Post – test	
	n	%	n	%	n	%	n	%
Excellent	36	97.3	36	97.3	34	89.5	38	100
Good	1	2.7	1	2.7	4	10.5	0	0
Fair	0	0	0	0	0	0	0	0
Poor	0	0	0	0	0	0	0	0
Total	37	100	37	100	38	100	38	100

Table 4 shows the measurement of students' Debris Index in maintaining oral health in the control and intervention groups.

Table 4: Distribution Based on Debris Index Score in the Control and Intervention Group

Criteria	Control Group				Intervention Group			
	Week 1		Week 4		Week 1		Week 4	
	n	%	n	%	n	%	n	%
Good	0	0	0	0	0	0	38	100
Fair	11	29.7	12	32.4	36	94.7	0	0
Poor	26	70.3	25	67.6	2	5.3	0	0
Total	37	100	37	100	38	100	38	100

Debris Index in good criteria is when the value of examination is between 0 – 0.6, fair with 0.7 – 1.8 and poor if the score of examination is 1.9 – 3.0 (Wei & Lang, 1982). In the control group, most of results show poor criteria, while in intervention group, there is a change from week 1 in fair criteria to all good criteria (100%).

3.2. Bivariate Analysis

Before performing the bivariate analysis, the data normality test was carried out first. Based on data on knowledge, attitudes, practice and Debris Index.

Table 5: Normality Test of Bivariate Analysis

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest_knowledge_control	.176	37	.005	.918	37	.010
Posttest_ knowledge_control	.219	37	.000	.904	37	.004
Pretest_attitude_control	.176	37	.005	.912	37	.007
Posttest_ attitude_control	.188	37	.002	.893	37	.002
Pretest_practice_control	.439	37	.000	.464	37	.000
Posttest_ practice_control	.434	37	.000	.449	37	.000
Pretest_DI_control	.362	37	.000	.764	37	.000
Posttest_DI_control	.344	37	.000	.784	37	.000
Pretest_knowledge_intervention	.236	37	.000	.888	37	.001
Posttest_ knowledge_intervention	.282	37	.000	.847	37	.000
Pretest_attitude_intervention	.196	37	.001	.888	37	.001
Posttest_ attitude_intervention	.270	37	.000	.811	37	.000
Pretest_practice_intervention	.205	37	.000	.871	37	.000
Posttest_ practice_intervention	.469	37	.000	.533	37	.000
Pretest_DI_intervention	.355	37	.000	.707	37	.000
Posttest_DI_intervention	.534	37	.000	.307	37	.000

a. Lilliefors Significance Correction

The significance value of the Kolmogorov-Smirnov test showed an overall $p < 0.05$, so that based on the results of the Kolmogorov-Smirnov normality test, the data were not normally distributed. Then, the significance value of the Shapiro-Wilk test showed $p < 0.05$ so that based on the Shapiro-Wilk normality test, the data was not normally distributed.

Table 5 shows that the data were not normally distributed, so the Wilcoxon test was used. The analysis is used to see the increase in knowledge, attitudes, practice and the Debris Index. The second analysis is an analysis to determine the differences in the value of knowledge, attitudes, practice and the value of the Debris Index in the control group receiving leaflets and the intervention receiving dental health care using the Mann Whitney test because the data is not normally distributed.

Table 6: Wilcoxon Test Results

	Knowledge		Attitude		Practice		Debris Index	
	p-value	Interpre-tation	p-value	Interpre-tation	p-value	Interpre-tation	p-value	Interpretation
Intervention group	.014	There is influence	.000	There is influence	.000	There is influence	.000	There is influence
Control group	.014	There is influence	.017	There is influence	.334	No influence	.171	No influence

Table 6 shows the results of Wilcoxon test to knowledge, attitude, practice and Debris Index score. The results reveal that in the intervention group, the dental health care given has influence to knowledge, attitude, and practice of maintaining dental and oral health and also influence on Debris Index score. Meanwhile in the control group,

the leaflet only gives influence on knowledge and attitude of maintaining oral health, and no influence to practice also Debris Index score.

3.1 Univariate Analysis

The next analysis is to compare the difference between pre-test and post-test on knowledge, attitudes, practice and Debris Index. Before performing the univariate analysis, the data normality test was carried out first. The significance value of the Kolmogorov-Smirnov test showed an overall $p < 0.05$, so that based on the results of the Kolmogorov-Smirnov normality test, the data were not normally distributed. Then, the significance value of the Shapiro-Wilk test showed $p < 0.05$ so that based on the Shapiro-Wilk normality test, the data was not normally distributed. The results of the normality test showed that the data were not normally distributed, so the non-parametric Mann-Whitney Test was used. The analysis was used to compare the difference in the value of knowledge, attitudes, practice and Debris Index before and after treatment between the control group and the intervention group.

Table 7: Mann-Whitney Test Results

	Knowledge		Attitude		Practice		Debris Index	
	p-value	Interpretation	p-value	Interpretation	p-value	Interpretation	p-value	IInterpretation
Intervention group – control group	.000	There is a significant difference	.011	There is a significant difference	.202	No significant difference	.000	There is a significant difference

Table 7 shows the results of Mann-Whitney test in which the difference value of intervention group and control group on knowledge, attitude, practice and Debris Index shows various results. On knowledge, there is a significant difference with p – value 0.000. The same result is shown in attitude where the p – value is 0.011, so it concludes that there is a significant difference on attitude. Meanwhile in practice, there is no significant difference with p – value of 0.202 and in Debris Index, there is a significant difference shown by p – value of 0.000.

4. Discussion

The results of the Wilcoxon statistical test on the level of knowledge showed that in the control group, there is an effect of leaflets on knowledge of maintaining dental health. The same result occurred in the intervention group where there is an effect of dental health care on the level of knowledge with a p-value of 0.014. Taking a look at the results of the Mann-Whitney test, the difference in knowledge scores between the pre-test and post-test in the intervention group and the control group turns out that although they have the same effect, there is a significant difference in the difference in the knowledge value of the intervention and control groups. Dental health care has been proven to have an effect on the knowledge of school-age children (Saffan et al., 2017). However, basically dental health care, if it is only in the form of written information without any care action, it will only have a short-term effect (Igić, et al., 2008;Veiga, et al., 2015). The extension program should be carried out in accordance with an active learning process between the child and the dental therapist.

The role of a dental therapist or dentist is very important for children in preventing dental disease from an early age. This is because based on the results of research by Davidovi, et al., (2014) It was found that although children have excellent knowledge about dental health maintenance, the relationship between knowledge and practice may result in contradictory conclusions. Therefore, knowledge and control on the implementation of dental health must be carried out simultaneously. As in this study, it can be seen that although the knowledge value in the control group is in accordance with Table 1 in the pre-test and post-test, it is consistently in excellent criteria, namely 64.9% pre-test and 70.3% in post-test, and there is an effect of leaflets on knowledge that was proven by the Wilcoxon test which resulted in a p-value of 0.014, but on the results of the practice, it was seen that there is no effect of giving leaflets on changes in dental health maintenance practice in the control group. This is due to the fact that leaflets are one-way information and there is no active interaction between students and dental therapists, as was done in the intervention group. Meanwhile, in the intervention group, it implies that the intervention group

experienced an increase in the percentage of knowledge from fair criteria (45%) to excellent (71.1%). It is proven that in the intervention group, the Wilcoxon test results obtained a p value of 0.000 which means that there is an effect of dental health care on dental health maintenance actions in the intervention group. Assistance in maintaining dental health has proven to be effective under the supervision of doctors, teachers and peers. It is evident that the peer strategy is as effective as a dentist supervision strategy than the teacher and self-study strategy to improve dental hygiene behaviors (Haleem, et al., 2012). This research proves that mentoring for students by dental health personnel has a positive and effective impact on improving student behavior in improving dental and oral health. Meanwhile, in terms of peer strategy, this can produce effective outcomes if the peer also has the right dental health behavior. This can be done by providing assistance to students so that slowly other students will follow the behavior of maintaining dental health fully and consciously, because by seeing, listening and interacting, students will be able to respond to what they get and manifest it in practice or action (Apesteguia, Huck, Oechssler, Weidenholzer, & Weidenholzer, 2018). Research by Abullais, et al., (2020) and Ahamed et al., (2015) said that adherence was also influenced by gender where adherence to dental health maintenance of female participants was better than that of male participants.

Practice on dental health maintenance in the intervention and control groups experienced differences where in the intervention group, the provision of dental health care gives an effect on dental health maintenance practice with a p-value of 0.000 while in the control group, there is no effect on dental health maintenance practice even though leaflets were given to the control group. This is evidenced by the p-value of the control group of 0.171. Basically, the act of maintaining dental health is influenced by several factors, such as the habit of maintaining dental health at home with parents (Neupaul & Mahomed, 2020), age, access to public health services (Medina-Solís, et al., 2006; Afeef, et al., 2021) and social economy status (Elamin, et al., 2021).

Aspects of practice can be increased if the aspects of knowledge, attitudes and practice in children are in harmony. In addition, the effectiveness of dental health care can be increased if the dental health program is adapted to the needs of respondents, especially school children so that in practice it can last for a long time (Blaggana, et al., 2016). In addition, good knowledge and good attitudes towards dental health care do not always result in good actions or practices. This is evidenced by Sogi et al., (2016) that the average percentage of knowledge on dental health is 69.5%, and attitude is 53.5%. However, in practice only 33.5% have good dental health maintenance practices. In correlation to this study, although the control group had an effect on knowledge and attitudes towards the treatment of giving leaflets, there is no significant effect on the practice because the results in the practice according to table 3 had the same number so that the leaflet administration did not change the dental health maintenance practice. This can be motivated by the habit of brushing teeth before this research.

The final results on knowledge, attitudes and practice can ultimately be seen in the Debris Index value. If the maintenance of the teeth is good, then the resulting Debris Index is also in good criteria. The Debris Index in the intervention group has a p - value of 0.000 so that there is an effect of dental care on the Debris Index value, while in the control group, there is no effect, seen from the p - value 0.171. This is reinforced by the Mann-Whitney test where the difference in the pre-test and post-test scores on the Debris Index, namely in the first week and fourth week, has a significant difference with a p-value of 0.000. Dental health care is proven to have an impact on the effect of the Debris Index value where the intervention group was given dental health care experienced an increase in status to 100% good at the fourth week. While in the control group, none of them are in the good criteria, on the contrary in the control group, the Debris Index value in the fourth week remained on the poor criteria, namely 67.6% of students. This is of course seen from the treatment of the two groups where the control group only received leaflets while the intervention group received dental health care. This difference in treatment turned out to have a significant effect on the value of the Debris Index. This is evidenced by the Wilcoxon test which shows a p - value of 0.000 in the intervention group which means that there is an effect of dental health care on the Debris Index value, while in the control group, it has a p - value of 0.171 and means that there is no effect of leaflets on the Debris Index value.

5. Conclusion

We have undertaken a research of dental health care to elementary school students. It can be concluded that there is an effect of dental health care on improving Oral Hygiene of SD Saraswati 4 Denpasar. In addition, there are

differences in the level of knowledge about dental health before and after being given dental health care in the intervention group and leaflets in the control group with Wilcoxon test results p - value 0.014 both in the intervention and control groups. The same thing happened to the attitude of maintaining dental health where both leaflets and dental health care has an effect on the attitude of maintaining dental health as evidenced by the p-value in the intervention group of 0.000 and the control group 0.017.

Meanwhile, in dental health maintenance, only the intervention group with dental health care treatment has an effect on dental health maintenance with a p-value of 0.000 and in the control group there is no effect with a p-value of 0.171. The same conclusion occurred in the Debris Index where only the intervention group with dental health care has an effect on the change in the Debris Index from 97.4% to 100% entirely on the good criteria. While in the control group there is no effect on the value of the Debris Index where the status of the Debris Index in the control group remained at the criteria of less than 67.6%.

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Prevalence of Gastroenteritis Among Children Under Five Years of Age at a District Hospital

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Abstract
Introduction: Gastroenteritis is a devastating disease particularly in children less than five year of age globally. In 1825, for the first time the term gastroenteritis was used to describe this symptom. **Study design**: A hospital-based descriptive study conducted among children less than five years of age. **Setting**: District teaching Hospital. The study was conducted during one Month, from February to march, 2017. **Objectives**: To study Prevalence of Gastroenteritis disease among children under 5 years of age, identify the prevalence rate and other risk factors associated with the disease. **Material & Methods**: The sample of the population covered all children under 5 years admitted the hospital during the specified period. (n = 50 child).Data were collected using a scientifically constructed Questionnaire. Data was analyzed using the computer soft-ware program (SPSS). **Results**: The study revealed that gender distribution indicated that gastroenteritis was more prevalent in male children than in female children. Also the study revealed that gastroenteritis was higher among families who have lower income 150 SDG (66.0%) and there was relationship between the family income and gastroenteritis. **Conclusion:** The study concluded that gastroenteritis was more prevalent in male children than in female children. And also low socio economic status, and sanitation practices and low parental education leads to gastroenteritis (GE) among children less than five years of age admitted to Ibrahim Malik teaching hospital in Khartoum state. **Recommendations:** Study recommends that Ministry of Health should implement health education program and training for raising knowledge and awareness of gastroenteritis among mothers, the department of health should improve the quality of water to avoid water borne disease that leads to gastroenteritis.

Keywords: Gastroenteritis, Prevalence, Under Five

1. Introduction

Gastroenteritis is a devastating disease particularly in child less than five year of age globally. In 1825, for the first time the term gastroenteritis was used to describe this symptom. In medical language, gastroenteritis or stomach flu or gastric flu is an inflammation of the stomach and the small intestine. Centuries ago, at the time of Hippocrates, it was assumed that weaning and weather of infants were associated with gastroenteritis. It was

thought that both teething and hot climate contribute to the development of infantile gastroenteritis (Friesema, et al., 2012).

It has been reported that more than 1.1 billion children less than five years of age were more susceptible to this disease. Gastroenteritis infections annually result in 7.6 million deaths in South Asian countries including Pakistan and a number of the Eastern Mediterranean countries. From 2008 to 2015, one million deaths have been recorded (Alam, et al., 2015). Outbreaks of gastroenteritis primarily depends upon a variety of risk factors among children such as contaminated pond water which was used for washing, bathing, drinking and cooking purposes without boiling (Mukherjee,etal.,2012).The aim of this study was carried out to study the prevalence of gastroenteritis among children under five years of age in Ibrahim Malik teaching hospital at Khartoum state.

1.1 Problem statement

According to WHO, 527 000 children aged less than five years die each year's caused 25 million clinical cases, 2 million hospital admissions and annually worldwide in children, most of them occurred in developing countries children are among vulnerable groups to gastroenteritis and leading diarrheal disease and need great attention, and mothers are very important individuals to the children so that their role is very important and toward early prevention and rehabilitation of gastroenteritis so that this research has been studied the prevalence of gastroenteritis among children under years of age.

1.2 Justification

Gastroenteritis is also known as infectious diarrhea which is the second leading cause of death among infectious disease of children under five years of age. (Walker, et al, 2012). The cause of deaths may relate to disease severity, delay of treatment or immunodeficiency's.

1.3 Objective

1.3.1 General objectives

To study Prevalence of Gastroenteritis among children under 5 years of age at Ibrahim Malik Hospital.

1.3.2 Specific objective

- To identify the prevalence rate of gender relationship gastroenteritis disease occurred.
- To determine relationship between the family size and gastroenteritis.
- To determine the relationship between the education of mothers children and gastroenteritis.
- To determine the relationship between socioeconomic status of the family and Gastroenteritis.
- To determine the relationship between hygiene of mothers children and gastroenteritis.

1.4 Significance of the study

The significance of this study is present updating knowledge of mothers; Help to raise the awareness of the mothers about highly necessary recommendations regarding to gastroenteritis disease among the children under five years, as well as, this research will also be addition to the existing of knowledge on gastroenteritis.

Table 1: Distribution of study population according to mother's age and education level (N=50).

Mother's age		Frequency	Percent
Valid	> 20 years	6	12.00%
	20 -29 years	8	16.00%
	30- 39 years	26	52.00%
	< 40 years	10	20.00%
	Total	50	100.00%

Mother's education level		Frequency	Percent
Valid	Primary	10	20.00%
	Secondary	15	30.00%
	University	5	10.00%
	Post graduate	0	0.00%
	Illiterate	20	40.00%
	Total	50	100.00%

The above table (2) indicates majority of mother's age 26(52.0%) were found 30 up to 39 years old. While 10(20.0%) had above 40years old and 8(22.50%) had 20-29 years old.Majority of mother's educational level 20(40.0%) were illiterate. While15 (30.0%) were secondary, 10(20.0%) were primary and 5(10.0%) were university.

Table 3: Distribution of study population according to family's income and size (N=50).

Family's income		Frequency	Percent
Valid	> 150 SDG	33	66.00%
	150 - 200 SDG	14	28.00%
	200 - 300 SDG	3	6.00%
	< 300 SDG	0	.00%
	Total	50	100.00%
Family's size		Frequency	Percent
Valid	> 5 members	20	40.00%
	5 - 10 members	24	48.00%
	11-15 members	6	12.00%
	<15 members	0	.00%
	Total	50	100.00%

The above table (3) has shown the majority family daily income 33(66.0%) were less than150 SDG, while 14(28.0%) were 150-200 SDG and 3(6.00%) were 200 - 300 SDG.

Majority of family size 24(48.0%) were 5-10 members while 20(40.0%) were less than 5 members and 6(12.0%) were 11-15 members.

Table 4: Distribution of study population according to water source and equipment's used for drinking it (N=50).

Water source		Frequency	Percent
Valid	Pipe water	18	36.00%
	River	19	38.00%
	Well	7	14.00%
	Others	6	12.00%
	Total	50	100.00%
equipment's used for drinking water		Frequency	Percent
Valid	Barrels	19	38.00%
	Zeer	20	40.00%
	Jerry cans	11	22.00%
	Others	0	.00%
	Total	50	100.00%

The above table (4)the majority of study participants 19 (38.00%) were used river water. While 18(36.0%) were used pipe water and 7(14.0%) were used well. The majority of study participants (mothers) 20 (40.0%) were used (Zeer) for drinking water and storage. While 19(38.0%) were used barrels and 11(22.0%) were used jerry cans.

Table 5: Distribution of study population according to washing hands with soap and water after using toilet or before and after eating (N=50).

washing hands with soap and water after using toilet		Frequency	Percent
Valid	Yes	20	40.00%
	No	30	60.00%
	Total	50	100.00%
washing hands with soap and water before and after eating		Frequency	Percent
Valid	Yes	11	22.00%
	No	39	78.00%
	Total	50	100.00%

The above table (5) shows the majority of study participants 30(60.0%) were not used washing hands with soap after using toilet while 20(40.0%) were using washing hands with soap after using toilet.

The majority of study participants 39(78.0%) were not used washing hands with soap and water before and after eating while 11(22.0%) were used washing hands with soap and water before and after eating.

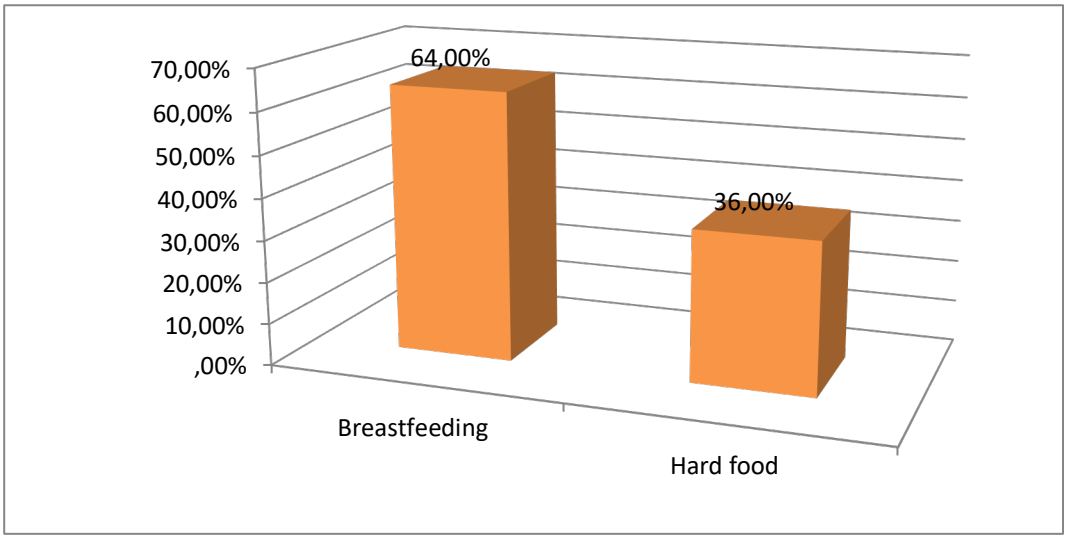

Figure 1: Distribution of study population according to type of feeding (N=50).

The above figure (1) have shown the majority of children 32 (64.0%) whose mothers were interviewed were breastfed their children while 18(36.0%) were not breastfed.

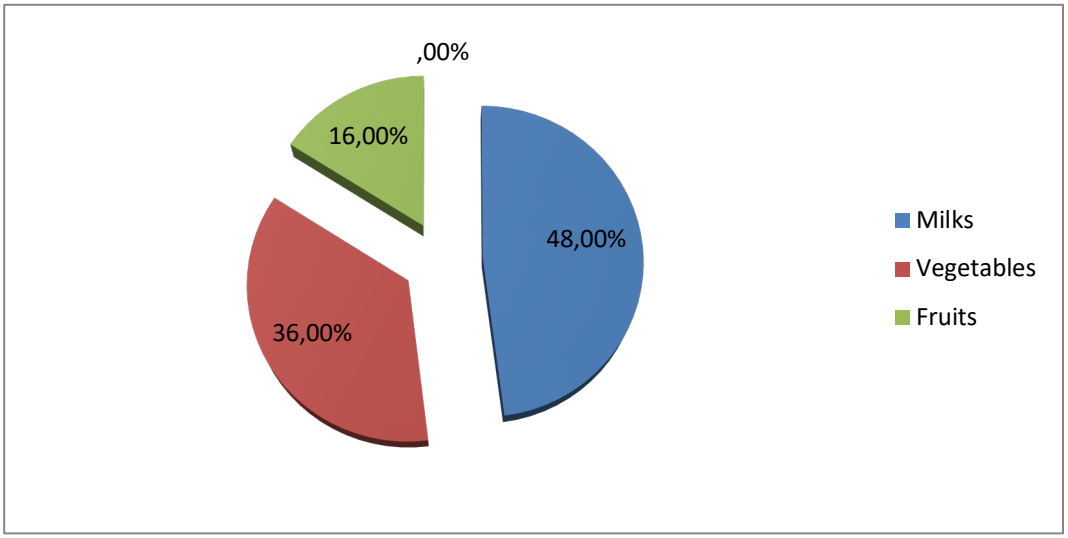

Figure 2: Distribution of study population according to type of food in weaning (N=50).

The above figure (2) shows the majority of mothers 24(48.0%) were given milk to their children while 18(36.0%) were given vegetables and 8(16.0%) were given fruit to their children.

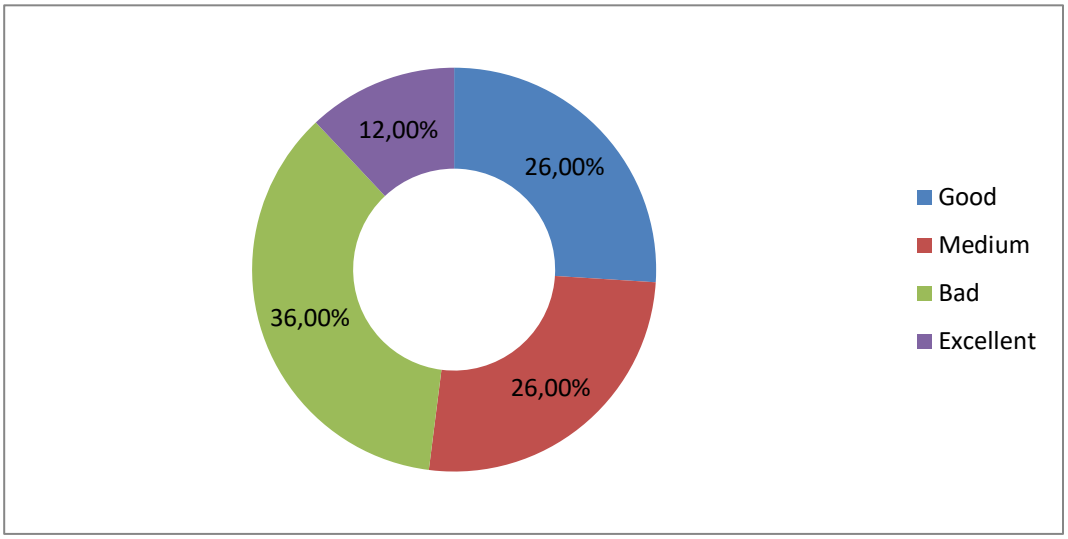

Figure 3: Distribution of study population according to level of personal hygiene of mothers (N=50).

The above figure (3) have shown the majority of mothers 18(36.0%) were bad according to level of their personal hygiene while 13(26.0%) were good according to level of their personal hygiene, 13(26.0%) were middle according to level of their personal hygiene and 6(12.0%) were excellent.

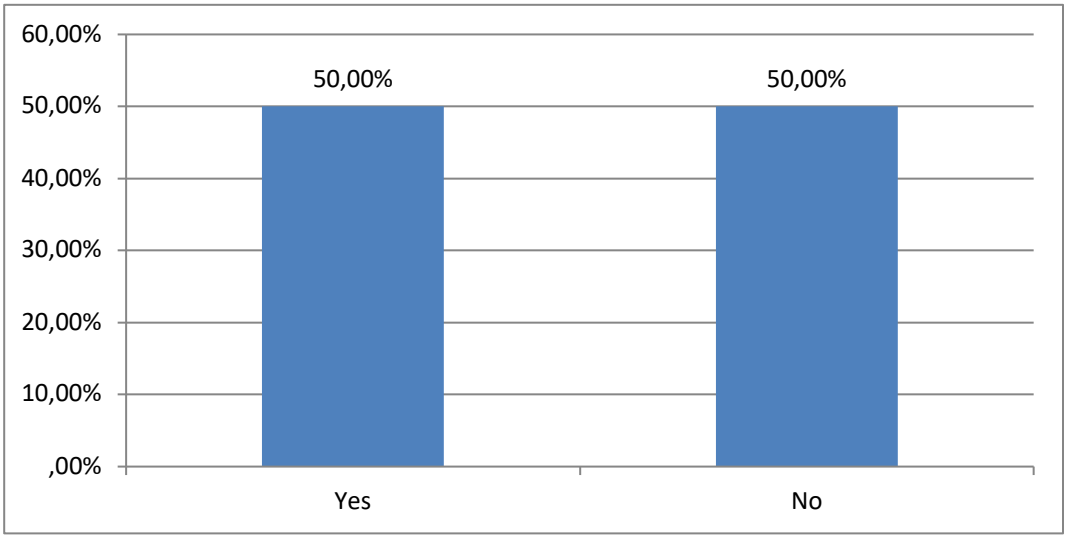

Figure 4: Distribution of study population according to mother's knowledge of personal hygiene (N=50).

The above figure (4) has shown the majority of mothers (50.0%) had knowledge of personal hygiene.

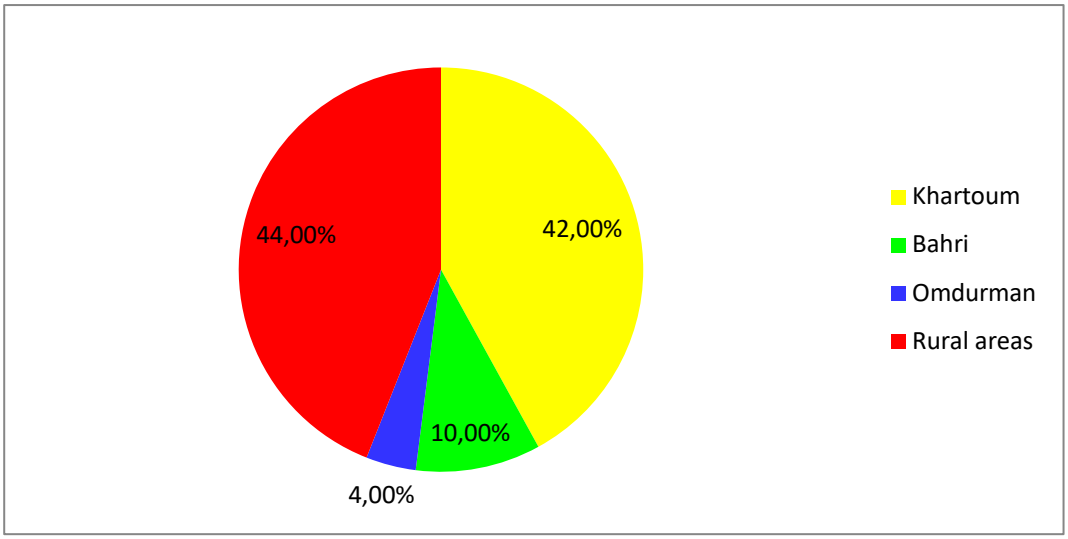

Figure 5: Distribution of study population according to family's place of residence (N=50).

The figure (5) shows the majority family's place of residence 22(44.0%) were rural areas while 21(42.0%) were Khartoum state and 7(14.0%) were Omdurman and Bahri.

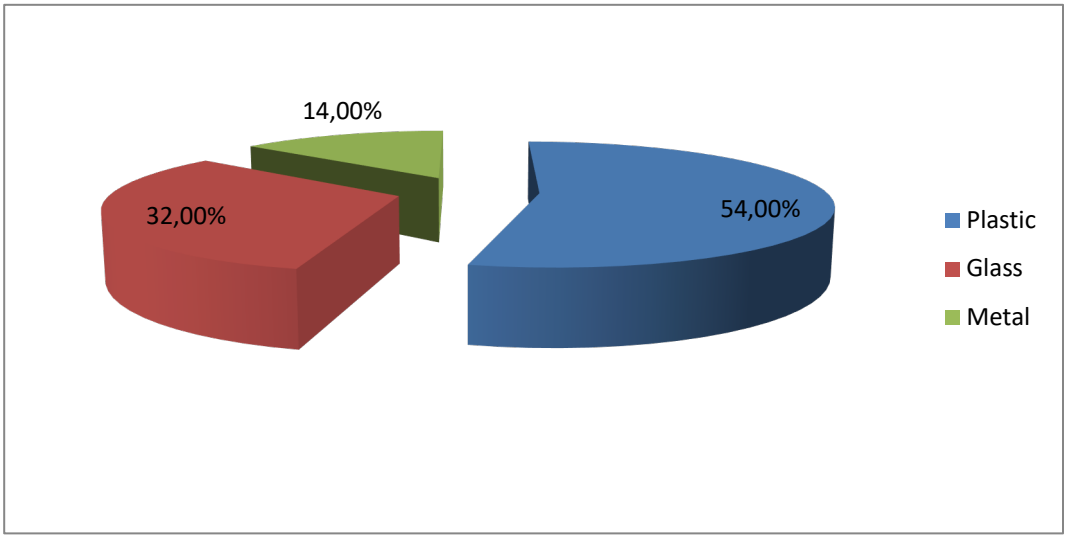

Figure 6: Distribution of study population according to containers of saving foods (N=50).

The above figure (6) have shown the majority of mothers 27(54.0%) were used plastic according to containers of saving foods while 16(32.0%) were used glass according to containers saving foods, 7(14.0%) were used metal.

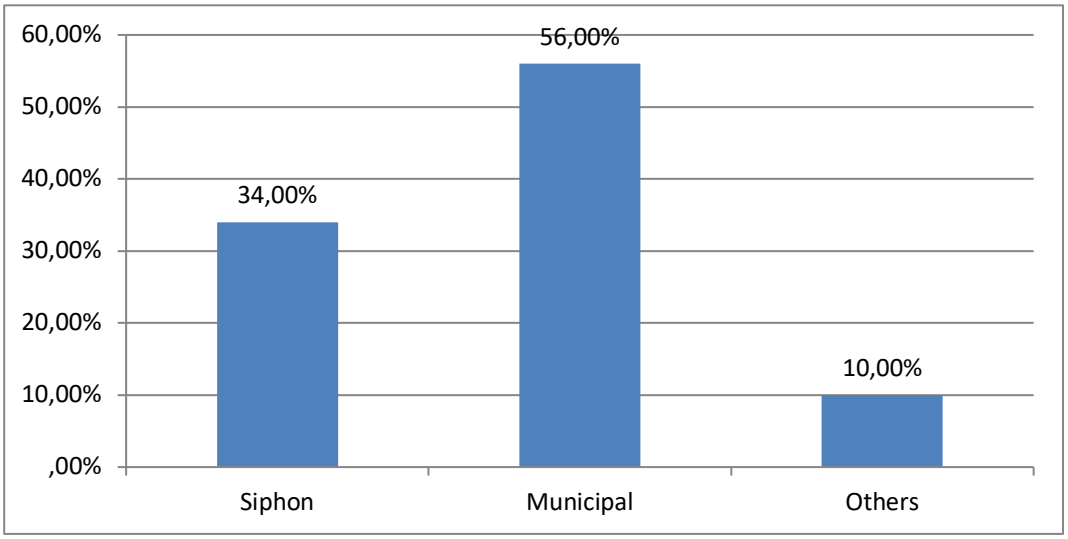

Figure 7: Distribution of study population according to Type of toilet (N=50).

The above figure (7) indicates the majority of family 26(56.0%) were used municipal according to the type of toilet while 17(34.0%) were used siphon and 5(10.0%) used others.

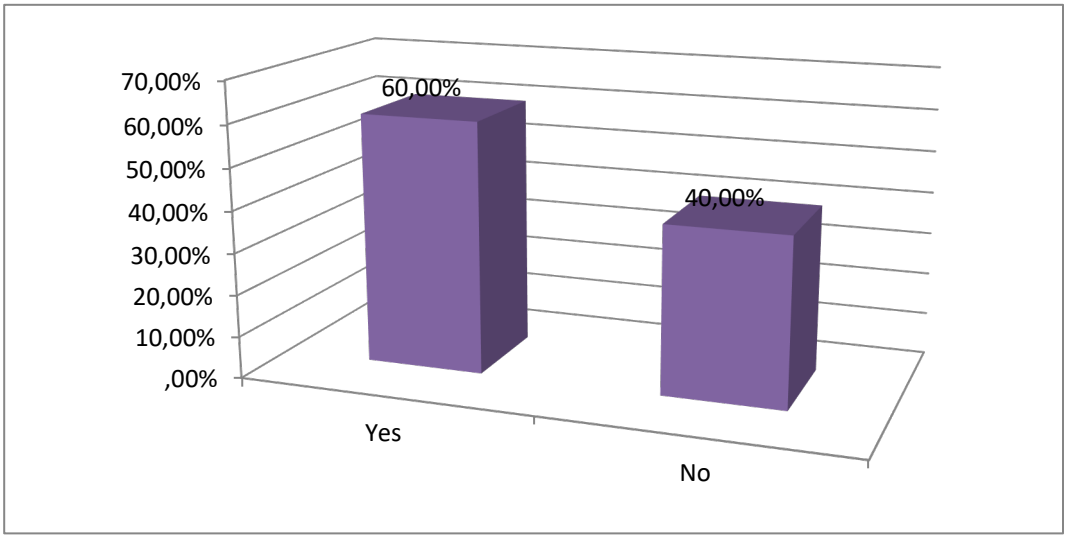

Figure 8: Distribution of study population according to attending child healthcare center (N=50).

The above figure (8) shows the majority of mothers' children 30(60.0%) were attended health centers with their children while 20(40.0%) were not attended health center with their children.

Discussion

Gastroenteritis is a major public health problem in children below the age of five it is one of the most common illnesses in humans worldwide. It is the second most common cause of death among children, and the leading cause of childhood deaths. Although it can affect individuals of any age, it presents a significant health risk to those at extremes of age, the very young children.

A total sample of this study was consisted of 50mothers who had brought their sick children less than five years of age with gastroenteritis admitted to Ibrahim Malik teaching hospital in Khartoum state. This study was carried out to achieve specific objectives through questionnaire, observation and interview the following findings were discussed:

The present study with demonstration of sample of the studied group the finding showed that the numbers of male children were 28(56.0%) and female children were 22(44.0%),the gender distribution indicated that gastroenteritis was more prevalent in male children than in female children. Revealed that a relation existed between gender and prevalence of gastroenteritis. These findings are similar to the findings from the study conducted in Morocco by (Benhafid et al, in 2009), where boys predominated among enrolled patients, compared with girls of hospital admissions. The study showed that 18(36.0%) were 11-24 months where more effected with gastroenteritis than the other age groups, These findings can be compared to the findings from the study conducted in (Maua Meru) North District, Kenya where most patients with gastroenteritis infection were of the age of 3 - 60 months, with 79% being less than 18 months old (Kiulia, 2006). The highest prevalence was observed in children aged between 1 and 2 years. In this study result indicated that gastroenteritis was higher among families who have lower income 33(66.0%) and there was relationship between the family income and gastroenteritis. This finding agreed (Khattak et al. 2007) reported that family income was less than Pakistani 5000/rupees per month in 60% children with gastroenteritis while 40% had income greater than 5000 rupees. And (Ahmed et al. (1995) conducted a study in Karachi and reported that in family income<2000 rupees per month was 36% chronic gastroenteritis patients and 24% acute gastroenteritis patients. This study illustrated gastroenteritis prevailed among children those mothers 20(40.0%) were illiterate or low educational level. Mansour et al. (2013) reported that 36% of the cases mothers were illiterate as reported in the present study. The study showed (36.0%) mothers children were poor hygiene, so that was associated with the prevalence of gastroenteritis. Also poor handling of drinking water was significantly associated with increased risk of childhood gastroenteritis.

The study revealed that lack of hand washing with soap after defecation and before food preparation was associated with the prevalence of gastroenteritis among children under five years of age.

Conclusion

The study concluded that gastroenteritis was more prevalent in male children than in female children. And also low socio economic status, and sanitation practices and low parental education leads to gastroenteritis (GE) among children less than five years of age. Mother's improper health care practices and knowledge regarding GE can increase the diarrheal complications. Gastroenteritis is a significant cause of morbidity amongst young children.

The study conducted at Ibrahim Malik teaching hospital in Khartoum state, revealed that prevalence of gastroenteritis among children under five years is still a problem in Sudan. This study has been concluded children11-24 months where more prevalent with gastroenteritis than the other age groups. Also concluded that water source was associated the prevalence of gastroenteritis among children under five years of age. Gastroenteritis is a common childhood illness, requiring a systematic approach to its assessment, management and prevention.

The study concluded that lack of hand washing with soap after defecation and before food preparation was associated the prevalence of gastroenteritis among children under five years of age. Also the study concluded children with poor hygiene was associated the prevalence of gastroenteritis.

Recommendations

The study recommended that the following activities to be carried out prevention or reducing the complication of the disease:

1. The federal Ministry of Health should implement health education program and Training of qualified the knowledge and awareness of gastroenteritis mothers children patient.
2. The federal ministry of health should improve the quality of water and treat before consumption on the community to avoid water borne disease that leads with gastroenteritis.
3. The Federal Ministry of Health Initiates strategies to demand compliance of protection the prevalence of gastroenteritis in children.
4. Since the problem of gastroenteritis is a widespread, the government in Sudan should overcome these problems by spreading guidance and practice in people about the phenomenon and by facilitating them with fundamental needs.
5. Wide research should conduct and policies should be made in order to eradicate the problem of gastroenteritis.
6. Mothers should carefully follow doctor's instructions to stay away improper medication use.
7. The government should be made major effort to contact patient who have a limited access to health care.

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Ischemic Stroke in a Young Adult Female Caused by Takayasu's Arteritis: A Case Report

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Abstract
Takayasu's arteritis is one of the causes of ischemic stroke at a young age, but the occurrence is still rarely reported in Indonesia. Here we report the case of a 19-year-old Indonesian female who was admitted to the Wahidin Sudirohusodo Hospital with a sudden onset of right-sided hemiplegia. Other features of Takayasu's arteritis were observed, including a discrepancy of more than 10 mmHg between the left and right arm systolic blood pressure, claudication of the extremities, and decreased brachial artery pulse. Left hemisphere cerebral infarction was confirmed on the computed tomography (CT) scan. Angiogram abnormalities were also present, showing occlusion of the left proximal inner carotid artery after branching at the aortic arch, and occlusion of the left subclavian artery. Although no fever was observed on presentation, the patient had an elevated erythrocyte sedimentation rate (ESR) of 44 mm/hour. In conclusion, Takayasu's arteritis should be considered as a potential cause of ischemic stroke in young adults.

Keywords: Takayasu, Arteritis, Young Female, Stroke

1. Introduction

Takayasu's arteritis is an idiopathic, granulomatous arteritis that mainly involves the aorta, branches of the main arteries and (more rarely) the pulmonary arteries. It is also known as pulseless disease, aortic arch syndrome, idiopathic or stenosing aortitis, aortoarteritis, and occlusive thromboartropathy (Da Cruz et al., 2014). The condition was first described by Mikito Takayasu in 1905, when he presented the case of a visually-impaired, young female patient with peculiar changes in her central retinal vessels. Minora Nakajima was the first person to propose the name "Takayasu Disease" in 1921 when he reported several patients with symptoms resembling those described in the Takayasu report. In 1990, the American College of Rheumatology published diagnostic

criteria (ARA criteria) for the disease and since then, the name "Takayasu Arteritis" began to be accepted around the world (Espinoza et al., 2018).

Takayasu's arteritis is rare, but has been found in various parts of the world with relatively similar incidents, ranging from 0.4 to 2.6 cases per million population. It is mostly found in women, and the highest prevalence rate is in Japan (40 cases per million population), whereas in other countries it ranges from 4.7 to 8.0 per million population (de Souza & de Carvalho, 2014). And whilst the age on onset can range from infancy to middle age, references have stated the highest incidence to be in the third decade, while some report a peak incidence of 15-19 years in female patients. Despite its rarity, Takayasu's arteritis is the most common large vessel vasculitis in children with a mortality rate as high as 35% (Hwang et al., 2012).

Takayasu's arteritis may present with various neurological manifestations including headaches (50-70%), syncope (4-19%), dizziness / vertigo (24-55%), visual disturbances (15-35%) and strokes (3-22%) (Chang & Hsieh, 2015). Although cerebral ischemia is not a common complication of Takayasu's arteritis, it can cause damaging neurological symptoms and is a major cause of unwanted events and early death (Maffei et al., 2006). During the progressive phase where there is fibrosis and thickening of the arterial walls, cerebrovascular abnormalities such as transient ischemic attacks and strokes can occur in about 10% to 20% of cases. However, stroke as an initial description of Takayasu's arteritis is rarely reported in the literature (Setty et al., 2017).

2. Case Presentation

A 19 year old female was brought to the emergency department of Dr. Wahidin Sudirohusodo Hospital in Makassar, Indonesia with a chief complaint of right typical hemiplegia, with a sudden onset of 3 hours. Prior to the onset, she initially felt weakness in the left arm which improved spontaneously, followed by syncope for approximately 5 minutes. After regaining consciousness, she was unable to move her right extremity. There was no history of headache, fever, head trauma, hypertension, diabetes mellitus and heart disease. Upon measurement of the vital signs we found a difference between the blood pressure of the right arm (110/70 mmHg) and the left arm (70/40 mmHg). The right radial pulse was 86 times/minute while the left pulse felt weak on palpation. The patient had a normal respiratory frequency of 20 times per minute, and a normal temperature of 36.6° Celsius.

On the neurologic exam, the patient was fully conscious with a GCS score of E4M6V5. No meningeal signs were found. There was central paresis of the right 7^{th} and 12^{th} nerve. On motoric examination, there was a lack of movement, and a decrease of muscle tone and physiologic reflex in the right extremities. Muscle strength assessment of the right hand and leg yielded a score of zero. The Babinsky's sign was positive on the right lower extremity. There was right hipesthesia, while the autonomic nervous system was not disturbed.

On the Head computed tomography (CT) scan (Figure 1), a cerebral infarction was found in the left cerebral hemisphere around the basal ganglia accompanied with minimal edema. The MSCTA examination (Figure 2) and cerebral angiography (Figure 3) of the head and neck showed occlusion in the proximal segment of the common carotid artery after the branching of the aortic arch, and occlusion in the proximal subclavian artery, and within the collateral of the V2 segment of the vertebral artery to the subclavian artery.

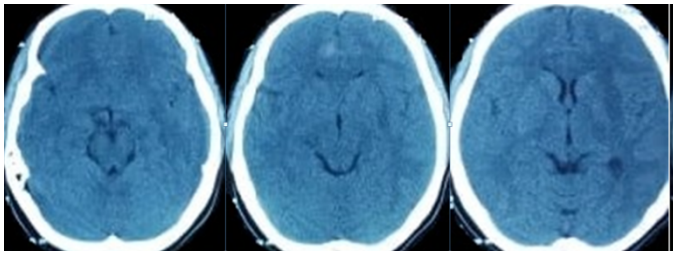

Figure 1: Head computed tomography (CT) scan results show hypodensity in the left cerebral hemisphere including the basal ganglia, internal capsule, external capsule, and frontal lobe.

The chest x-ray examination showed normal results. Echocardiographic examination showed good left and right ventricular systolic function, with an ejection fraction of 67.6%. Routine blood test showed a leukocyte count of

9200 / uL, erythrocyte count of 4.66 x 10^6 / uL, hemoglobin 11.8 mg/dL, platelet count of 400,000 mg / dl, sodium 141 mmol / L, potassium 3.7 mmol / L, chloride 108 mmol / l L, CRP 0.1 mg / l, GDS 88 mg / dl, urea 7 mg / dl, creatinine 0.73 mg / dl, prothrombin time (PT) of 10.5 seconds, INR 1.01, activated partial thromboplastin time (aPTT) of 26.2 seconds, HBsAg non reactive, anti HCV non reactive, lupus erythematosus (LE) cells are negative. An elevated erythrocyte sedimentation rate (ESR) was observed, with an ESR hour I of 44 mm, and ESR hour II of = 61 mm.

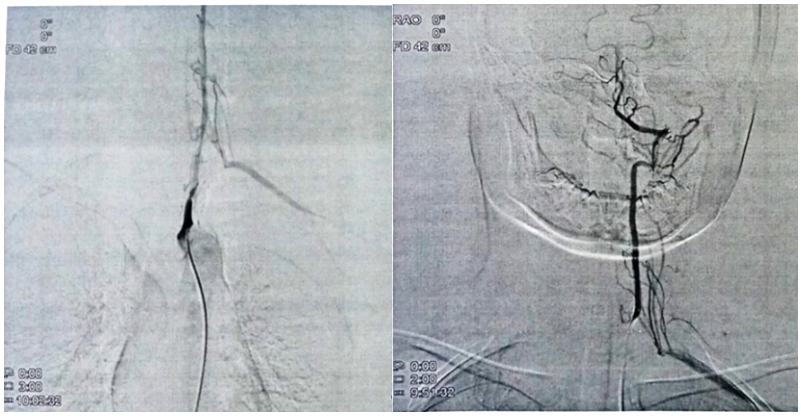

Figure 2: Multi-slice computed tomography (MSCT) angiography. Results show occlusion of the left proximal inner carotid artery after branching at the aortic arch, and occlusion of the left subclavian artery.

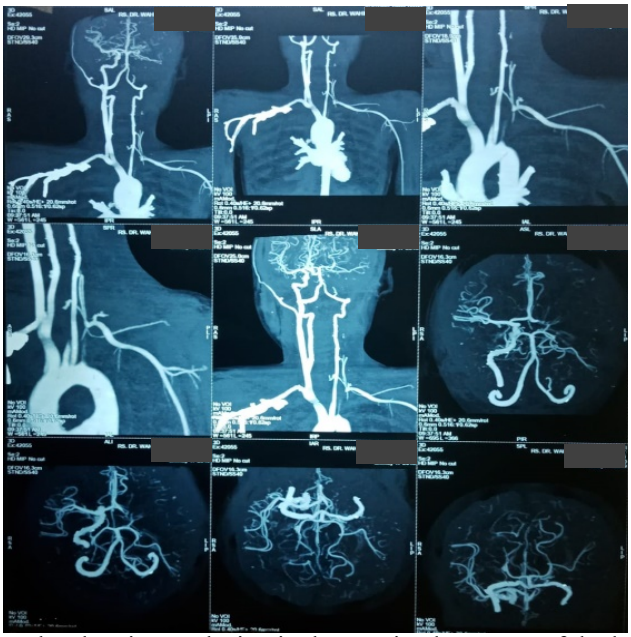

Figure 3: Cerebral angiography showing occlusion in the proximal segment of the left common carotid artery, and occlusion of the left subclavian artery. Collateral from the V2 segment of the vertebral artery to the subclavian artery can be visualized distal from the occlusion.

The patient was treated with antiplatelets and methyl-prednisolone, and was also given physical rehabilitation. After approximately 2 weeks of therapy, the patient showed slight clinical improvement in the form of increased hand motor strength. Until now the patient is still under our supervision.

3. Discussion

Takayasu's arteritis is a chronic, granulomatous, large blood vessel vasculitis, which mainly involves the aorta, its main branches or pulmonary arteries (de Souza & de Carvalho, 2014). In 1990, the American College of Rheumatology (ACR) published the six diagnostic criteria for Takayasu's arteritis, which requires a minimum of

three criterias to establish diagnosis of the condition. The ACR classification has a sensitivity of 90.5% and a specificity of 97.8% (Maffei et al., 2006). In this patient, we found 5 out of the 6 ACR criterias. First is an age of onset less than 40 years of age, wherein the patient was diagnosed at 19 years of age. Other criteria found include the presence of claudication of the extremities, decreased brachial artery pulse, a systolic blood pressure difference of > 10 mmHg between the two upper extremities, and abnormalities on arteriograms. Based on said findings, the patient was diagnosed with Takayasu's arteritis.

Although the ACR diagnostic criteria are simple and easy to use, it does not describe other clinical symptoms that may be considered for clinical diagnoses such as fever, arthralgia, weight loss, hypertension, increased erythrocyte sedimentation rate (ESR) and anemia. Therefore, in 1995 Sharma et al. modified the Ishikawa criteria by removing age and the presence of typical symptoms and signs of less than 1 month. The presence of two major criterias or one major and two minor criterias, or four minor criterias indicates a high likelihood of Takayasu's arteritis (Setty et al., 2017). In this patient, two major criterias were identified, namely lesions in the left mid-subclavian artery, typical signs and symptoms in the form of claudication of the extremities, differences in pulse and blood pressure > 10 mmHg in the arm, and one minor criterion namely left middle carotid artery lesions. Based on this, it is most likely that this patient has Takayasu's arteritis.

The etiology of Takayasu's arteritis is still unknown. Similarly, the exact pathogenesis of this disease also cannot be determined. Infection, autoimmune and genetic factors have been studied as risk factors for this disease. This disease is also associated with viral infections that may trigger vasculitis because the vascular lesions found are the same as those found in infected animals. Genetic factors that play a role in the pathogenesis of Takayasu's arteritis are mainly associated with the Human Leukocyte Antigen (HLA) complex. In Japan a clear relationship was established between arteritis and the HLA-B52 and -B39 alleles, while in Mexico and Colombia the incidence of Takayasu's arteritis was higher among carriers of the HLA-DRB1*13:01 allele and HLA-DRB1*16:02 alleles (Setty et al., 2017). Immunological mechanisms involved in the pathogenesis of Takayasu's arteritis involve cell-mediated immunity and humoral immunity that leads to inflammation and tissue damage. Dendritic cells in the tunica adventisia expresses specific HLA molecules that are activated by unknown stimuli, the activation of which may be affected by the 65kDa HSP expression in aortic tissue. These cells synthesize and release pro-inflammatory cytokines (such as IL-18) and chemokines that result in T cells recruitment in blood vessel walls and initiate a deviant T-cell response. Degenerative changes in the tunica media and adventisia, as well as intimal fibrocellular hyperplasia, eventually cause muscle weakness, aneurysm formation, vascular stenosis and thrombus formation (Da Cruz et al., 2014).

Clinically there are three different phases of Takayasu's arthritis. In the first phase, patients typically exhibit symptoms of non-specific inflammation, such as fever without a clear etiology. In the second phase, inflammation of the large blood vessel mural begins, causing carotidynia felt in the form of neck pain, sometimes accompanied by regional pain in the thoracic and dorsal regions. The third phase (advanced phase) is characterized by a decrease or absence of pulses and/or differing arterial pressure between the upper limbs, arterial bruit and intermittent claudication of the extremities (Keser et al., 2018). In this patient there were no signs of fever or carotidynia, but the patient presented with an acute onset of right-sided hemiplegia as a result of the advanced progression of the arteritis and its secondary impact. Although the exact etiology of ischemic stroke in Takayasu's arteritis remains unclear, it is speculated that a decrease in cerebral blood flow from occlusive lesions, stenosis of the aortic arch and its main branches, and accompanying heart disease such as aortic regurgitation may play a role in a number of stroke patients. Intracranial stenosis as a consequence of vasculitis involvement, or previous embolization to the blood vessels has also been hypothesized (Chang & Hsieh, 2015).

Diagnosis and monitoring of Takaysu's arteritis can be performed through blood vessel imaging. Angiography is the gold standard for evaluating vascular lesions. Digital Substraction Angiography (DSA) is a method that is not only useful for diagnosis but also to assess the level and localization of vascular involvement in Takayasu's arteritis, detect stenosis, occlusion or arterial aneurysms in the large and medium blood vessels. However, DSA can only visualize the lumen, but not the vessel wall. It is also an invasive method that poses a risk of radiation exposure, so it is not routinely used in clinical practice (Da Cruz et al., 2014). At present, some experts prefer to use Magnetic Resonance Angiography (MRA) or Computerized Tomography Angiography (CTA) to establish the diagnosis of Takayasu's arteritis. CTA can provide anatomical characteristics of structural aortic changes, but

cannot detect early-stage disease. Although MRA can show thickening and edema of the vascular wall, its correlation with clinical activity and systemic inflammation is poor and shows limitations in long-term follow-up. Color Doppler ultrasonography (CDU) is an alternative imaging modality that can help evaluate the temporal, carotid, axillary and femoral arteries. However, although CDU is inexpensive and non-invasive but it is operator-dependent and does not determine disease activity. In recent years the use of positron emission tomography (PET) with 18F-fluorodeoxyglucose (18F-FDG PET) for the diagnosis of Takayasu's arteritis has a sensitivity and specificity of up to 100% and can also detect subclinical activity, but this examination is expensive and places the patient at risk of radiation exposure (Keser et al., 2018).

Based on angiographic findings, Takayasu's arteritis is classified into five types. In Type 1, involvement is limited to the branches of the aortic arch, whilst Type 2a involves the ascending aorta, aortic arch and its main branch. Type 2b is the same as Type 2a with the additional involvement of the descending thoracic aorta. Type 3 involves the thoracic descending aorta, the abdominal aorta, and / or the renal artery. Type 4 involves the abdominal aorta and / or renal artery. Whereas type 5 is a combination of types 2b and 4 (Maffei et al., 2006). Based on the results of angiography, our patient was classified as Type 1 Takayasu arteritis.

The therapeutic aim in Takayasu's arteritis is to control acute inflammation and minimize arterial injury. Early initiation of immunosuppressive therapy is crucial to prevent further vascular complications and induce remission. Prednisolone is first-line therapy, and EULAR (European League Against Rheumatism) guidelines recommend a dose of 1 mg / kg of body weight / day for 1-3 months (maximum dose of 60 mg / day) with gradual tapering (Maffei et al., 2006). However, since only a portion of patients respond to corticosteroids, other therapeutic options include cytotoxic treatment such as cyclophosphamide (1-2 mg / kg / day), azathioprine (1-2 mg / kg / day) or methotrexate (0.3 mg / kg / day) kg / week). Vascular surgery, with either endovascular or open approaches, is predominantly used in the presence of life-threatening aneurysm or in severe organ ischemia (Mason, 2018). It is recommended to perform surgery during remission to avoid complications that may arise from inflammation, such as re-stenosis, anastomosis failure, thrombosis, bleeding and infection (Setty et al., 2017). Percutaneous transluminal angioplasty with ballooning and stenting has long been used in Takayasu's arteritis, with several studies indicating balloon angioplasty as the more efficacious option (Jeong et al., 2017). And although it provides short-term benefits, re-stenosis and aneurysm formation can occur within 1 or 2 years, thus justifying a bypass surgery (Da Cruz et al., 2014).

4. Conclusion

Takayasu's arteritis is one of the causes of ischemic stroke at a young age. Although neurological manifestations often occur after the chronic phase, acute stroke as an initial manifestation of the disease is rarely reported. Appropriate diagnosis and effective and adequate treatment can reduce patient mortality and morbidity.

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Ethics Statement

Informed consent was obtained from this patient for the publication of the report

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Does Spending More on Healthcare Yields Higher Life Expectancy? A Case Study on Gulf Cooperation Council Countries

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Abstract
This study aims to evaluate the nexus between economic factors and life expectancy in Gulf Cooperation Council (GCC) countries. Using the data of 115 countries for the year 2019, results revealed that only healthcare expenditure (HE) per capita showed statistically significant direct relation with life expectancy while GDP per capita and percentage of country GDP allocated to healthcare sector did not show any statistically significant effect. Based on panel OLS regression model used in this research, results showed that with the amount of money GCC countries spend on their healthcare systems, four out of the six GCC countries had a life expectancy that was lower than the estimated life expectancy by 3.28 years indicating inefficiency in their healthcare systems. The output also indicates that even though economic factors have an effect on life expectancy to a certain point, other factors such as the quality of the healthcare system staff, education, corruption, pollution, and other non-economic factors also affect life expectancy.

Keywords: Gulf Cooperation Council (GCC), Life Expectancy, Healthcare Expenditure (HE), Panel OLS Regression, Healthcare System Efficiency

Introduction

The health status of the population has always been associated with economic growth and prosperity of any nation. Novignon et al. (2012) showed that population poor health status has significant negative influence on economic growth. Life expectancy is widely used as an indicator of the health status of the population and the overall development of a country. Ngangue and Manfred (2015) used the data of 141 countries over the period 2000-2013 and concluded that the improvement in life expectancy showed positive affect on economic growth. Life expectancy is not only influenced by economic factors but it is also influenced by other factors such as environmental and social factors as concluded by Lleras-Muney and Sherry (2008) and Boachie and Ramu (2016). This research focuses on the effect of the economic factors on life expectancy in GCC countries. The GCC is a

council that is made of 6 oil-rich countries (Kuwait, Bahrain, Saudi Arabia, Qatar, Oman, and United Arab Emirates) that was formed in 1981. These countries pay huge amounts of attention to their healthcare systems and back them up with the financial support they need. The question of this research is whether or not that financial support is spent efficiently and does it really increases life expectancy in these countries.

Previous literature showed conflicted results when it came to the effect of HE per capita on life expectancy, for example Jaba et al. (2014) using the data of 175 countries found positive association between life expectancy and HE per capita. Deshpande et al. (2014) showed mixed results when studying the data of 181 countries where they did not find any significant correlation between HE per capita and life expectancy in developing countries, but that relation did exist in developed countries. While on the other hand, Kaufmann et al. (2003) did not find any statistical validations that considerably increase in investments in healthcare have any significant influence on the indicators of population health and life expectancy.

While many researchers associate healthcare expenditure as a percentage of country GDP with HE per capita, that relation tends to be weak. Countries that allocate large portion of their GDP to their healthcare sector but have large population sizes and low GDP would most likely have lower HE per capita than a country with large GDP and small population size. Healthcare expenditure as a percentage of GDP, might not give a clear picture regarding the amount of money paid to that sector but it gives an indication to the amount of attention the government pays to its healthcare sector. Linden and Ray (2017) examined the effect of healthcare expenditure as a percentage of GDP on life expectancy for 34 OECD countries over the period 1970 to 2012 and concluded that a direct relation exists between them does exist. Mahumud et al. (2013) analyzed data from Bangladesh during the period 1995 to 2011 and found that healthcare expenditure as a percentage of GDP had a statistically significant direct relation with life expectancy.

High income individuals can afford getting better healthcare services and thus would be expected to live longer than lower income people. It has been observed that there is a strong direct relationship between the level of income, measured by GDP per capita, and life expectancy among the poor countries (World Bank, 1993). Chetty et al. (2016) used U.S. data over the period 2001 to 2014 to examine the relation between income and life expectancy and found that income was positively correlated with greater life expectancy. On the other hand, Rogers (1979) provided a conceptual framework of the relationship between income and life expectancy and concluded that life expectancy rises at a declining rate as income grows. Wilkinson (1996) set a threshold income level of $5000-$10000 where the direct relation between income and life expectancy does exist below the threshold but fades above it. Sen (1999) questioned the validity of that relation where he found that the Indian state of Kerala has achieved impressively high life expectancy despite its low per capita income.

Methodology

This research is set to examine the effect of economic factors which are GDP per capita, HE per capita and HE as a percentage of GDP on life expectancy. In examining this relation OLS regression is used as shown in equation 1;

$$Life\ Exp = \alpha + \beta_1 GDP\ Per\ Capita + \beta_2 HE\ Per\ Capita + \beta_3 \%GDP + \varepsilon \quad (1)$$

Data and Empirical Results

Results of this research are based on a panel data of 115 countries for the year 2019, where the countries in the sample are shown in table 1. The data of this research were obtained from World Bank web site.

Table 1: Sample Countries

Kuwait	Cuba	Tunisia	Mozambique	Singapore
Argentina	Cyprus	Iraq	Malaysia	El Salvador
Armenia	Czech Rep.	Iceland	Nigeria	Serbia
Australia	Germany	Israel	Nicaragua	Slovak Rep.

Austria	Denmark	Italy	Netherlands	Slovenia
Azerbaijan	Algeria	Jamaica	Norway	Sweden
Belgium	Ecuador	Jordan	Nepal	Seychelles
Bangladesh	Egypt	Japan	New Zealand	Chad
Bulgaria	Spain	Kazakhstan	Oman	Thailand
Bahrain	Estonia	Kenya	Pakistan	Tajikistan
Bahamas	Finland	Korea, Rep.	Peru	Turkmenistan
Bosnia and Herzegovina	United Kingdom	United Arab Emirates	Philippines	Iran, Islamic Rep.
Bolivia	France	Lebanon	Poland	Turkey
Brazil	Fiji	Sri Lanka	Portugal	Tanzania
Brunei	Georgia	Lithuania	Paraguay	Uganda
Bhutan	Ghana	Luxembourg	Qatar	Ukraine
Canada	Greece	Latvia	Romania	Uruguay
Switzerland	Honduras	Morocco	Russian Fed.	United States
Chile	Croatia	Mexico	Rwanda	Uzbekistan
China	Hungary	Mali	South Asia	Vietnam
Cameroon	Indonesia	Malta	Saudi Arabia	South Africa
Colombia	India	Montenegro	Sudan	Zambia
Costa Rica	Ireland	Mongolia	Senegal	Zimbabwe

Descriptive analysis is presented in table 2, where it can be seen that average life expectancy for the countries under study was 75.18 years with standard error of ±0.60 years. The mean GDP per capita was $19314.13 and those countries spend on average %6.73 of their GDP on their healthcare systems. It can also be seen that both Kurtosis and skewness were within the acceptable normal distribution range of ±10 and ± 3 respectively.

Table 2: Descriptive Analysis

	Life Exp	*GDP Per Capita*	*HE Per Capita*	*% GDP*
Mean	75.18	19314.13	2061.60	6.73
Standard Error	0.60	2075.30	190.21	0.24
Median	76.16	9126.56	1336.53	6.69
Kurtosis	0.99	2.71	2.16	0.66
Skewness	-1.03	1.64	1.44	0.52
Minimum	54.24	441.51	79.01	1.60
Maximum	84.36	114685.17	10623.85	16.89
Count	115	115	115	115

A comparison between the factors means for the countries under study and GCC countries is presented in table 3. It can be seen from the table that five GCC countries had a life expectancy that was above the mean of the sample except for Saudi Arabia that was below even though Saudi Arabia had a higher GDP per capita and HE per capita than the mean of the sample. GCC countries are major players in the global oil and natural gas markets and for that it can be seen that their GDP per capita is higher than the mean of the sample countries except for Oman since it does not export much oil as the rest of the GCC countries. When it comes to HE per capita, it can be seen that both Bahrain and Oman fell below the sample average. Even though the percentage of GDP allocated to the healthcare sector does not give a clear picture of the actual amount of money spend on the healthcare sector, it sheds some light on the importance of that sector to the government. Governments that gives high priority to their healthcare sector would usually allocate higher percentage of their budget to that sector. Oman had the highest percentage of their GDP allocated to their healthcare sector among the GCC countries and was the only one that was above the sample average.

Table 3: Mean Comparison

	Life Exp	*GDP Per Capita*	*HE Per Capita*	*% GDP*
Sample Mean	75.18	19314.13	2061.60	6.73
United Arab Emirates	77.97	43103.32	3172.61	4.23
Bahrain	77.29	23503.98	1955.35	4.13
Kuwait	75.49	32000.45	3669.02	5.00
Oman	77.86	15343.06	1729.54	9.21
Qatar	80.23	62088.06	3165.86	6.65
Saudi Arabia	75.13	23139.80	3519.91	6.36

The OLS regression results are presented in table 4, where it can be seen that the model showed an adjusted R square of 0.721 indicating that the economic variables used in this research were able to explain 72.1% of the variation in life expectancy while the remaining 27.9% are related to other factors such as education, technological advancement, pollution, and other factors. The model can also be labeled as a "Good Fit" since the *F-sig* was almost 0. The results showed that only HE per capita had a statistically significant direct effect on life expectancy which supports Jaba et al. (2014) findings. While Chetty et al. (2016) found significant direct relation between GDP per capita and life expectancy, results from this research contradicts their findings and support Sen (1999) findings especially since all GCC countries had a GDP per capita that exceeds the threshold of $10000 set by Wilkinson (1996). The results also opposes Mahumud et al. (2013) and Linden and Ray (2017) findings that percentage of GDP allocated to the healthcare sector significantly affects life expectancy.

Table 4: OLS Regression Output

Regression Statistics				
Multiple R	0.854		*F*	*Significance F*
R Square	0.729		99.348	2.64E-31
Adjusted R Square	0.721			
Standard Error	0.048			
Observations	115			
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	3.864	0.032	119.880	0.000
GDP Per Capita	-0.002	0.013	-0.141	0.888
HE Per Capita	0.067	0.016	4.320	0.000
% GDP	-0.064	0.233	-0.274	0.784

By plotting the coefficients generates from the OLS regression in equation 1, the forecasted life expectancy can be estimated using equation 2 as follows;

$$\widehat{Life\ Exp} = 3.863 + (-0.002 * GDP\ Per\ Capita) + (0.067 * HE\ Per\ Capita) + (-0.064 * \%GDP) \quad (2)$$

Where $\widehat{Life\ Exp}$ is the estimated life expectancy based on the economic inputs for each country. By looking at table 5, it can be seen that United Arab Emirates, Bahrain, Kuwait, and Saudi Arabia should have a higher life expectancy based on their economic factors and the amount of money they spend on their healthcare systems. Based on the personal income and the amount of money Saudi government spend on its healthcare system, the estimated life expectancy in Saudi Arabia should be 80.58 years but the actual life expectancy is 75.13 years meaning that the money allocated to the healthcare sector is not utilized efficiently. The same thing can be said about Kuwait where there was a 5.34 years difference between the average life expectancy and projected life expectancy. Despite having the lowest GDP per capita and HE per capita, Oman showed life expectancy that was higher than the forecasted one indicating efficiency in their healthcare system compared to other GCC countries.

Table 5: Projected Life Expectancy

	Forecasted Life Exp	Life Expectancy	Difference	% Difference
United Arab Emirates	80.04	77.97	-2.07	-2.65%
Bahrain	77.58	77.29	-0.28	-0.37%
Kuwait	80.83	75.49	-5.34	-7.07%
Oman	76.75	77.86	1.11	1.43%
Qatar	79.85	80.23	0.37	0.47%
Saudi Arabia	80.58	75.13	-5.44	-7.25%

Conclusion

This research was set to examine the effect of economic factors on life expectancy and estimate what life expectancy should be in GCC countries. Using panel data of 115 countries for the year 2019, results revealed that HE per capita was the only factor that had a statistically significant direct relation with life expectancy. Using the economic factors examined in this research to estimate what life expectancy should be in GCC countries, results showed that four out of the six GCC countries had a life expectancy that was lower than the projected one indicating that the healthcare sectors in these four countries are not fully utilizing the resources provided to them by their governments.

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