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EDITORIAL NOTE

Dear Authors / Researchers / Readers,

Welcome to the 6th Edition of Manipal Alumni Science & Health (MASH) Journal.

Manipal Alumni Association of Malaysia (MAAM) is publishing the 6th Edition of 'Manipal Alumni Science & Health (MASH) Journal since its launch in 2014 by the then Minister of Health, Malaysia, Y.B. Datuk Seri Dr S Subramaniam.

MASH Journal focuses and publishes case reports, original research work, review articles etc. from different disciplines of medicine, health and science. This is published as an open access journal to provide access to wider audience with common interest on science and health issues and challenges. The main goal of MASH Journal is to publish high quality peer-reviewed scientific papers in the field of science and health and serve as a forum for diverse viewpoints on major scientific, health issues and policies. I would like to encourage authors to present their thoughts without any hesitation in order to push for new and innovative ideas in solving current various challenges. This way we can ensure that this journal is accepted and respected as a reputable academic journal with impact to influence the practice of science and medicine in Malaysia and the region.

The motto behind the journal is to help students, researchers and scientist worldwide to benefit from the high quality peer reviewed articles and to their high performing works in the entire arena of science and health. I do hope that more Researchers, Clinicians, Students and Scientists will consider sending their articles to the Manipal Alumni Science & Health Journal. We hope you enjoy this edition and best wishes to everyone from all of us in the Editorial team.

I would like to thank all authors, reviewers and editors for their continuous support to this Journal.

Regards

Associate Professor Dr Mohammad Nazmul Hasan Maziz
Chief Editor



CASE REPORT

Dermatofibrosarcoma Protuberans With Fibrosarcomatous Transformation: A Case Report & An Overview

Eyrique G¹, Riham H¹ and Arrazeen H¹

Key Words: Fibrosarcomatous, Dermatofibrosarcoma Protuberans, DFSP, FS-DFSP, High Recurrence

ABSTRACT

Dermatofibrosarcoma protuberans (DFSP) is a rare soft tissue sarcoma of the skin characterized by plaque like tumor derived from mesenchymal cell. Fibrosarcomatous transformation of DFSP (FS-DFSP) is an even rarer variant of which it is clinically indistinguishable from other DFSP variant - diagnosed by histopathological characteristics. As it is known to be more aggressive with higher risk of distant metastases, treatment should be carefully planned followed by strict post-op follow ups.

This is a case of a 57 years old man with a slow growing large tumor on his forearm following a minor trauma 10 years ago, presented to our institution for further management due sudden rapid enlargement and discomfort. The result of the lesion sent for histopathological examination is diagnosed as FS-DFSP without distant metastases (from a full body CT scan). On 3rd month of follow up, neither recurrence nor symptoms of distant metastases has been observed.

In conclusion DFSP needs a histopathological examination to distinguish its variant. This is important as FS-DFSP has higher risk of recurrence and metastasis. There are options of technique to ensure complete surgical resection of tumor. In cases of metastases and unresectable tumor, radiotherapy and pharmacological treatment is to be considered. In our case, there is no signs of recurrent or distant metastases. However, long -term follow up is strictly recommended.

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INTRODUCTION

Dermatofibrosarcoma Protuberans (DFSP) is a rare soft tissue sarcoma characterized by plaque like tumor derived from mesenchymal cell. It involves the dermis, subcutaneous fat, but rarely the fascia and muscle. It is a slow growing tumor, a low to intermediate grade malignant sarcoma and frequently occurs at middle aged adults. Studies have shown DFSP demonstrating chromosomal translocation t(17;22) (q22;q13) resulting in fusion of collagen type 1 (*COL1A1*) with platelet-derived growth factor beta (*PDGFB*) to be the pathogenesis¹. Fibrosarcomatous transformation of DFSP (FS-DFSP), a variant of DFSP likely to metastasis compared to other variant.² Lesions of more than 10 cm have also shown significant risk of metastasis.² Due to its metastatic risk, proper evaluation, thorough radiological assessment and histopathological findings are crucial in order to deliver appropriate treatment.

In this case, the patient with a gradual enlarging tumor over his left forearm for the past 10 years, started as a painless growth after a foreign body removal procedure. The tumor grew up to 16 x 11.5 cm during review by our institution. Wide Local Excision (WLE) was done without any skin reconstruction – to be healed by secondary intention. Histopathological findings show a FS-DFSP. Patient was reviewed post WLE to look for sign of recurrence 3 monthly in which the operation wound have scarred and healed. This case did not show any signs of recurrence till date.

CASE REPORT

A 57 years old gentleman came with a gradually enlarging growth on his left forearm for the past 10 years. Initially, he had a foreign body removal surgery over the forearm. The wound healed but followed by a painless skin growth which gradually increased in size over the years. He was not keen for surgery and kept the lesion without any intervention as years follows. Then he decided to consult for treatment as the lesion caused discomfort during movement of his limb with recurrent contact bleeds which was worsening as the lesion continues to grow. There was no family history of malignancy. MRI findings shows a soft tissue growth originating within the subcutaneous plane without muscular infiltration or intraarticular extension. CT Thoracic Abdomen and Pelvic revealed absence of metastasis. Once the margin and extension we proceeded with a Wide Local Excision over his left arm with a margin of 3-5cm at least from the tumor and depth about 5mm. Intraoperatively the mass attaches to the fascial layer of volar forearm with feeding vessels from brachial artery. The lesion histopathological sample reported as diffuse DFSP cell lesion involving epidermis, dermis and subcutis layer with a separate hypercellular lesion of herring-bone pattern, increased mitotic activity, collagen deposition and myxoid changes which is consistent with FS-DFSP. During our follow up after WLE, we offered patient for split skin grafting (SSG) for early wound, but patient refused, the wound healed with secondary intention.

DISCUSSION

Pathogenesis

Pathogenesis of DFSP through cytogenetic and molecular studies shows chromosomal translocation t(17;22) (q22;q13) resulting in fusion of collagen type 1 alpha 1 (*COL1A1*) and platelet-derived growth factor beta (*PDGFB*)^{1,3}. Fusion of the genes were the initiating factors of tumorigenesis. In the initial stage, patients typically notice a slow-growing, small, firm, painless skin-colored dermal plaque. The tumor commonly affects the trunk, proximal extremities and least commonly involving head and neck⁴.

Variants of DFSP

There are few variants of DFSP which can be diagnosed via histopathology, to avoid misdiagnosis. The variant according to its histopathological findings are Bednar tumors (pigmented) melanin rich dendritic cell, myxoid, giant cell (Juvenile) seen in childhood and adolescent, atrophic, sclerosing, granular cell and FS-DFSP.

FS-DFSP characterized by its aggressive fibrosarcomatous transformation which likely to spread further than local region and metastasis. Hayakawa et al. reported higher cases of metastasis in FS-DFSP compared to ordinary DFSP. There are also reports of significant metastatic risk in cases where the tumor diameter larger than 10 cm².

Diagnosis

DFSP can be diagnosed clinically, radiologically and with histopathology. Histopathological studies show an atypical spindle cell with increased mitotic activity arranged in herringbone pattern.⁵ Immunohistochemical staining useful in diagnosing, CD34 are commonly positive.⁶ Tumor with fascicular and herringbone pattern are features of FS-DFSP.

Ultrasound may help to show hypoechoic and hyperechoic superficial soft tissue masses.⁷ Computed tomography (CT) may have limited role in assessing lesion signal. Magnetic resonance imaging (MRI) may delineate tumor size and extension to adjacent neuromuscular structures and bone. MRI is the ideal in most cases of musculoskeletal neoplasms, in DFSP it may shows void or lobulated circumscribed subcutaneous nodules.⁷ It is important for preoperative evaluation to decide operative approach. CT thorax maybe needed in cases where distant metastasis suspected due to its hematogenous spread to the lungs.

Management

Mainstay treatment for DFSP according to *National Comprehensive Cancer Network* (NCCN) is complete local surgical resection of the tumor. There are 2 ways to achieve this goal which is either a Wide Local Excision (WLE) or Mohs Micrographic Surgery (MMS)⁷. MMS allows a complete margin assessment and tissue preservation. For WLE, a three-dimensional excision including normal skin, subcutaneous tissue and underlying fascia with 2-4 cm margins from gross tumor borders⁷. For deep margin, excision suggested at the level of investing fascia to archive a negative margin⁷. Paradisi et al. have reported, lower recurrence rates in patient subjected to MMS compared with those treated with WLE⁸.

Alternative treatments options include radiotherapy and chemotherapy in cases of metastasis or in unresectable lesion. Chemotherapy agent Imatinib Mesylate competitively inhibit ATP binding to the PGDF receptor which slows down the growth of the tumor and promote apoptosis. Chunmeng Wang et al. reported Imatinib Mesylate gave 95.5% clinical benefit overall for metastatic and unresectable DFSP.⁹ This study demonstrated similar response of metastatic and unresectable DFSP towards Imatinib Mesylate.⁹

As local recurrence is common, close clinical follow-up after completing treatment are recommended. Risk of recurrence are highest during first 3 years post treatment. Thus, patient should be evaluated every 3-6 monthly during this period. Serial CT thorax is not required unless symptoms of metastasis suspected.



Figure 1: Lobulated fungating, cauliflower mass, firm to hard lesion 16.0 x 11.5 cm in proximal forearm which is fixed to the skin but from underlying deep structure.

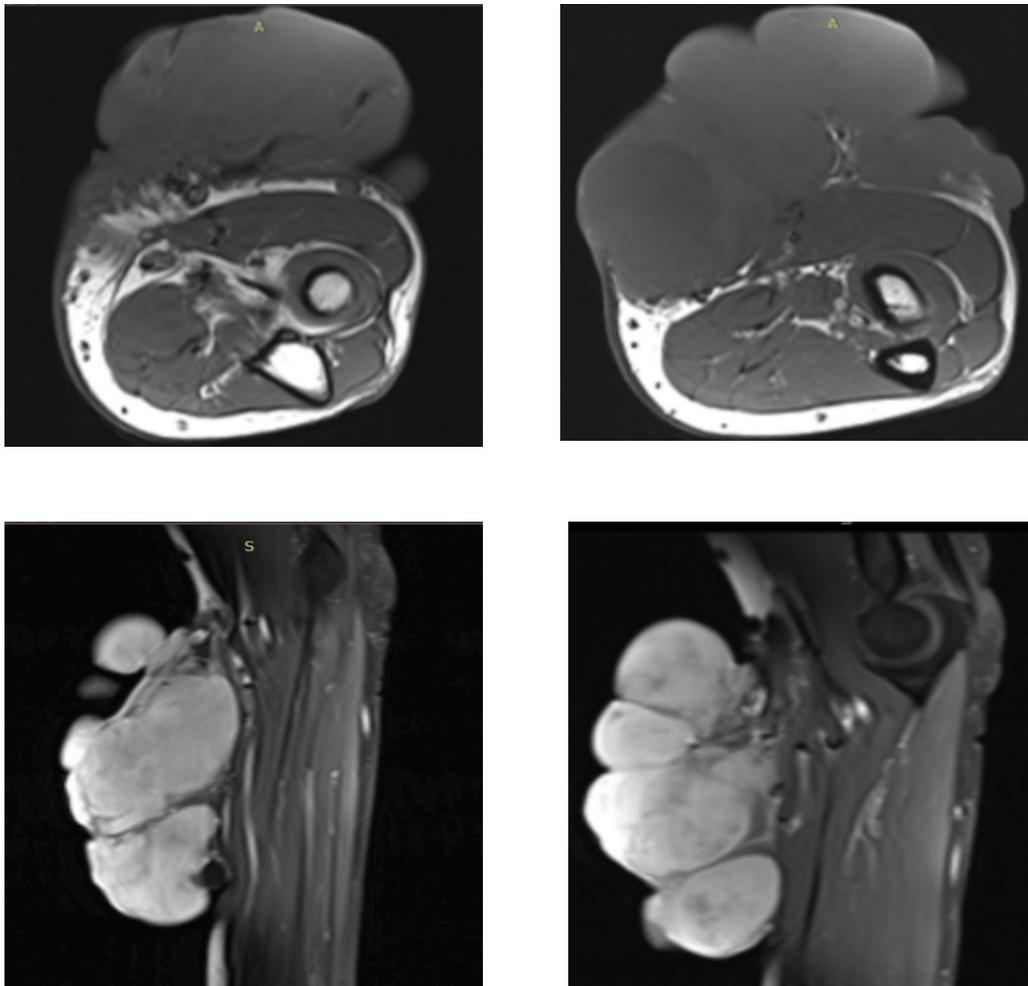


Figure 2: MRI findings show soft tissue sarcoma mainly located within subcutaneous region with no evidence of muscle infiltration or intraarticular extension

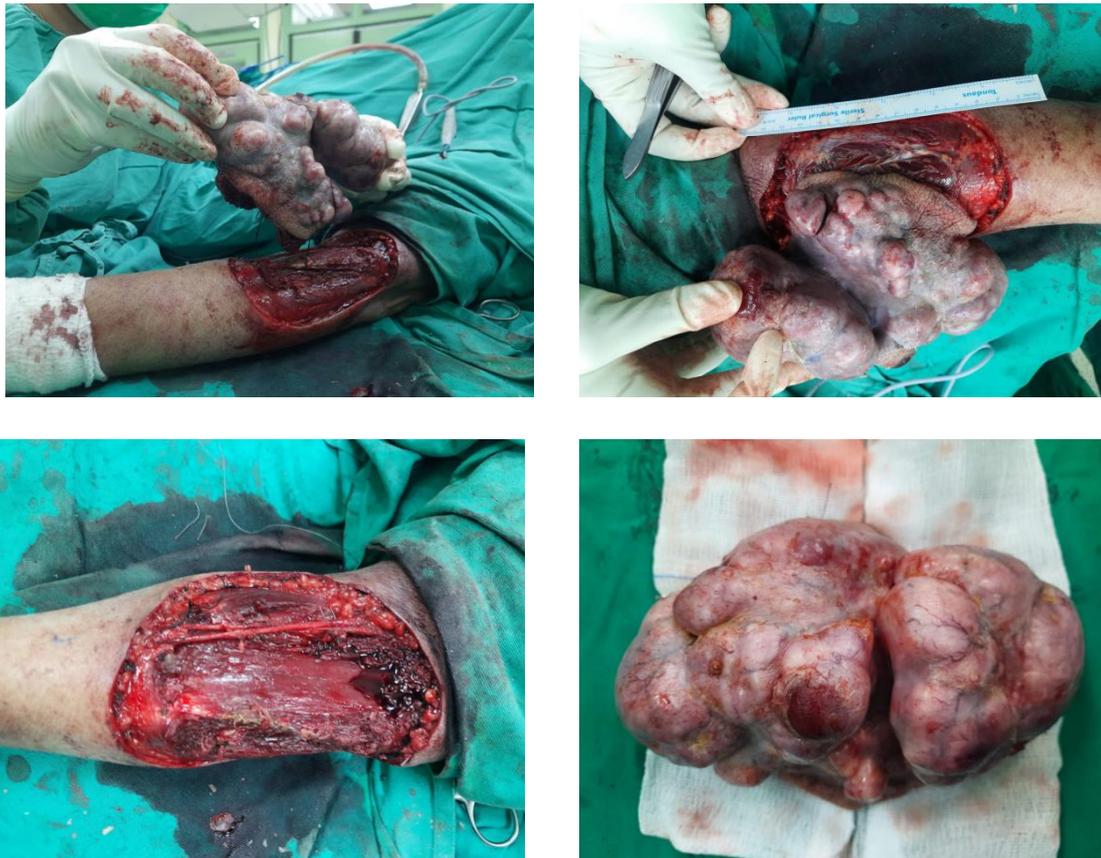
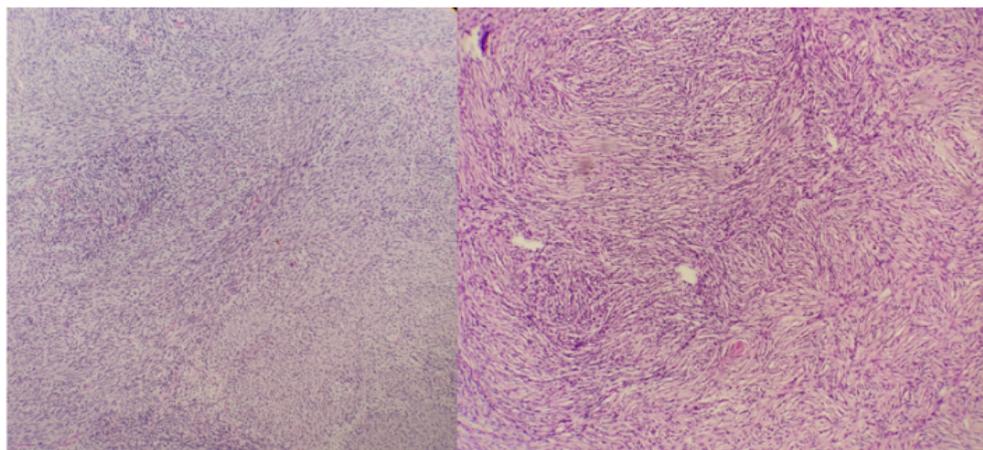


Figure 3: Wide local excision biopsy procedure - attached to the fascial layer of volar forearm with feeding artery from brachial artery



Diffuse infiltration of spindle-shaped cell in fascicular (left) and storiform (right) growth pattern. H&E 100x (left) and 200x magnification (right)

Figure 4: Histopathological reported as diffuse DFSP cell lesion involving epidermis, dermis and subcutis layer with a separate hypercellular lesion of herringbone pattern, increased mitotic activity, collagen deposition and myxoid changes. In addition, the CD34 staining indicates a diffuse positivity with focal loss within separate nodule



Figure 5: a) Post operation wound after 1 month done WLE. Noted healthy granulating tissue with no sign of recurrence b) Post operation 2 month, noted scar tissue covering large portion of granulating tissue, c) Post operation 3 month - noted scar tissue covered all part of wound.

CONCLUSION

FS- DFSP is a rare soft tissue sarcoma of the skin that requires a systematic surgical planning. Risk of metastasis is higher compared to other types of DFSP. Ultrasound and MRI may help in evaluating the tumor margin and offers an advantage in the adequate surgical resection strategy. Histopathological evaluation is important to recognize the variants of DFSP as it may help in determining risk of metastasis. WLE may had been slightly inferior in approach as compared to MMS in terms of risk of recurrences. Close follow-up after operation to look for sign of recurrence is recommended and should be done up to few years to look out for signs of recurrences or metastasis.

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COMMENTARY

A 6 Step Approach In Initiating Essential Emergency Critical Care Services In A Resource Limited Emergency Department Setting.

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Key Words: *6 Step Approach, Critical Care, Emergency Department, Essential Care*

ABSTRACT

The emergency departments of today no longer only cater for treatment of life threatening conditions as it also involves monitoring and lodging of critically ill patients pending admission to the wards in view of overcrowding and longer boarding times in the emergency. Application of critical care services will ensure that the patients who are critically ill and boarding in the emergency departments especially the red zones receive proper monitoring and ICU like care services. However, advanced emergency and critical care services require many resources which may not be possible in many resource limited facilities. This calls for the introduction of essential emergency critical care, a concept that provides the essentials of critical care in the emergency setting to ensure good monitoring and continuous critical care for lodging patients. In this article we introduce a 6 step method employed in a resource limited setting to implement essential emergency critical care services in the red zones of the emergency department.

BACKGROUND

The emergency departments all over the world including Malaysia have been hit with overcrowding, longer boarding times and longer waiting times for admission¹. This situation has been made worse with the ongoing covid 19 pandemic and its variants which have been more infective.

Association of missed assessments and treatments has been established to be related to overcrowding, lack of education and awareness among hospital staff². In an overcrowded setting the implementation of continuous education, awareness and accurate treatment can be affected.

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The patients who have critical illness awaiting for bed in the wards and boarding in the emergency departments should receive essential critical care services to ensure reduction in morbidity and mortality while awaiting beds in the acute wards or ICU setting³. The delay in admission or acute ward or ICU beds should not delay the best care for the critically ill.

The establishment of advanced emergency and critical care set up including the ED-ICU model may incur a lot of resources including additional space for the ICU model, critical care nurses and staff, supplies of invasive monitoring and procedures and system integration with the local ICU and this may not be achievable for all emergency departments and centers.

To establish an essential emergency critical care service in a resource limited setting is challenging. Thus in this article we describe a 6 step approach that was done in the emergency department of a tertiary hospital in Malaysia with high patient load to provide essential emergency critical care services to patients while boarding and awaiting beds while maintaining patients' assessment and treatment.

METHODS

The first step in setting up essential emergency critical care services is to establish its clinical governance. This is done by creating a committee to continue to provide and develop the essential emergency critical care services within the emergency department. The role of the committee is to establish protocols, carry out critical care initiatives and its continuous education.

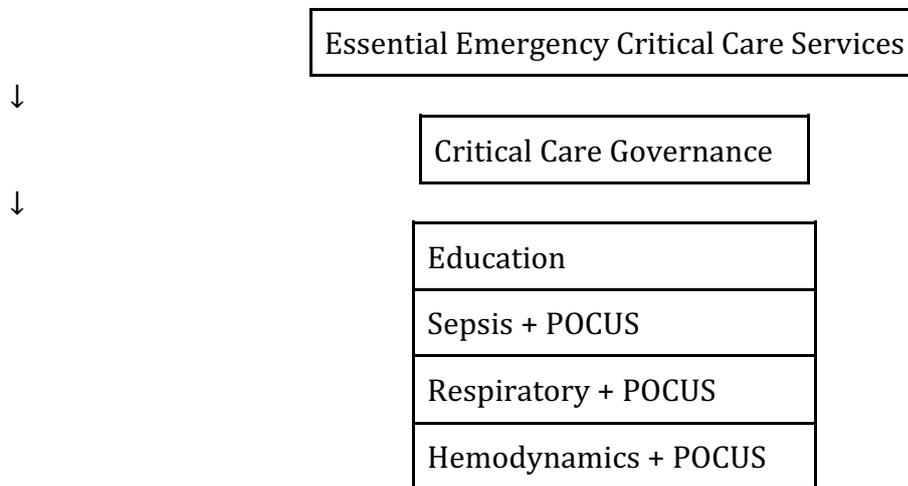
The second step in setting up essential emergency critical care services is focusing on hemodynamic assessment and stability. This is best established by creating a critical care chart within the red zones of the emergency department. A critical care chart that has the parameters of pulse, blood pressure, vital signs, respiratory or ventilator setting, blood gasses interpretation, vasopressor, fluids in and out charting is to be established and compulsory for critically ill patients.

The third step is to establish POCUS (Point of care ultrasound) among the critically ill. Making it mandatory for all critically ill patients and the red zone patients to receive a POCUS and critical care ultrasonography at least once within their stay in the emergency setting.

The fourth step is to establish continuous education in critical care topics. Incorporation of critical care topics once a month within the continuous medical education (CME) program of the emergency department and organizing a yearly fundamentals of critical care course to embed critical care education within the services of the emergency department.

The fifth method is to include sepsis guidelines incorporation into all sepsis patients in the emergency department. Using the latest guidelines of sepsis to guide treatment of septic and critical patients boarding in the emergency by fluids, inotropes/vasopressors, measuring lactate counts, blood c & s within one hour and initiating iv antibiotics must be stressed.

The sixth and final method is to incorporate ventilator management within the emergency departments. Education on basic mechanical ventilation including the modes, oxygen, tidal volume, PEEP, airway pressures, I:E ratio and respiratory rates must be a routine together with incorporating obstructive and protective lung ventilation strategies.



DISCUSSION

A critical care team composed of emergency physicians with special interest in critical care, medical officers and paramedics will provide a holistic approach in targeting all groups and improving services at all levels.

Formation of a critical care chart will help in evaluation of hemodynamic stability, continuous hemodynamic monitoring, input of fluids and output as well as vasopressor and inotropic requirements⁴.

Point of care ultrasound can be utilized for patients with undifferentiated conditions, preventing a mis-diagnosis, establishing fluid status and response to fluid challenge, as well as hemodynamics assessment using critical care echocardiography⁵.

Continuous essential emergency critical care education and incorporation of topics into the CME once a month which includes FOAM learning, blogs, podcasts on topics related to trauma critical care, surgical critical care, intensive care modules will help enforce knowledge in the field of critical care and improve its service delivery within the emergency setting⁶.

Inclusion of sepsis protocols will help in reducing the morbidity and mortality of septic and ill patients and coupling it with routine ventilator set up and monitoring with basic setting or advanced ventilation strategies will provide a holistic approach and addition of critical care in ill patients⁷.

CONCLUSION

The increasing cases of overcrowding in the emergency departments, higher boarding rates and waiting times for critically ill patients in the emergency department warrants critical care services provided by emergency physicians. Advanced critical care services in the emergency departments may take up resources. Thus in a resource limited setting, we would like to recommend initiating a 6 step approach to set up essential emergency critical care.

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A Brief on Exercises in Gym with Some Misconceptions

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Key Words: *Gym, Exercise, Health, Food, Nutrition, Misconceptions*

INTRODUCTION

Ancient gymnasiums were the places for social interaction, recreation and leisure, but they were first and foremost educational institutions where the intellectual and athletic training of a military character was supposed to be accomplished. The Greek gymnasium was a popular recreational space for the members of the aristocratic class as it provided those with an opportunity to perform and enhance their outstanding persona and family [1]. Gyms are one of the most pursued leisure places in western societies and can be said to have established themselves as part of a white middle-class culture [2, 3, 4, 5, 6-8, 9]. Almost 13% of the UK population is registered as members of a private health and fitness gym or publicly-owned fitness facility, with London having the most registered users [10]. Depending on the size and target group, multi-purpose amenities encourage pre- or post-training activities, for example at their spas and beauty centers or they organize social activities at the weekend [11]. Indeed, gym membership usually starts with the diagnostic procedure of a health check where weight, height, body fat, blood pressure, body mass index, etc., are measured and compared to what has been established as a scientific norm so that goals for further training can be identified and changes noticed. Bodies can be sculpted and corrected by the right diet, exercise and cosmetic products. Advertisements suggest that individuals are personally responsible for monitoring and controlling their attractiveness and ambition [12]. Gym participants over 65 years old tend to come to the gym not only for physical training but also to form social bonds [13]. The medical condition might experience to come in a gym as a compulsory homework [14].

Nowadays over-weight then obesity is increasing day by day all over the world. Since people are becoming conscious but in this way, some are undergoing unwanted physique. Correct diet and physical labor are the key elements for maintaining human fitness. Without good strength or power and fitness, nothing is possible to gain. Sometimes for some physical ailments, physicians prescribe to their patients for going into the gym. For instance, respiratory ailments, digestive problems, arthritis, blood pressure, diabetes mellitus, etc. There are lots of benefits to perfectly using the gym. A master trainer guides

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all members of their gym. Based on the body structure and demand of those members, the trainer suggests their gym routine and diet. Age, sex, and physical condition are depended on the schedule of the gym routine. Sufficient time and goal for rectifying their body power and muscles, they should maintain the rules and regulations of the gym. Education on a balanced diet, ideal food, scientific lifestyle, as well as exercise is important for fitness. At home, parents should gather knowledge first on human health as well as food, exercise, and mental health also [15]. Hippocrates often used lifestyle modifications such as diet and exercise to treat diseases [16]. Lack of physical exercise and ingestion of excess calories is to enhance obesity [17]. Regular exercise will be our mandatory issue from the very beginning and this is the fundamental activity for everybody. After 16 years, everybody will be allowed to admit to the gym. Before this, they could regularize yoga in their home. Their parents will help them in this regard. For maintaining our better health all yoga poses as well as animal-inspired yoga poses are beneficial [18]. We should know the effects of every exercise item on our bodies. Proper posture and set with replication will be recommended by the trainer. Without their concern, we should not touch any object in the gym. Unwanted or forbidden workouts could harm your body; need to control your mind for the sake of your bodily improvement. Somebody expands misconceptions about the gym which are not scientifically correct. In this case, if you have any queries, ask the trainer, he/she will rectify you. Very few injuries could happen in the early days in the gym and for the time being, all will be neutralized by following the trainer's suggestion. Maximum injuries come from doing such non-prescribed exercise items and lack of proper warm-ups. If we stay at home and maintain exercise that will not be effective because at that time we do not have any routine or guidelines. Trainer of the gym knows about every muscle of our body with their contraction and expansion capability. In addition, in a gym, we have a goal to maintain our body shape where our home does not support it. Moreover, in our home, this is quite impossible to buy all items for the exercise. In the gym, they could provide all facilities, so all muscles (compound exercise) could be stimulated and the result would come gradually. It is no doubt that a gym is an excellent place not only for fitness but also a place for making bonds with other people. With the physical attitude, our mental health could be stronger. In more than 300 gyms in Dhaka city, 70% of people do not come to the gym regularly after admission because of their pain and some do not get desired result [19]. We should read adequate articles, journals, and magazines on human health. For avoiding boring sessions in the gym, it is needed to rotate the routine. Exercises in a gym can help to improve our sleep quality and energy level. We should do exercise in the gym with a small and build up to more intense workouts later when our body will be fully ready [20]. There is no doubt that exercise is a complete drug of human life and a combined succession of exercises like yoga, gym, aerobic and therapeutic could prevent our many types of cancers [21]. The objective of this study is to motivate people for coming to the gym and try to overcome such misconceptions about the exercises in the gym.

Exercise In Gym

If you are over 40, changes in your activity level, eating habits, hormones and how your body stores fat can play roles. Every week at least 2.5 hours of moderate physical activity (like brisk walking or light yard work) can make you stay healthy. Muscles burn more calories than fat, can slow down your metabolism and make it harder to shake those stubborn pounds. Strength training at least twice a week can help you keep those muscles. People who do not get good-quality sleep are more likely to gain weight [22]. Exercise and nutrition, but avoid high-impact workouts that aggravate the joint. Swimming or cycling is one of the most acceptable activities in gym for our healthy joints [23] (Picture 1).

Misconceptions about gym

Weight gain: Most of the people said that if anybody stops gym they will gain more weight. The truth is that after leaving the gym if their diet is improper or crash diet they will gain excess weight, the gym is not responsible here [24]. Exercise in the morning might help speed weight loss by priming the body to burn more fat throughout the day. In terms of weight loss, diet plays a much bigger role than exercise [25] (Picture 1).

Height: In addition, somebody says that during performing in the gym, you will be short. This is scientifically impossible, whereas exercises in the gym will give you correct posture so you will show a few centimeters taller, not short [24] (Picture 1).

Hair loss: There is no link between the high impact exercise and hair loss of people [26] (Picture 1).



Picture 1. National Gym of Saidpur, Bangladesh where author is continuing his workouts

SUMMARY

If possible all educational institutes need to establish a gym for calorie burning and increasing the immune system of all employees and students. Physical activity, taking rest and enjoying life are very important for a student. In Bangladesh, most people perform exercise after affecting disease. Ill health is not suitable for exercise. In addition, need to overcome such misconceptions about exercises in the gym and motivate everybody to take admission to the gym for continuing a routine and obeying the rules and regulations of that particular fitness center.

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ORIGINAL RESEARCH ARTICLE

Mental Health Evaluation Of Students In A Private University In Malaysia During The Pandemic.

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Key Words: Pandemic, Mental Health, University Students

ABSTRACT

Mental health disorders in Malaysia have been on the rise, especially among youth. The data from the National Health and Morbidity Survey, 2015 conducted by the Ministry of Health Malaysia recorded an increasing trend of mental health problems among adults, of age 16 years and above in Malaysia from the year 1996 (10.7%) to 2015 (29.2%). Changes in the learning environment due to the COVID-19 pandemic cause an increased burden on their mental health. This survey evaluates 118 students from a local private university using several scales such as the- DASS-21, Satisfaction with Life Scale (SWLS), and Brief Resilience Scale (BRS) to screen for mental health wellbeing. The results showed the prevalence of moderate to extremely severe depression symptoms at 33.9%, anxiety symptoms at 30.51%, and stress at 19.49%. About 31.3% of students have poor satisfaction with life and 29.7% of students have poor resilience. There seemed to be no significant association between different ethnicity, course of study, family income, and relationship status. However, there is a significant relationship between the age group of 15-24 years compared to 25-34 years in stress scores. Younger students seemed to record more stress symptoms.

INTRODUCTION

In recent years, issues on mental health have been on the rise and are beginning to capture more attention. In Malaysia, the prevalence of depression in secondary school was studied among 2927 students in South Malaysia and revealed that 33.2% of respondents suffered from mild depression while those who faced moderate, severe, and extremely severe depression were 21.5%, 18.1%, and 3.0% respectively [1]. Another study conducted on secondary students in urban and rural areas in Selangor

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which involved 2048 participants using the children's depression inventory (CDI) developed by Maria Kovacs. This study revealed that 10.3% of the students were much above average on the depression scale following interpretive guidelines for the T-scores [2].

Meanwhile, a study was conducted among 1602 first-year undergraduate students in a university in 2019 using the DASS-21 questionnaire [3]. The findings revealed that the prevalence of moderate to extremely severe depression was 21% ($n = 341$), anxiety was 50% ($n = 793$), and stress was 12% ($n = 197$) [3]. In the Klang Valley, a study was done on 506 students from 4 different public higher learning institutions and showed that 27.5% had moderate, and 9.7% had severe or extremely severe depression; 34% had moderate, and 29% had severe or extremely severe anxiety, and 18.6% had moderate and 5.1% had severe or extremely severe stress scores based on the DASS-21 inventory [4].

From an international standpoint, studies of university students suggested increased stress, anxiety, substance use disorders, and suicidal thoughts in countries such as Australia, Mexico, and Belgium. In fact, medical students experience higher depression rates as compared to the general population according to two different studies done in Sweden [7] and Iran [11]. On the other hand, studies were conducted among university students in the United Kingdom [5], Saudi Arabia [6] and Sweden [7] reported a significant association between mental disorder and year of study. This high prevalence of stress and pressure are observed in the first three years of being a medical student in medical school [8]. From a gender perspective, women were associated with higher stress levels compared to men [9,10].

Mental health issues can affect anyone regardless of ethnicity, gender, age, and location. Stigma, discrimination, and prejudice prevent sufferers from seeking appropriate help. Unawareness and poor mental health literacy can contribute to this as well. Studies show that most mental health symptoms first manifest during adolescence [12] and delays in seeking treatment ultimately lead to poorer outcomes [13]. Therefore, identifying the condition and providing early intervention are crucial in combating mental health issues. Students typically face difficulties adapting to the increased academic load, as well as the increasingly heavy social responsibilities, when they have yet to acquire the skills to survive. First-time experiences such as working, committing to a relationship, staying away from home with strangers, and adapting to cultural and belief differences may further add pressure on young minds [14]. Gender discrimination and physiological differences have also been identified as risk factors, with females at a higher level of depression than males on average [15].

Socioeconomically, students with lower status and background are more susceptible to anxiety, depression, stress, and negative emotions due to a relatively higher financial vulnerability [17]. As such, students who come from rural areas typically have a higher prevalence of mental health issues compared to those from urban backgrounds [16]. In a similar manner, family functioning plays an important role in maintaining mental health in children, which is proven by associations between anxiety, psychological distress, and family conflicts [18]. Interestingly, studies suggest that satisfaction with

the living environment can be a protective barrier against poor mental health whereas dissatisfaction and unhappiness pose higher risks of deterioration [19,20].

As mental health disorders mostly affect adolescents and young to middle-aged adults which is approximately 10-20% of the cases, mental health resilience has become an important need for most young individuals. [21] This survey is preliminary to an interventional study using a mental health application to better deal with stress and improve mental health resilience.

MATERIALS AND METHODS

An assessment of mental health indexes was conducted among students at a private healthcare university as part of an interventional study using a text-based mental health coaching application. The study received approval from the University ethics committee on the 18th of March 2021. The inclusion criteria were students who consented to participate and were proficient in the language used. Three scales were used namely, sociodemographic details, a measurement for stress, anxiety, or depression using the self-administered DASS-21, life satisfaction using the Satisfaction with Life Scale, and a measurement of resilience using the Brief Resilience Scale questionnaire.

The exclusion criteria were students who have already or just graduated, who are not proficient in the English language, and who do not give written consent for participating in the study. Students who were found to score extremely severe stress, anxiety, or depression, were provided with the contacts to university-based support services and helplines as attached in the study information sheet.

The **Depression, Anxiety and Stress Scale - 21 Items (DASS-21)** is a set of three self-report scales used to measure the emotional states of depression, anxiety, and stress. Each of the three DASS-21 scales contains 7 items, divided into subscales with similar content. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale is sensitive to levels of chronic nonspecific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient. Scores for depression, anxiety, and stress are calculated by summing the scores for the relevant items. For the depression component of the scale, a cumulative score of 0-4 indicates no depression, whilst a score of 5 and above indicates that there is depression. For the anxiety component of the scale, a cumulative score of 0-3 indicates no anxiety, whilst a score of 4 and above indicates that there is anxiety. For the stress component of the scale, a cumulative score of 0-7 indicates no stress, whilst a score of 7 and above indicates that there is stress.

The **Satisfaction with Life** scale is a 7-point Likert style response scale. The possible range of scores is 5-35, with a score of 20 representing a neutral point on the scale. Scores between 5-9 indicate the respondent is extremely dissatisfied with life, whereas scores between 31-35 indicate the respondent is extremely satisfied.

The **Brief Resilience scale (BRS)** assesses the ability to bounce back or recover from stress. The tool asks individuals to decide how much they agree or disagree with six statements. Each answer is allocated a number. Once all six statements have been assessed, the individual can total up their numbers. This summing up will give them an overall resilience score of between 6 and 30 and a BRS score of 1.00 to 5.00. A BRS score of 2.99 and below indicates low resilience whilst a score of 4.31 and above indicates high resilience.

RESULTS

There was a total of 118 participants recruited. The majority were between 15-24 of age (93%). 66% of the participants were female while the rest were male. The races were categorized into Malay, Chinese, Indian, and others. 80% of the participants were Chinese, followed by Indian (13%), Malay (6%), and others (1%). 86% of them were studying medicine while 11%, 5%, and 1% of the participants were studying Dentistry, Chiropractic, and Pharmacy respectively. The family income of the participants was divided into B40 (bottom 40%), M40 (middle 40%), and T20 (top 20%) and “not disclosed”. Almost half (49%) of the participants fall under M40, with 30% in T20, 15% in B40, and 5% did not disclose the information.

According to Table 1 below, more than a third (33.9%) of the sample scored moderate, severe, and extremely severe depression. 11.02% reported mild depression symptoms.

Table 1: Prevalence of Depression Among IMU students

	Depression			
	Normal (0-4)	Mild (5-6)	Moderate to severe (7-13)	Extremely severe- (14+)
	65	13	31	9
Percentage	55.08	11.02	26.27	7.63

Table 2 below shows that more than half of the sample reported mild, moderate to severe, and extremely severe anxiety symptoms (55.1%)

Table 2: Prevalence of Anxiety Among IMU Students

	Anxiety			
	Normal (0-3)	Mild (4-5)	Moderate to severe (6-9)	Extremely severe- (10+)
	53	29	25	11
Percentage	44.92	24.58	21.19	9.32

Table 3 below shows mild, moderate, severe, and extremely severe stress was seen among 36.49% of the sample as in the graph below.

Table 3: Prevalence of Stress Among IMU Students

	Stress			
	Normal (0-7)	Mild (8-9)	Moderate to severe (10-16)	Extremely severe (17+)
	75	20	21	2
Percentage	63.56	16.95	17.80	1.69

If we look at the Satisfaction with Life Scale of the participants, most of them were slightly satisfied and satisfied (33.9% and 26.3%). The rest were slightly dissatisfied (22.0%), dissatisfied (6.8%) and extremely dissatisfied (1.7%)

As for the Brief Resilience Score of the participants, almost a third or 29.7% reported low resilience, as stated in Table 4 below.

Table 4: Prevalence of Brief Resilience Scale Scores Among IMU Students

	BRS rating		
	Low resilience (1.00-2.99)	normal resilience (3.00-4.30)	High resilience (4.31-5.00)
	35	82	1
Percentage	29.7	69.5	0.8

We found that there was no statistically significant association of depression scores with age, sex, race, the course they are taking, their family income, and relationship status (p-values >0.05). Similarly, anxiety scores also showed no significant association with sociodemographic details (p-values >0.05). As for scores on stress experienced by the participants, there was a significant correlation between their age group and the level of stress they experienced with a p-value <0.05. The p-values for each correlation tests are stated in Table 5 below.

Table 5: Comparison of Stress Scores with Demographics

Stress		Normal (0-7)	Mild (8-9)	Moderate to severe (10-16)	Extremely severe-excluded (17+)	Value	df	p
Age group	15-24 years	71	19	20	0	11.291	3	0.010
	25-34 years	4	1	1	2			
Sex	Male	28	4	8	0	4.092	3	0.252
	Female	47	16	13	2			
Race	Malay	4	1	2	0	5.333	9	0.804
	Chinese	56	16	13	1			
	Indian	8	1	4	0			
	Others	7	2	2	1			
Course	medicine	66	13	20	2	10.562	9	0.307
	Dentistry	5	5	1	0			
	chiropractic	3	2	0	0			
	pharmacy	1	0	0	0			
Family Income	B40	13	2	3	0	8.654	9	0.470
	M40	32	11	13	2			
	T20	25	7	4	0			
	Not Disclosed	5	0	1	0			
Relationship Status	Single	73	19	18	2	7.647	6	0.265
	In a relationship	2	1	1	0			
	Others	0	0	2	0			

There was no significant association between participants' SWL rating and their age group, sex, race, the course undertaken, and their family income. Similarly, the results of this study found no significant association between the participants' BRS and their demographics with all the p-values >0.05.

DISCUSSION

Our study was conducted during a time when the Malaysian Ministry of Education had restricted most teaching & learning activities to an online setting due to the pandemic. However, practical sessions which required in-person attendance albeit limited were still conducted. The impact of these restrictions was further compounded by the prohibition of inter-district and interstate travel for students where the out-of-state students were unable to travel back to their families and were instead subject to social

isolation, a common precipitant of mental health issues [22]. According to a cross-sectional online survey conducted by Sheela et. al during the initial months of the COVID-19 pandemic in April and May 2020, 20.4%, 6.6%, and 2.8% of a total of 983 university students in Malaysia had experienced minimal to moderate, marked to severe, and most extreme anxiety levels, respectively. Based on the selected relevant narrative feedback given by the students in the said survey, the most prevalent stressors included financial constraints and a feeling of uncertainty about their futures. [23]

Ever since the implementation of the MCO, online teaching and learning became the main mode of delivery in higher education institutes in Malaysia. In fact, during the second week of MCO, Universiti Sains Malaysia released an appreciation note that they conducted a total of 1421 online sessions across all their programmes which included more than 16,000 students. [24]

A study done in 2020 showed that problems arising from open and distance online learning were issues with internet connectivity, network signal, and speed of the internet. From the study, almost half of the participants faced connectivity issues more than a few times a week. Around 20% had problems with internet connection almost every day and less than 10% had difficulty with severe problems with internet access and network coverage every day. On top of that, even though online learning was implemented during the pandemic, the absence of real-time sharing of ideas, knowledge, and information could also create a void in online classroom interaction, which made it difficult for the students to gauge and understand during the class. [25]

Our study has almost similar results as another by Khadijah et al., whereby 27.5% had moderate and 9.7% had severe or extremely severe depression; 34% had moderate and 29% had severe or extremely severe anxiety, and 18.6% had moderate and 5.1% had severe or extremely severe stress scores [26]. In our study, we found out that 30.5% of the population reported slightly to extreme dissatisfaction. According to a study by Joshanloo M, an individual's satisfaction with life is under the strong influence of one's emotional experiences, which varies over time and context [27]. Therefore, we can theorise that the participants in our study who reported lower scores for satisfaction with life might be more affected by the pandemic and its effects.

Our results showed that 29.7% of the participants reported low resilience. According to Carver, resilience is defined as a state of returning to the previous level of functioning or moving to a superior level of functioning following a stressful event [28]. Resilience is important as human perseverance during difficult times will bring about many well-being benefits and academic achievements. In a study conducted by Sallehudin et al. among medical students in a Malaysian public university, the level of resilience was highly associated with their sense of belonging in the medical environment [28]. During the COVID-19 pandemic, the need to meet the requirements of the University SOPs and program, and the expectations and challenges in the family, affected the resilience of the student population.

There are several limitations in this study including its small sample size, uneven distribution of the participants' race, course taken, and relationship status. Furthermore, the questionnaires administered did not have diagnostic value as they were designed as screening tools. A formal psychiatric assessment conducted by physicians with reference to diagnostic criteria from the DSM-V was required to ascertain the presence or absence of mental health illnesses in the participants.

CONCLUSION

This study has demonstrated a high prevalence of mental health symptoms, reduced resilience, and low satisfaction in life scores among university students. Institutions of higher learning need to be cognizant of the challenges of the pandemic including changes in teaching, learning, and lifestyle that can impose on a student population. More needs to be done to improve the mental health resilience of the student population as well as to provide for timely and appropriate interventions by mental health professionals.

CONFLICT OF INTEREST

No potential conflicts of interest were reported.

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ORIGINAL RESEARCH ARTICLE

Covid-19 Vaccination: The Prevalence And Influencing Factors For Vaccine Hesitancy Among Mbbs Students From International Medical University, Malaysia

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ABSTRACT

Vaccines have been the most effective and safe way to protect people from harmful diseases. With the severity of the pandemic weighing on healthcare systems around the world, the development of COVID-19 vaccines has been prioritized by pharmaceutical companies around the world. Therefore, we decided to carry out research to determine the prevalence of vaccine-acceptance and vaccine-hesitancy attitudes among medical students, to identify factors influencing attitudes towards COVID-19 vaccines among medical students, and to establish correlation among various variables toward COVID-19 vaccination. This comparative cross-sectional study recruited medical students from semester 1 to 10, and data was collected by using a questionnaire adopted from a similar study in the local settings. A total of 397 students responded to this study. Overall, students of both phases had similar attitudes but the only significant difference regarding the trust in vaccines approved by the Ministry of Health with more agreeability in clinical phase students. This study is one of few studies that evaluate the vaccine hesitancy of medical students in Malaysia. Further studies should be carried out to compare these findings with undergraduates at various points of their education.

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INTRODUCTION

As Coronavirus disease 19 (COVID-19) spreads throughout the world causing a pandemic, countries around the world imposed lockdown measures to curb the spread of the virus in the hope that it will not overburden the healthcare system of each country. The first COVID-19 case reached Malaysia on the 25th of January 2020, and since then as of 18th May 2021, Malaysia has gone through 3 waves of COVID-19 cases and is currently still on the rise with 465,330 cases in total [1]. Due to many factors including non-compliance to Standard Operating Procedures (SOPs), the government of Malaysia has implemented a third Movement Control Order (MCO) to prevent a possible fourth wave of the COVID-19 virus. Malaysia is not the only country that is affected by the COVID-19 virus, many other countries such as India or Brazil are seeing an unimaginable number of cases a day that is bringing their healthcare systems to the brink of collapse. Vaccines have been the most effective and safe way to protect people from harmful diseases and with the severity of the pandemic weighing on healthcare systems around the world. The development of COVID-19 vaccines has been prioritized by pharmaceutical companies around the world. With the completion of the development of COVID-19 vaccines, many countries around the world have started procuring and planning immunisation programmes to distribute these vaccines and ensure that all of their citizens are vaccinated. Similar to drugs, vaccines have also been at the forefront of controversies and scepticism around the world. Therefore, we decided to carry out research to determine the prevalence of vaccine-acceptance and vaccine-hesitancy attitudes among medical students, to identify factors influencing attitudes towards COVID-19 vaccines among medical students, and to establish correlation among various variables toward COVID-19 vaccines. The reason for recruiting medical students was those medical students were our future doctors and they played an important role in educating and influencing the public regarding vaccination.

METHODS

The study was conducted among semester 1-10 medical students from the MBBS programme at International Medical University. A self-administered online questionnaire was distributed to 397 students enrolled in MBBS programme. The online questionnaire was in Microsoft Forms format and was sent to the selected students through email.

The questionnaire was developed based on past research on the attitudes of medical students against the COVID-19 Vaccine where permission was obtained from one of the authors, Dr. Victoria C Lucia to adapt the questionnaire according to our local settings. [8] The questionnaire assessed the prevalence of vaccine hesitancy among the students of the IMU MBBS program. The questionnaire included demographics, attitudes towards the COVID-19 vaccines, knowledge regarding COVID-19 vaccines, concerns about the COVID-19 vaccines, and personal experiences regarding the COVID-19 vaccines. There

were five demographic questions, eight questions about attitude, two multiple choice questions about concerns, six questions about knowledge, and four questions about personal experiences.

STUDY DESIGN

This study was a comparative cross-sectional study involving Sem 1-10 MBBS students at International Medical University.

SAMPLE SIZE

The estimated sample size was 397 MBBS students calculated by using Slovin's formula and simple random sampling.

With 953 students from preclinical and 439 students from clinical school

Sample of students from preclinical school

$$\begin{aligned} n &= N / (1 + Ne^2) \\ &= 953 / (1 + 1000 * 0.05^2) \\ &= 272 \end{aligned}$$

Sample of students from clinical school

$$\begin{aligned} n &= N / (1 + Ne^2) \\ &= 439 / (1 + 1000 * 0.05^2) \\ &= 125 \end{aligned}$$

272 preclinical students + 125 clinical students = 397 students from MBBS

Participants were stratified based on the phase of the MBBS programme, with Phase 1 (preclinical) being one stratum, and Phase 2 (clinical) being the other. The sample size in either stratum was calculated using Slovin's formula. For preclinical students, the sample size was 272. For clinical students, the sample size was 125. Systematic random sampling was then used to draw preclinical students and clinical students from a list of all students arranged alphabetically without confinement to the corresponding

semester. This was to avoid underlying patterns in the order of the individuals, and with each interval $k = 4$, the participants were selected. The sample size for each semester totaled:

	Preclinical		Clinical
S1	53	S6	33
S2	51	S7	11
S3	54	S8	30
S4	55	S9	24
S5	59	S10	27
Grand Total	272	Grand Total	125

Theoretical Framework for the Research Study

Abbreviations

D-V Dependent Variable

IN-V Independent Variable

E- Experience- Moderating Variable

K - Knowledge- Moderating Variable

G- Gender Influencing Variable

R- Race Influencing Variable

L- Religion- Moderating Variable

This research assessed the attitudes of the students in the IMU MBBS program towards the COVID-19 vaccine and took into account their gender, race, religion, knowledge, and experience with the COVID-19 vaccine to assess the prevalence of vaccine hesitancy among the students in the IMU MBBS program.

INCLUSION CRITERIA

Students enrolled in IMU MBBS program.

Students who had given consent for participating in the study.

EXCLUSION CRITERIA

Students who had received 2nd dose of COVID-19 vaccine.

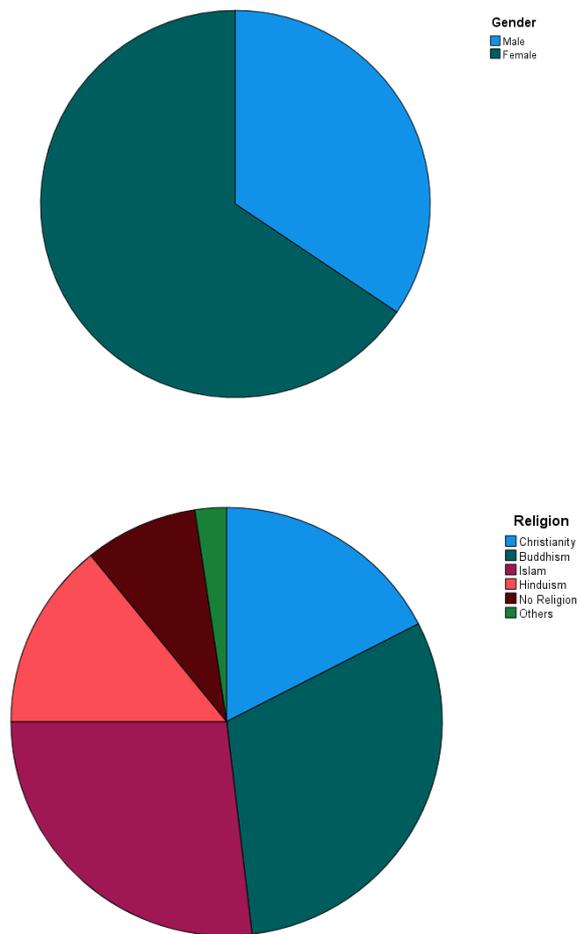
Students unable to take vaccine due to medical reasons.

RESULT

5 demographic questions, 8 questions about attitude, 2 multiple choice questions about concerns, 6 questions about knowledge, and 4 questions about personal experience.

Report on demographics - data collection and recruitment, response rates

Our study included 212 participants from MBBS students of International Medical University; gender was presented by male 34.4% (73 of 212), and female 65.6% (139 of 212) of the students. The phases of the medical course were divided into pre-clinical 60.4% (128 of 212) and 39.6% (84 of 212). Religion of participants consisted of Buddhism 30.7% (65 of 212), Islam 26.9% (57 of 212), Christianity 17.5% (37 of 212), no religion 8.5% (18 of 212) and others 2.4% (5 of 212). Of the races included, there were 47.2% (100 of 212) Chinese, 17.9% (38 of 212) Indian, 13.7% (29 of 212) Malays, and other races representing 21.2% (45 of 212). Regarding the COVID-19 vaccination status of the participants, the majority (86.3%) had received the 2nd dose of the COVID-19 vaccine, while only 12.3 % had received the 1st dose of the COVID-19 vaccine and 1.4% who were unvaccinated but planned to. When given the option to choose the brand of the COVID-19 vaccine, most participants would choose the brand (62.3%) instead of accepting any brand of the COVID-19 vaccine (37.7%).



Attitude

The majority of students either strongly agreed (58%) or agreed (29.2%) to make the COVID-19 vaccine compulsory, and this perception was held similarly amongst students in pre-clinical who strongly agreed (57%) and clinical students who strongly agreed (59%). Near half (48%) of the participants also strongly agreed with another 36.8% agreeing that the best preventive measure for COVID-19 was getting vaccinated. Students in both pre-clinical and clinical course either strongly agreed (86.8%) or agreed (12.3%) that the role of the physician necessitates learning about vaccines for themselves and patients. Regarding concerns about serious side effects of the COVID-19 vaccine, students who strongly agreed stood at 9%, agreed (33%), neutral (33%), and those who disagreed (20.8%). When participants were questioned if health systems/medical school mandates were the only reason to get a COVID-19 vaccine, students from both phases mostly strongly disagreed (51.4%) or disagreed (33%). However, more than half still expressed strong agreement (58%) in trusting of vaccine approved by the Ministry of health, with another 33.5% agreeing, and 10% remaining neutral ($p= 0.002$).

Concerns

The relationship between religion and vaccines was seen as 97.6% of students did not hold religious beliefs regarding vaccines. Most students reportedly were not concerned with having not enough time to make an informed decision when taking the COVID-19 vaccine (87.7%). Only 7.5% of students were concerned about getting COVID-19 from the vaccine while 92.5% were not. However, side effects of the vaccines were a major concern with 70.3% of the participants, only 29.7% were not worried. One of the potential barriers to COVID-19 vaccination was lack of information, and this is exemplified by split decisions in students from both phases with 47.6% of clinical phase students agreeing to lack of information, while 52.4% disagreed. More than half of pre-clinical students (67.2%) disagreed with the lack of information while only 32.8% felt a lack of information (p=0.03). Trust in information released by health experts about vaccines was not a concern with the majority (95.3%).

Phase of Medical Course * I trust the vaccine that has been approved by the Ministry of Health Crosstabulation

		I trust the vaccine that has been approved by the Ministry of Health					Total	
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree		
Phase of Medical Course	Pre-Clinical	Count	73	34	20	1	0	128
		% within Phase of Medical Course	57.0%	26.6%	15.6%	0.8%	0.0%	100.0%
	Clinical	Count	42	37	2	1	2	84
		% within Phase of Medical Course	50.0%	44.0%	2.4%	1.2%	2.4%	100.0%
Total		Count	115	71	22	2	2	212
		% within Phase of Medical Course	54.2%	33.5%	10.4%	0.9%	0.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	16.802 ^a	4	.002	<.001		
Likelihood Ratio	19.256	4	<.001	<.001		
Fisher-Freeman-Halton Exact Test	17.482			<.001		
Linear-by-Linear Association	.025 ^b	1	.874	.929	.470	.070
N of Valid Cases	212					

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .79.

b. The standardized statistic is .158.

Knowledge about the COVID-19 vaccine

The majority of respondents believed that vaccines were beneficial in preventing the further spread of the virus (94.8%), but vaccination did not increase mortality in an otherwise healthy individual (84.4%). On the other hand, the idea that the COVID-19 vaccine could be used for any variant of the COVID-19 virus showed split results among pre-clinical and clinical phase students with more than half of clinical students agreeing (51.2% vs 48.8%) and pre-clinical students mostly disagreeing (63.3% vs 36.7%) ($p=0.037$). Most students also believed that the side effects of the vaccine were higher in a person with a history of anaphylaxis (83%) ($p=0.032$), but most students agreed that vaccines were important to stay healthy as a future physician (97.2%).

Personal experience

The majority of participants had not been infected with COVID-19 before (97.2%), did not know someone who had had COVID-19 infection (77.4%), and did not care for someone with COVID-19 infection before (76.4%). Most participants also did not personally know someone who died from a COVID-19 infection (63.7%).

DISCUSSION

Since the conception of vaccines against the COVID-19 virus, studies have been done to determine the attitudes of health care workers regarding the vaccines. A study in Canada found that less than 5% of healthcare professionals had no intention of receiving the COVID-19 vaccine. Another study in France demonstrated hesitancy and reluctance to take the COVID-19 vaccine in 28.4% of healthcare professionals. In addition to that, one more study in Palestine illustrated that 30.7% of healthcare professionals were hesitant to receive the COVID-19 vaccine, and 31.5% planned to decline. [1-3] These rates vary widely from country to country but one of the main recurring reasons for the hesitancies was with regards to the safety of the vaccine as it was developed in a short amount of time. Other themes that were explored include concerns regarding the side effects of the vaccines and the distrust of the ministries of health and their experts regarding the information on the vaccines. With regards to medical students, studies have also demonstrated varying rates of vaccine hesitancy. In one study, a group of medical students in the US showed that around 20% of the students were hesitant. While in another study, a group of medical students from two universities in Egypt showed that 46% of their students were hesitant. Similar to the studies of current frontliners and healthcare professionals, one of the main reasons for vaccine hesitancy among medical students was the concerns regarding the side effects of the vaccines and lack of trust in the information received from public health experts. [4-5]

Our study suggested that the students within the school of medicine at International Medical University (IMU), both preclinical (Year 1 – 3) and clinical (Year 3 – 5) year students were not hesitant regarding the COVID-19 vaccination. However, there were still concerns about the vaccines such as the side effects of the vaccines and the lack of information with regard to the vaccines. Information released by health experts about vaccines was not a concern to most of the students in IMU. There did not seem to be any relation between religion and the attitudes of the students towards the vaccines. Students from both pre-clinical and clinical years did not show any big difference in attitudes towards the vaccines with mostly similar attitudes with regards to most of the aspects of the COVID-19 vaccines. More students from the preclinical years felt that there was enough information with regards to the vaccines compared to students from the clinical years who felt that there was not enough information out there regarding the vaccines. The idea that the COVID-19 vaccine could be used for any variant of the COVID-19 seemed to be more agreed upon amongst the clinical students compared to the preclinical students. A difference in the hesitancy of taking the COVID-19 vaccine amongst the students of IMU School of Medicine compared to the medical students of other countries may be due to the difference in time when the studies were done. As our study was only done when COVID-19 vaccine efforts were very well established amongst the government, this might have decreased the hesitancy rates significantly. However, like other medical students around the world, the side effects of vaccines were one of the recurring themes of concern.

This study was one of few studies that evaluate the vaccine hesitancy of medical students in Malaysia and determined any correlation between religion and vaccine hesitancy. Understanding the limitations such as religion on vaccine hesitancy could help improve the rates of vaccination.

Limitations of this study include a low response rate from clinical year students, the timing of our study, and data collection of students at only a single medical school in Malaysia. A better response rate from clinical year students might have yielded different results. The timing of our study was also when governmental efforts for vaccine uptake were very high therefore might not have reflected what their initial attitudes towards the vaccines before. Data was collected only in a single medical school in Malaysia that might limit the generalisation among other medical schools in Malaysia. There was a potential of bias regarding those who decided not to answer as they were hesitant on accepting the vaccine. Further studies may be done to explore more about attitudes of medical students in Malaysia toward the COVID-19 vaccines. The inclusion of differences in curriculum between the medical schools and student population may draw a better picture of the actual attitudes of medical students towards the COVID-19 vaccines.

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CASE REPORT

Outcome Of Reduction Of Subcondylar Fracture In Retromandibular Transparotid Approach

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Keywords: *Retromandibular Approach, Subcondylar, Occlusion, Frey's Syndrome, Salivary Fistula, Hematoma.*

ABSTRACT

Among all mandibular fracture, 25 to 40% fractures are regarded as Condylar and Subcondylar fracture. Commonly, reduction of subcondylar fracture is done under general anaesthesia. Different approaches are found for the surgical treatment of condylar fractures besides intraoral approaches such as the pre-auricular, submandibular, rhytidectomy, retromandibular. To find out the outcome of retromandibular transparotid approach for subcondylar fracture treatment of mandible i.e to find out correction of occlusion and establishment of jaw function, infection, hematoma, salivary fistula, facial nerve damage, hematoma etc. complications. Surgical treatment of subcondylar fractures of 15 patients were done from January 2019 to December 2021 in retromandibular transparotid approach. The patients were evaluated for hematoma, infection, Frey's syndrome, salivary fistula, facial nerve damage, occlusion, fracture site stability, chronic pain in the fracture site and temporomandibular joint movements in the postoperative period. Facial nerve injury was not observed. Postoperative swelling of parotid region developed in first two patients. Single patient developed paresis in zygomatic branch of facial nerve causing left upper eyelid muscle weak and after two weeks of physiotherapy it became normal. Salivary fistula developed in three patients which were resolved spontaneously. Outcome of this approach like good anatomy and function was found in all cases. Good articular function was obtained in all the cases. By this retromandibular approach condylar fracture reduction, fixation and healing were managed comfortably. However, direct vision of facial nerve fibers has limited the risk of facial nerve injury.

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INTRODUCTION

The subcondylar and condylar fractures are common among all mandibular fractures [1] and the rate of this fracture is 20–62% among all fractures of mandibular [2]. Condylar fractures may be considered as highly common although there is some controversy regarding its treatment [3]. Direct trauma to chin may be the cause of most condylar, subcondylar fractures of the mandible. Force of the trauma is transmitted through the condyle to the skull resulting in fracture [4]. But their management remains controversial which one is better, either open reduction or closed reduction [5].

The complications of condylar fracture include pain, restricted mandibular movement, muscle spasm and deviation of the mandible, malocclusion and pathological changes in the TMJ, osteonecrosis, facial asymmetry and ankylosis irrespective of whether treatment was performed or not [6]. Mandibular fossa of temporal bone, tympanic plate may be fractured with or without condylar displacement into the middle cranial fossa, damage to cranial nerves, vascular injury, bleeding, salivary fistula, growth disturbance, arteriovenous fistula [7] and alter the balance in the masticatory muscles [8].

There are two treatment options; open and closed reductions. In closed reduction these fractures may be treated through intermaxillary fixation followed by physiotherapy. Rigid or semi rigid fixation are used in open reduction of condylar fractures by giving extra oral or intraoral incision [9].

Although closed reduction is the most useful method, it can be difficult to achieve anatomical reduction with this technique compared with open reduction and internal fixation (ORIF) [10].

Titanium or titanium coated mini plates and screws or intraosseous fixation wires are used for fixation after open reduction of the condylar fracture. But different wiring methods and inter maxillary fixation are used as conservative treatment. Few benefits like a better recovery of joint function, achievement of a closer to normal anatomical reduction have encouraged the clinicians generally to favor the surgical procedure though there was an increased risk of nerve injury.

Surgical injury can be avoided with conservative treatment and acceptable results can be achieved due to capacity of masticatory system and condylar remodeling. But several complications may develop like pseudarthrosis, temporomandibular joint pain, malocclusion facial asymmetry and lateral deviation which can be avoided by surgical treatment [11].

Different publications have reported that the outcomes of surgical treatment are superior to conservative treatment of this type of fractures; in fact, risk for functional disorders is a concern of conservative treatment [12].

Different approaches can be adopted for the surgical intervention of extra capsular condylar fractures of the mandible, such as the pre-auricular, submandibular, rhytidectomy, and retromandibular and intraoral approaches [13]. Proper visualization

of the fracture site is always a factor for the surgeon in any approach to allow for optimal anatomical and functional restorations of the mandible [14].

MATERIALS AND METHODS

This study was done on fifteen patients who were treated by open reduction and miniplate fixation in retromandibular approach in Dhaka Dental College and hospital and private centre in between January 2019 to December 2021. The patients were diagnosed clinically and radiologically. The radiological examination combines coronal and axial maxillofacial CT scan with 3D reconstruction with or without an orthopantomogram and posterior/anterior view of skull. Only plain radiograms may be sufficient for the evaluation of postoperative condition. Occlusion, mouth opening and any complication were evaluated in postoperative period. Patients were kept free of arch bar.

During operation one cm below the ear lobule a 2 cm vertical incision was given. However, the incision line was extended distally or proximally in cases of requirements of exposure of the fracture part of condyle. The path of the facial nerve branches was identified via nerve stimulator after passing the cutaneous, subcutaneous tissue and parotid capsule. Then, from both sides of path of the nerve a blunt dissection was done through a curved hemostat and advanced to the masseter muscle. After exposure of masseter muscle it was incised with sharp scalpel upto bone. Periosteum was reflected and fracture part was exposed. After manipulation the fracture ends were approximated and anatomical reduction was achieved, normal occlusion was established. Approximated ends were fixed with titanium coated miniplate and screws. Above the fracture 5mm long, 2mm broad and below 7/2 mm screws were fixed. After proper haemostasis and irrigation wound was closed layer by layer. The parotid capsule was restored with 3/0 absorbable sutures in all patients. The sites were not drained and the skin incisions were covered with 4/0 monofilament sutures.

After surgery, a one week liquid diet followed by soft diet for three weeks was recommended to the patients. On the first postoperative day the patients were discharged and were asked to return for follow-up visits. The end of the first and fourth weeks and at the end of third and sixth months postoperatively is advised for follow up visit. The arch-bars wire patients were advised to visit accordingly for the removal of the arch-bar. The patients were evaluated for infection, salivary fistula, facial nerve damage, Frey's syndrome, occlusion, chronic pain in the fracture site in the postoperative period.

Fracture line



Picture 1: Left sided subcondylar fracture screws

Miniplate and screws



Picture 2: Fixation with miniplate and screws

RESULTS

Table 1: Age* of the patients (n=15)

Age group in years	Frequency	Percent
16-20	3	20.0
21-25	4	26.7
26-30	4	26.7
31-35	3	20.0
36-40	1	6.7
Total	15	100.0

*Mean±SD = 25.93±5.74 years

Gender of the patients:

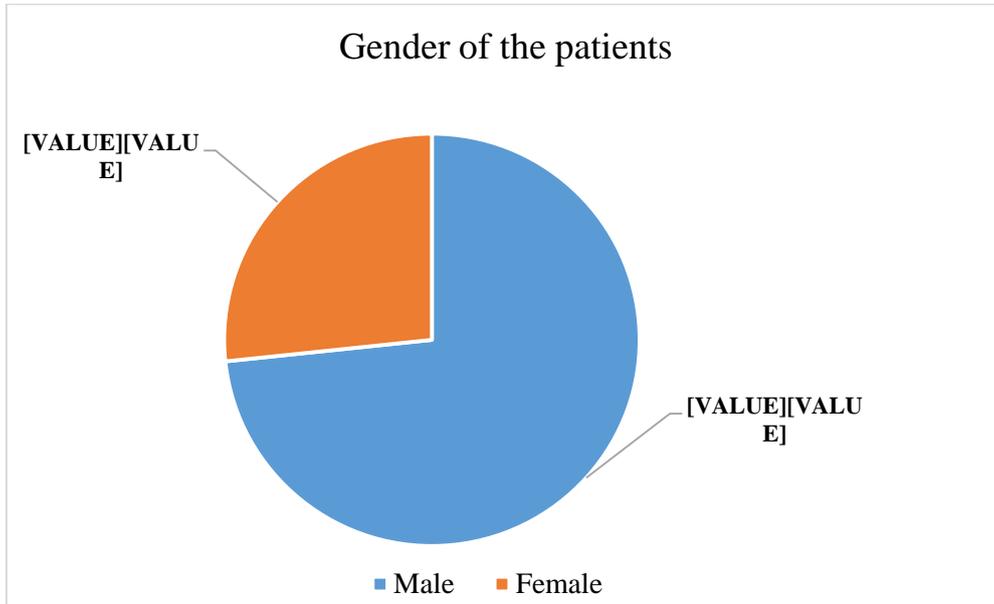


Figure 1: Pie diagram showing gender of the patients (n=15)

Table2: Sites of fracture:

Fracture site in Mandible	Frequency	Percent
Base of the condyle	Nine	60
Neck of the condyle	Five	26.66
Bilaterally subcondyle	One	13.34

Table 3: Nerve injury

Nerve injury	Frequency	Percent
Positive	3	20.0
Negative	12	80.0
Total	15	100.0

Table 4: Parotid fistula

Parotid fistula		Frequency	Percent
Valid	Positive	3	20.0
	Negative	12	80.0
	Total	15	100.0

No infection, no Frey’s syndrome, no malocclusion, no post-operative TMJ pain.

This study included fifteen patients aged 16-40 years (mean± SD 25.93±5.74 years), of whom four ((26.7%) were females and eleven (73.3%) were male patients. Nine (60%) base of the condyle and five (26.66%) neck of the condyle. were operated. One (13.34%) patient of bilateral subcondylar fracture was operated. In addition to plates and screws intermaxillary fixation was not given with arch-bar. Patient’s follow-up was done routinely in every week.

There was no serious bleeding during the operation. No infection, hematoma, Frey’s syndrome, malocclusion, TMJ pain, chronic pain in the fracture site, hypoesthesia of the ear was observed post-operatively. Salivary fistula was observed in three patients which were resolved after few days of dressing. Furthermore, the radiologically fracture site was apposed and had no rotation or angulation in the condyle. Further surgery was not needed in any case.

Postoperative occlusion was alright and pre-trauma occlusion was achieved in all patients. Complete damage to the facial nerve was not found in any patient. However, three (20%) patients developed neuropraxia in the temporal branch of the facial nerve resulting in weakness in upper eyelid muscle to close eye. After few days of physiotherapy the problem was resolved. Mouth opening and side to side movement were normal in function without any restriction.

DISCUSSION

Although treatment method of mandibular condylar fractures is a controversy, many studies have demonstrated that open surgical treatment is the more preferred treatment modality at the present time and is superior to closed-method treatments for unfavorable extra capsular fractures [15]. Among the extra oral approaches, the retromandibular, preauricular and submandibular, approaches are used routinely [16].

The preauricular approach is usually suitable for intracapsular condylar fractures and the fracture line can be extended inferior to the ear in subcondylar fractures. The

submandibular approach provides a wide exposure but the length of the incision scar is its most important disadvantage [17].

The retromandibular transparotid approach has great advantages to enter the subcondylar and high ramus fracture area. In this approach, the fracture lines are clearly seen and we can easily extend the incision if required over the preauricular region and up to the mandibular corner. Furthermore, it is aesthetically good as the incision line remains behind the mandibular margin and 2-3 cm incision is sufficient in most cases [18].

Endoscope-assisted intraoral approaches have also advantages over other approaches in both cosmetic and functional purposes preserving the facial nerve, but the cost and lack of equipment such as an endoscope has limited the use of this approach [19]. Kumaran et al. have argued that if a 1.5 mm plate is used, even a 1-cm incision is sufficient for the fractures of these sites [20].

Now a days, retromandibular transparotid approach has reported very low rates of complication [21]. In this study, infection and hematoma were not observed in any patient. In case of the retromandibular transparotid approach the complications that may be called method-specific includes salivary fistula, Frey's syndrome, restriction in mouth opening and pain in temporomandibular movements, hypoesthesia of the ear and facial nerve injury.

Bindra et al. have reported that they did not observe any salivary fistulas. Ellis et al. have reported a rate of 2.3% for salivary fistulas in their study. In the present study, three salivary fistula was observed which were resolved after few days of dressing. As an opinion it can be said that if parotid capsule is repaired, a salivary fistula will not appear.

Frey's syndrome was also observed and no cases were found in this series, which is consistent with the literature. Sverzut et al. have reported Frey's syndrome in one case treated with the retromandibular approach [22]. No other study in the literature reported Frey's syndrome in this approach.

Regarding the temporomandibular joint movements, there were no significant restricted mandibular movements in the patients during the follow-up. In advanced period no patient experienced pain in the temporomandibular region.

In these patients the main reason of the temporal branch injury was excessive traction at the superior border of the incision, near the earlobe. Usually, the facial nerve divides into two main trunks at the posterior border of the ramus of the mandible, an upper (temporofacial) trunk and a lower (cervicofacial) trunk. The upper trunk gives off temporal, zygomatic and buccal branches, whereas the lower trunk gives off marginal mandibular and cervical branches [21]. But the rules are made to be broken. Many studies have shown that pattern of branching of the facial nerve is highly variable [23]. Indeed, it is our belief that zygomatic and temporal branches are both injured in some patients. Yet, zygomatic branch injury remained asymptomatic because of the buccal

branch interconnections. The reported anastomosis among the zygomatic and buccal branches varies 70% to 100% [24, 25].

The mean inter incisal distance at the maximal mouth opening was remained within normal limits. General acceptance for normal limits is between 40–50 mm [20].

Yang and Patil argue that subcondylar fractures may also be successfully treated by using a single miniplate [15]. Usually a 2-mm double miniplate is generally recommended for the fixation of the mandibular fractures [26]. Sometime, a single plate can be used in cases of more restricted exposure of the subcondylar fracture areas so that facial nerve damage can be avoided and if there is a lack of space to place two plates.

Extension of the incision about 1 cm proximal or distal to previous 2-cm incision reduced over- traction with in other cases. One cm more incision scar would not be a serious problem in cosmetic terms, but it is clear that serious problems may arise due to facial nerve injury in both cosmetic and medico legal aspects.

In spite of the incision length, the retromandibular transparotid approach is very safe in terms of facial nerve injury [27–29]. In the retromandibular approach here were no occlusal defects in any of the patients after the operation and the anatomic fixation of the fracture can be achieved nicely.

We prefer two 2-mm miniplates with four holes for fracture fixation. However, if the second miniplate cannot be properly placed into the fracture line or if excessive traction is applied to the facial nerve branches in particular, an arch-bar in combination with a single miniplate is used for fracture fixation and the bar was removed two weeks after.

Therefore, complete reduction in each plane of the mandible for subcondylar fracture will avoid minimal gap at the anterior margin which could result in modifications to the contact surface of the cartilage tissue within the temporomandibular joint, thereby causing degeneration in the long term period. This gap may result from one-point fixation with a single plate. But two-point fixation (two plates or a single plate and an IMF) provides a complete reduction in the anterior and posterior planes of the condyle.

Our experience with fifteen patients suggested that the retromandibular transparotid approach was a safe and effective method. In the present study, no major complications were found, except for temporary injury to the temporal branch of the facial nerve in three patients.

CONCLUSION

We believe that the retromandibular transparotid approach is the most appropriate method for extra oral surgical intervention in subcondylar fractures due to the easy access to the fracture area, the site of scar is behind the mandible for cosmetic purposes and a very low complication rate. Moreover, we believe that the retromandibular transparotid approach using two-point fixation will reduce the risk of temporomandibular joint degeneration in the following years.

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Thoughts on Snake Species, Their Bites As Well As Management

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Keywords: Snake, Snakebite, Superstitions, Antivenom, Toxin, Snake charmer, Medical Colleges, Treatment, Management

ABSTRACT

Snakes are medically recognized creature all over the world. Snakebite is a much-neglected issue, but its management is urgent to the victims. Recently, Chittagong Medical College of Bangladesh has inaugurated a research section on the venom of snakes. This composition based on various reports, articles and books has been done for the multidisciplinary people. The review report suggested flood season is vulnerable to all sorts of people, and villagers are more prone to snakebite. The villagers do not get proper medications due to a lack of knowledge of first aid, and they are used to the treatment by traditional snake charmers.

INTRODUCTION

There are 3000 types of snakes in the world and only 15% are dangerous. According to World Health Organization globally there are 5 million cases of snake bites each year leading to 81000-183000 deaths, and 4000000 amputations [1]. The vipers, rattlesnakes, boas and most sea snakes give birth to offspring but colubrid and 70% of world snake species lay eggs. In 50% of cases, no venom is injected by the bite of snakes [1]. Many victims do not attend health centers or hospitals and they rely on traditional treatments. There is evidence that 4.5 - 5.4 million people a year are bitten by snakes that 1.4 - 2.7 million of them develop clinical illness (envenoming) after snakebites. The lowest incident was found in Europe, Australia and North America and the highest in sub-Saharan Africa, South Asia and Southeast Asia. Rural dwellers, agricultural workers, herders, fishermen, hunters, working children (ages 10-14), people with limited access to education and healthcare providers are the risky individuals to this snakebite.

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Pregnant women are extremely vulnerable to the risk of hemorrhage and miscarriage following a venomous snakebite. In Nepal, 56% of victims reported traditional medicine as primary health-seeking behavior, while in Kenya this figure is at least 68%. Some snakebite victims survive with permanent physical damage due to tissue necrosis, spat venom ophthalmia, nerve damage and sometimes psychological consequences. Snakebite is an important public health issue and is the second most common cause of death during floods. Natural disasters such as floods and earthquakes force them to come out of human settlements [2]. In cobras, mambas, kraits, vipers and pit vipers the toxins found in their venom differ from one group to another, or even between the same groups of snakes in a different region. This means the correct antivenom is often hard to identify and can be very expensive. A little amount of non-harmful amount of snake venom is injected into an animal-usually a horse or sheep. The best antivenom costs US dollars 140 to 300 with three to 10 vials usually required to save a victim's life [3]. Snake charmer cuts the poison sac or rubs the fangs of snakes for their safety [4]. There are many superstitions about snakes in Bangladesh [5]. A circus team could maintain an animal section where snakes could be available [6, 7]. Snake is not suitable as a pet animal [8]. The biting by cobra happens in the late afternoon [9, 10]. Most people know that snakes are harmful and when it comes out they are killed by people instantly [11]. The objective of this review is to enrich the knowledge about the types of snakes and their bites and ensure people provide medical support.

FLOOD SEASON, SNAKE SPECIES AND RESEARCH IN BANGLADESH

The rural area of Bangladesh is a vulnerable area to snakes and their bites, especially during flood time [1]. In Bangladesh (2010) report says there are 4.3 snake bites per 1000000 populations with approximately 2000 deaths annually [1]. A report says that 1064 cobras and 178 eggs were found in Rajshahi division of Bangladesh and in Satkhira and Tangail the number of cobras was remarkable [12]. The common krait is very aggressive at night but docile reptile during the day [13]. In Bangladesh out of 82 species, 28 are venomous and 12 of them are sea snakes [14]. IUCN Bangladesh [15] mentioned total 100 snake species of Bangladesh where most of them are non-poisonous. Some research works on snakes have been focused on the taxonomy, status and distribution and epidemiological survey on snakebite in Bangladesh [16, 17, 18]. Chittagong Medical College of Bangladesh has opened a section on the research of snake venom [19].

BITING SITES OF SNAKES

Sometimes snake bites in the home surrounding while people take care of their chicken or pet birds [20]. Snakes eat a huge quantity of live rodents annually that are usually considered a biological pest of crops [16, 17, 18]. Tota Mia, a snake charmer set up a snake farm in his home yard. He collected 67 snakes from nature. He died of biting of monocled cobra (*Naja kaouthia*) in 2008 when he was playing with snakes [6].

TYPES OF TOXINS

Snake toxins are classified as neurotoxins, hemotoxins, cardiotoxins, cytotoxins and myotoxins. A complex mixture of enzymes, proteins of various sizes, amines, lipids, nucleosides, carbohydrates, enzyme (hyaluronidase) and metal ions are available in snake venom [21].

VENOM RESISTS ANIMALS

Hedgehogs, skunks, ground squirrels and pigs have been shown resistant to venom [22]. Mongooses, badgers, opossums, California squirrels and garden dormice are not immune to all types of snake venom [23].

CAUSES OF SNAKE BITE AND ITS MANAGEMENT

There are several causes of snakebite in the world which are circus team/snake charming/teasing with snakes/exhibition, food storage in home, forest adjacent living and walking/profession, hunting/killing, photographing, importing/exporting/business, pet/vivarium, lack of knowledge, and swimming in the water, etc. Poor access to often inadequately equipped and staffed medical centers in rural areas, high cost of the treatment protocol and inadequate use of antivenoms are major concerns [24, 25]. One should call the nearest poison control center or zoo for identifying the snake that bite the patient [26]. In many cases, the biting snake cannot be identified or even misidentified [27, 28]. Currently available antivenoms are polyvalent that contain antibodies against cobra, Russell's viper, common krait and saw-scaled viper, but not against uncommon kraits, pit vipers and sea snakes [29]. As a first-aid measure, the bitten area should be cleaned with antiseptic or soap and water. A broad firm pressure bandage should be placed over the bitten area but not arterial tourniquets. The patient should be urgently sent to the hospital or health center where antivenom would be available. If there is clear evidence of systemic poisoning slow intravenous infusion of antivenom (20-100 ml diluted in 2-3 volumes of isotonic saline at 15 drops per minute) is given within 4 hours of bite to minimize local effects (necrosis). Children also require the same dose. However, one should be careful about possible allergic reactions and adrenaline (1:1000 solutions). Anti-tetanus and antibiotic prophylaxis must be given. Intravenous fluid (volume expanders in hypotension) should be given to support vital functions. In some forms of neurotoxicity and cholinesterase therapy with neostigmine and atropine may be required. Fright can produce collapse with a feeble pulse within minutes of the patients. Prevention of snakebite can be done by wearing boots, avoiding tall grass and fallen leaves and never trying to capture, or tease snakes. Most of the snakes will try to bite if they are cornered or frightened [1]. It is good to avoid keeping food items like paddy, poultry, and pigeon within the bedroom which might attract rats which in turn attract snakes. Piles of leaves, wood chips, mulch stacks of firewood and piles of cut grass are all comfortable places to hide from snakes. A dead snake should be handled with great care and may inflict a reflex bite. June-September is the epidemic season when 80% of bites may happen. Except for cobra biting, the identification of other snakes is relatively poor by the health service providers. The 10-19 year is the peak age group affected by

snakebites. 67% of bites occur on the feet and legs, 40% of bites between 1700—2200 hours, and 8% of bites occurred when people used to go to the field for defecation. The scientific management of snakebite envenomation requires appropriate first aid, quick transfer of victims to the hospital, training of health care professionals and availability of antivenom and other ancillary drugs and organ support systems. Venomous snakes sometimes fail to inject enough venom effectively during bites [30]. T or Y stick can be used for transferring snakes, Y stick is useful for making pressure on the head of those snakes, grab stick is used for catching speedy snake like kraits and king cobras [31].

CONCLUDING REMARKS

There are many snakes in the world, and among them, most are considered non-poisonous. Superstitions are very obvious about snakes all over the world. Due to playing with snakes, many biting incidents happen and the mortality rate of individuals and snakes is very remarkable. Hot weather, flood season and earthquakes influence to come to these snakes from the wholes. Deforestation and jungle adjacent dwelling and some unauthorized snake farms in the country may lead to this biting incident. All medical colleges could play a significant role to consummate a sufficient amount of antivenom and providing knowledge about snakes. In addition, it is possible to implement a chapter on 'Snakes, their Bites and Management' in all of the classes elaborately.

Table 1. Notes on the following features with the sources

Features	Examples	References
World statistics on snakebite and venom	We should know the world statistics about snakebite	Ahmed, 2019; SEARO, WHO, 2019; Casewell & Ainsworth, 2019
Superstitions	Superstitions on snake is higher than other animals in the world	Azam <i>et al.</i> , 2011; Kabir, 2014
Snake charmer and animals in circus team	Till now, snake charmers are available in Bangladesh	Kabir, 2013; Kabir, 2018; Kabir, 2020
Snake behaviors	Behaviors of snakes could help to protect us from their bites	Warrell, 1995; Whitaker and Captain, 2004
Biting season, species, and research	We should enrich research on snakes	Sarker & Sarker, 1993; Ahsan, 1998; Kularatne, 2002; Khan, 2004; Faiz <i>et al.</i> , 2008; IUCN Bangladesh, 2015; Ahmed, 2019; Kabir, 2019; Dey, 2022
Biting sites	To know those biting sites from their bites	Daniel, 1983; Sarker & Sarker, 1993; Ahsan, 1998; Khan, 2004; Kabir, 2013
Types of toxins	For proper treatment need to know the toxicity of snake venoms	Powell, 2005
Venom resists animals	Some animals could be used to produce antivenom	Bittel, 2016; Chris, 2021
Causes of bite and management	Causes of snakebite could help us to manage this neglected health issue	Khan, 1992; Taber, 2004; WHO, 2007; Simpson, 2008; Alirol <i>et al.</i> , 2010; Harris <i>et al.</i> , 2010; Amin, 2010; Ahmed, 2019; NCDC Guideline, 2019

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Influence Of Academic Strain, Remoteness From School, And Fear Of Infection In Medical Students' Stress And Health During The Covid-19 Pandemic

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Keywords: *Academic strain, Remoteness from school, Fear of infection, Physical and psychological health, medical students, COVID-19*

ABSTRACT

The emergence of the COVID-19 has greatly affected the world and caused many unprecedented changes in our lives. For many, it has generated a significant amount of stress, anxiety, worries about health, social isolation, unemployment as well as financial problems. Just like the rest, the pandemic has really taken a toll on students' well-being all around the world. They have a lot on their plates, especially dealing with academic strains, remoteness from school and fear of infection during this time of crisis. Therefore, a cross-sectional study was conducted to explore how and if these three stressors have an impact on the medical students' stress and health during the pandemic. The analysis included mean, frequency, correlation, unpaired T-test & ANOVA. Out of 159 students, we have found that Hindu religion has a higher stress level (mean =24.4). Female gender (mean = 25.6) and those who have underlying mental health issues (mean=30.3) have a higher physical and psychological impairment. There is a positive significant association between academic strain ($r= 0.245$, $p=0.001$), remoteness from school ($r=0.223$, $p=0.003$) with perceived stress. There is also a positive significant correlation between academic strain ($r=0.283$, $p=0.000$), remoteness from school ($r=0.387$, $p=0.000$), perceived stress ($r=0.583$, $p=0.000$) with impairment of physical and psychological health. Thus, with this information we can conclude that we have found that there is a positive significant association between academic strain, remoteness from school with perceived stress, physical and psychological health.

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INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) is an illness caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On December 31, 2019, the World Health Organization (WHO) received the first notification of the outbreak. It began as an epidemic outbreak in Wuhan City, Hubei Province, China that has now spread uncontrollably to the rest of the world and has become a global pandemic [1]. It is an airborne disease transmitted through respiratory droplets produced from coughing or sneezing. The illness manifests usually as fever, a dry cough, sore throat, and fatigability. Some people may get lung infections like pneumonia, organ failure, or septic shock, all of which can result in death [2].

In January 2020, the first case of COVID-19 was detected in Malaysia [3]. In February, the first local Malaysian case was identified. The number of COVID-19 cases were slowly rising in March 2020 until an abrupt increase in cases after that [4]. As a precautionary measure, the Prime Minister of Malaysia announced a Movement Control order (MCO) to reduce the spread of the virus [5]. Employees in the non-critical public sector were obliged to work from home, activities at educational institutions were suspended, closure of businesses, social distancing, followed by border closures [6]. These measures not only have a negative effect on the educational institution but also affected business, health, and tourism sectors [7].

A few studies have been conducted to acknowledge the sources of stress among college students. Examples include a Danish study that suggests the COVID-19 outbreak has influenced university students' academic stress during the first lockdown in Denmark [8]. Moreover, in Qinhuangdao City, Hebei, China, a study was conducted to examine the relationship between three clinical stressors and two types of health in the COVID-19 pandemic setting among undergraduate students recruited from four public universities in China. According to the findings of this study, academic workload, remoteness from school, and fears of contagion all had negative consequences on college students' health. Only 29.2% of the students rated the quality of online courses as good. Where else, 49.2% of the participants said they wanted school to start soon. Of the 867 college students who had participated, 56.2% of them were concerned about the possibility of contracting COVID-19 once the semester began [9].

Due to the implementation of MCO in Malaysia, there has been a sudden shift to virtual teaching and learning in all the universities as well as in other educational facilities [10]. This change is likely to cause an academic strain on the students as it affects teacher-student communication, peer interaction and increases student isolation [8]. There are also concerns that long-term school suspensions, house arrest, and distance learning may have negative effects on the physical and mental health for college students [11]. Moreover, emerging issues during the COVID-19 pandemic, such as clashing family schedules, alterations in eating and sleeping habits, and disconnection from classmates could also negatively affect college students [12].

Academic strain is described as the body's reaction to academic demands that surpass pupils' adaptive capacity. It is regarded as the most common cause of stress among college students, which can come in the form of constant studying, preparing for exams, and short time frames with a large amount of workload [13]. Since the commencement of COVID-19, increased concerns about academic achievement have arisen. This is seen from the lack of motivation to study and poor concentration during virtual classes that has now become a norm. Moreover, learning can also be tough due to poor teacher- student communication and peer interaction in the form of group studies [8]. With that being said, the increasing amount of workload, exams, and assessment conducted along with poor learning and lack of subject mastery can eventually result in poor academic performance, poor health, anxiety and depression [14,15].

Due to the nationwide lockdown, the Malaysian population has been forced to live in social isolation. All educational facilities have also been closed to restrict the movement of citizens, thus students are now being secluded to their homes and confined to loneliness [16]. This has majorly taken a toll on the mental well-being of the students as there is less social interaction. Mental health is a crucial component of overall health and well-being, which includes intellectual, spiritual, and emotional well-being [17]. Without a doubt, social separation reduces social contact and hence slows the transmission of COVID-19. However, social separation can disrupt social rhythms by robbing people of their typical stress coping methods thus, putting their mental health at risk [16]. As a result, knowing the incidence and determinants of mental health problems among college students could aid in the development of effective psychological interventions and the reduction of negative consequences [16].

Fear of infection reflects concerns about having COVID-19 or contracting it. According to research on health anxiety situations such as a global pandemic, cause high levels of stress and anxiety [9]. Due to the current outbreak in Malaysia, the government had decided that since there's a lack of a safe and effective treatment for COVID-19, Malaysia had implemented the strict guideline tailored by WHO. These include using alcoholic hand sanitizers, greetings that omit hand shaking, wearing face masks and even gloves, a minimum of 1-2 metres of distance in social settings, flexing elbows and coughing into them and also self-quarantine if showing of signs of illness and unessential travels are not permitted [2]. Lazarus et al. quoted that stress is "a particular interaction between a person and the environment that the individual perceives to be straining or exceeding his or her resources and putting his or her well-being at risk" [18]. It's also been studied that stress is clearly perceived as an interpretive prototype that contrasts between the individual's stressors and psychological reactions [18]. Hypothetically based on these studies its evident that the fear contagion among medical students may have a negative impact on their stress and health.

The abrupt modification of teaching methods due to the potential risk of death caused by COVID19, isolation and imprisonment have increased the level of anxiety and caused great pressure on the public and students [19,20]. The abnormal stress and depression among students will not only impact their performance, but also increase serious mental health impacts [21]. Therefore, it is essential to study the possible risk factors that could prevent the detriment of students' stress levels and health during the pandemic. Due to the best data collection possibilities, we chose Malaysia as the case country. To add to this, so far,

the majority of the studies have explored the impact of COVID-19 on Chinese students, paramedical staff, patients and even the general public, but have ignored Malaysian medical university students.

A study conducted in Universiti Sains Malaysia, concluded that the prevalence of stress among medical students is high and the top 10 stressors were academic related [22]. To the best of our knowledge, there is no research involving three stressors (academic strain, remoteness from school and fear of infection) correlating to the psychological health and the stress among medical students during the pandemic in Malaysia. Therefore, this study aimed to assess how remoteness from school, academic pressure and fear of contagion during the COVID-19 pandemic affects the medical university student's stress and health.

METHODS

STUDY DESIGN

This cross-sectional study was conducted in the month of June-July 2021 among the undergraduate students in a private medical college in Malaysia.

SAMPLE SIZE

Based on previous research, the prevalence of the students with perceived stress is 22% among medical students in Sarawak, Malaysia [23]. By using Microsoft Excel sample size calculator with a total population of 1300 MBBS students, along with the study estimation of 22%, and a 7% acceptable margin of error, the minimum sample size was 127 participants [24]. With non-response percentage of 20%, the final sample size was estimated as 159 participants.

SAMPLING

Purposive sampling was used to conduct this study. The inclusion criteria were pre-clinical and clinical medical students who voluntarily consented and agreed to participate in our study; they were asked to complete questionnaires to be included in the study. Participants who did not consent, Bachelor of Dental Surgery (BDS) students, and Foundation In Science (FIS) students were excluded from this study.

DATA COLLECTION

A google survey form link was sent through WhatsApp Messenger to each class representative of the concerned subjects to distribute among their classmates. This form was only sent to the preclinical and clinical batch students in the study university. The participation in this study was voluntary.

The questionnaire consisted of six sections: (i) the sociodemographic data of our participants, (ii) questions on fear of infection created by Chunjiang Yang, Aobo Chen and Yashuo Chen [9], (iii) questions on academic strain caused by the pandemic developed by Hystad et al. [25], (iv) remoteness from school by using the attachment avoidance scale developed by Smith et al. [26], (v) Perceived Stress Scale (PSS) [27], (vi) CHQ-12 to assess physical and psychological health [9]. Perceived stress is calculated using the perceived stress scale (PSS). There was a total of 10 questions to answer from, where each question was given a scale of 0 to 4, (0= never, 4= very often). The scores for each question were added up to get a total. Then, it is classified as low stress (score 0-13), moderate stress (score 14-26) and high stress (score 27-40) according to literature. [26]

DATA ANALYSIS

Epi info version 7.0 was used to analyse and calculate the mean, standard deviation, range and correlation of the quantitative data which were fear of infection, academic strain, remoteness from school, perceived stress, and physical and psychological health whereas we have tabulated the qualitative data using Microsoft Excel 2011. The statistical tests used for our hypothesis testing are correlation, unpaired T-test and ANOVA. The level of significance was set at 5%.

ETHICAL CONSIDERATION

Informed consent was obtained from the participants and anonymity was ensured. Ethical approval was granted by the Research Ethics Committee of the Faculty of Medicine, Manipal University College Malaysia, Melaka, Malaysia.

RESULTS

Table 1 presents the demographic characteristics of the respondents. The mean age of our sample was 22.1 (SD1.3). Our study consisted of 67(42.14%) males and 92(57.86%) females. Majority (89.94%) were Malaysian students. Our participants consisted of preclinical and clinical MBBS students, 38(23.90%) participants were in the preclinical phase, while the majority of them,121(76.10%) were in their clinical phase of studies. Most of our participants, 97(61.01%), currently lived with their parents/relatives, while 39 (24.53%) of them lived in the hostel. Only 13(8.18%) of our participants personally knew someone infected with COVID-19 as opposed to 72(45.28%) who didn't (Table 1).

Table 1: Socio-demographic data of the participants (n=159)

Variable	Frequency (%)
Age	
<22	45(28.3%)
>22	144(71.1%)
Mean (SD)	22.1 (1.3)
Minimum- Maximum	19-25
Gender	
Male	67(42.14%)
Female	92(57.86%)
Ethnicity	
Chinese	48(30.9%)
Indian	84(52.83%)
Malay	10(6.29%)
Others	17(9.98%)
Nationality	
Malaysian	143(89.94%)
International Students	16(10.06%)
Religion	
Buddhist	47(29.56%)
Christian	25(15.72%)
Hindu	67(42.14%)
Islam	16(10.06%)
Others	4(2.52%)
Program and Academic Year	
MBBS Clinical Year (semester 6-10)	121(76.10%)
MBBS Pre-clinical Year (semester 1-5)	38(23.90%)
Where and with whom do you live currently?	
Alone in campus	4(2.5%)
Friends outside campus	19(11.95%)
In the hostel	39(24.53%)
Parents/Relatives	97(61.01%)

Do you personally know anyone infected with COVID-19?	
No	72(45.28%)
Yes	13(8.18%)
Do you smoke?	
No	150(94.34%)
Yes	9(5.66%)
Do you consume alcohol?	
No	96(60.38%)
Yes	63(39.62%)
Do you exercise?	
No	39(24.53%)
Yes	120(75.47%)
Scholarship Status	
No	131(82.39%)
Yes, full	1(0.63)
Yes, partial	27(16.98)
Monthly Family Income	
<RM 4360	33(20.75%)
>RM 9619	62(38.99%)
RM 4360- RM 9619	64(40.25%)

Table 2 shows academic strain, remoteness from school, fear of infection, perceived stress, physical and psychological health among the respondents. The mean score for academic strain was 16.3 (SD 4.3). For remoteness from school, the mean score was 52.6 (SD 18.7). For fear of infection, the mean score was 21.1 (SD 5.8). Among 159 students, 1.9% of them were categorized under low perceived stress. Majority of them bringing the total percentage of 95.6 are categorized under high perceived stress while the remaining 2.5% were categorized under moderate perceived stress. Lastly, for physical and psychological health, the mean score calculated was 24.0 (SD 8.5) (Table 2).

Table 2: Academic strain, remoteness from school, fear of infection, perceived stress, physical and psychological health (n=159)

Variables	Mean (SD)	Frequency (n)	Percentage %
Academic strain	16.3 (4.3)		
Remoteness from school	52.6 (18.7)		
Fear of infection	21.1 (5.8)		
Perceived stress	22.9 (6.8)		
Low		3	1.89
Moderate		4	2.52
High		152	95.60
Physical and Psychological health	24.0 (8.5)		

Table 3 shows the correlation between the Academic strain, Remoteness from school, Fear of infection and the Perceived stress among the participants. Based on the absolute value of r which was 0.25 (academic strain and perceived stress) and 0.22 (remoteness from school and perceived stress), the correlation was positive, little if any relationship. When academic strain was more, the perceived stress increased. As the remoteness from school increased, the perceived stress increased (Table 3).

Table 3: Correlation between academic strain, remoteness from school, fear of infection, and perceived stress

Variable	Perceived stress correlation (r)	P value
Academic strain	0.245	0.001
Remoteness from school	0.223	0.003
Fear of infection	-0.141	0.064

Table 4 shows correlation between Academic Strain, Remoteness from School, Fear of Infection, Perceived Stress and Physical and Psychological Health among the participants. The absolute value of r was 0.28 for academic strain and physical and psychological health, indicating the correlation was positive and has little if any relationship. The absolute r value for remoteness from school and physical and psychological health was 0.40 indicating the correlation was positive and had a low relationship. The absolute r value was 0.58 for perceived stress and perceived stress and physical and psychological health, indicating the correlation was positive and had a moderate relationship. When the academic strain increases, their Impairment of Physical and Psychological health increased. As remoteness from school was more, their Impairment of Physical and Psychological health increased and as the Perceived stress among medical students in MUCM increased, their Impairment of Physical and Psychological health increased.

Table 4: Correlation between academic strain, remoteness from school, fear on infection, perceived stress, and physical and psychological health

Variable	Physical and psychological health correlation (r)	P value
Academic strain	0.283	0.000
Remoteness from school	0.387	0.000
Fear of infection	-0.000	0.403
Perceived stress	0.583	0.000

Table 5 shows the association between demographic variables and perceived stress. Only religion was found to be significantly associated with perceived stress among the participants. Under religion, Buddhist, Christian, Hindu, Islam and other religions have the mean perceived stress score of 22.2, 23.5, 24.4, 24.2 and 18.0 respectively (p value 0.028) (Table 5).

Table 5: Association between demographic variables and perceived stress

Demographic variables	Perceived stress Mean (SD)	Mean difference (95% CI)	P value
Gender			
Female	24.1 (5.3)	1.6 (-0.1 – 3.4)	0.068
Male	22.4 (6.2)		
Age			
<22	23.0 (4.6)	- 0.5 (-2.4 – 1.4)	0.624
≥22	23.5 (6.2)		
Ethnicity			
Chinese	22.3 (6.0)	-	0.129
Indian	24.3 (5.7)		
Malay	22.8 (6.6)		
Others	21.9 (4.2)		
Nationality			
International students	23.8 (5.4)	0.5 (-2.4 – 3.4)	0.734
Malaysian students	23.3 (5.8)		
Religion			
Buddhist	22.2 (6.1)	-	0.028
Christian	23.5 (5.2)		
Hindu	24.4 (5.4)		
Islam	24.2 (6.5)		
Others	18.0 (4.3)		
Programme and academic years			
MBBS clinical year (Semester 6-10)	23.6 (6.1)	0.9 (-1.1 – 2.8)	0.382
MBBS pre-clinical year (Semester 1-5)	22.7 (4.7)		
Residing country			

Malaysia	23.4 (5.8)	0.6 (-5.1 – 6.4)	0.828
Outside Malaysia	22.8 (3.1)		
Living situations			
Alone outside campus	27.8 (3.5)	-	0.072
Friends outside campus	25.9 (6.2)		
In the hostel	22.9 (4.7)		
Parents/ Relatives	22.9 (6.0)		
Personally know a person infected with COVID-19			
No	22.7 (6.0)	-1.3 (-3.0 – 0.4)	0.136
Yes	24.0 (5.5)		
Underlying mental/physical health			
No	23.4 (5.8)	0.2 (-3.0 – 3.3)	0.915
Yes	23.2 (5.7)		
Smoking			
No	23.3 (5.6)	-1.6 (-5.3 – 2.1)	0.388
Yes	24.9 (8.3)		
Alcohol			
No	23.2 (5.5)	-0.6 (-2.4 – 1.2)	0.534
Yes	23.7 (6.2)		
Exercise			
No	23.4 (9.3)	<0.1 (-2.0 – 2.1)	0.972
Yes	≈23.4 (8.2)		
Monthly family income			
<RM 4360	22.1 (7.4)	-	0.304
>RM 9619	23.5 (5.1)		
RM 4360 – RM 9619	23.9 (5.4)		

Table 6 shows the association between demographic variables and physical and psychological health. There was a significant association between gender and physical and psychological health. Females' mean score was 25.6 and males' mean score was 22.1 (95% CI 0.9, 6.0, p value 0.007). Students who did not have underlying mental or physical health and students who had underlying mental or physical health had the mean score of 23.6 and 30.3 respectively. The mean difference was -6.7 (95%CI -11.3, -2.2, p value 0.004) (Table 6).

Table 6: The association between demographic variables and physical and physiological health.

Demographic variables	Physical and psychological health Mean (SD)	Mean difference (95% CI)	P value
Gender			
Female	25.6 (8.2)	3.5 (0.9 – 6.0)	0.007
Male	22.1 (8.4)		
Age			
<22	23.5 (8.0)	- 0.9 (-3.6 – 1.9)	0.5395
≥22	24.4 (8.6)		
Ethnicity			
Chinese	22.5 (8.3)	-	0.398
Indian	25.0 (9.2)		
Malay	24.6 (6.2)		
Others	23.7 (5.3)		
Nationality			
International students	25.6 (7.4)	1.7 (-2.6 – 5.9)	0.444
Malaysian students	23.9 (8.5)		
Religion			
Buddhist	22.4 (8.2)	-	0.320
Christian	24.6 (9.5)		
Hindu	25.2 (8.6)		
Islam	24.5 (7.2)		

Others	20.4 (4.4)		
Programme and academic years			
MBBS clinical year (Semester 6-10)	24.7 (8.4)	2.3 (-0.5 – 5.2)	0.106
MBBS pre-clinical year (Semester 1-5)	22.4 (8.2)		
Residing country			
Malaysia	24.2 (8.4)	4.2 (-4.2 – 12.6)	0.326
Outside Malaysia	20.0 (7.3)		
Living situation			
Alone outside campus	23.0 (12.3)	-	0.501
Friends outside campus	26.8 (8.8)		
In the hostel	23.6 (6.6)		
Parents/ Relatives	23.8 (8.8)		
Personally know a person infected with COVID-19			
No	22.8 (8.5)	-2.5 (-5.0 – 0.1)	0.056
Yes	25.2 (8.2)		
Underlying mental/physical health			
No	23.6 (8.3)	-6.7 (-11.3 – 2.2)	0.004
Yes	30.3 (8.0)		
Smoking			
No	24.3 (8.2)	3.8 (-1.6 – 9.2)	0.164
Yes	20.5 (10.6)		
Alcohol			
No	23.5 (7.7)	-1.5 (-4.1 – 1.1)	0.259
Yes	25.0 (9.4)		

Exercise			
No	25.1 (9.3)	1.2 (-1.8 – 4.2)	0.416
Yes	23.8 (8.2)		
Monthly family income			
<RM 4360	21.9 (9.0)	-	0.199
>RM 9619	24.8 (8.9)		
RM 4360 – RM 9619	24.6 (7.6)		

DISCUSSION

This cross-sectional study among medical students in a private medical university to explore how and if these academic strains, remoteness from school and the fear of infection have an impact on the medical students' stress and health during the pandemic. Our main hypothesis was that the academic strain, fear of infection and remoteness from school caused by the COVID-19 pandemic had a negative impact on the stress and health of medical students. The secondary hypothesis was that the pre-existing mental health status of an individual varies in the study and the three stressors mentioned above caused by the pandemic also contribute to the stress and health of the medical students.

Based on the findings our study, there was a significant association between academic strain, remoteness from school and perceived stress. The higher the scores the participants obtained in the academic strain component the higher the perceived stress scores. In previous studies, there was a significant positive correlation between academic strain and perceived stress [9]. The higher the scores the participants obtained in the remoteness from school component, the higher the perceived stress scores. Based on a similar study previously carried out in Hong Kong, they've also demonstrated that separation from school was positively associated with perceived stress [9]. We concluded that this association was a positive association. However, when it comes to fear of infection and perceived stress there was no significant association. In previous studies however there was a significant association between fears of contagion and perceived stress [9].

In this study, we have found that there was a positive significant correlation between academic strain, remoteness from school, perceived stress and the impairment of physical and psychological health. The higher the score of academic strain, the higher the impairment of physical and psychological health. The previous study also showed a significant association as the results obtained were the higher the academic strain the more it indirectly affects physical and psychological health through perceived stress [9]. The higher the score of remoteness from school (the more the student is remote from school) the higher the impairment of physical and psychological health. Compared to the previous study, there is a significant association as well when the separation from school

is more the more it indirectly affects the physical and psychological health through perceived stress [9]. The higher the score of perceived stress (the more stress the student feels), the higher the impairment of physical and psychological health. Collectively the previous study showed that there is a significant association between perceived stress and physical and psychological health [9]. However, we have found that there is no significant association between fear of infection and impairment of physical and psychological health of the individual. This is not the case in the previous study as their results showed a significant association between fear of contagion indirectly affecting physical and psychological health through perceived stress [9].

Regarding the association between demographic variables and perceived stress, there was a significant association of perceived stress between different religions. Hindu have the highest mean score of perceived stress followed by Islam, Christian, Buddhist, and lastly other religions have the lowest mean score of perceived stress. Although there are different mean scores of the perceived stress, the range of the mean scores of all religions fall in 14-26 which indicates moderate stress. For instance, a study conducted in University Sains Malaysia showed religion as one of the main coping strategies [28].

Another study has also proven that an individual with positive religious coping has less perceived stress [29].

A study by Bong-Jae Lee also showed that the stress effect is reduced by religious coping [30].

In addition, a study conducted at church-sponsored school in the Western United States concluded that higher levels of religiosity can reduce negative outcomes with stress [31].

Unfortunately, this study did not study the levels of religiosity and we need more research on different perceived stress levels between different religions to differentiate the stress levels from each religion specifically. However, there is no significant association between perceived stress and other demographic variables which are gender, age, ethnicity, nationality, programme, and academic years, residing country, living situation, personally know a person infected with COVID-19, underlying mental or physical health, smoking, alcohol, exercise and monthly family income. In this study, it could be concluded that gender and those with underlying mental health conditions have a significant association with physical and psychological health. Due to females obtaining a higher mean than males, females are concluded to have a higher impairment compared to males. There has been some research done to study the association between these two factors. A study conducted in Wallonia-Brussels Federation, Belgium, has similar results as theirs and concluded a significant association between gender and physical and psychological health [32].

The results also showed a significant disadvantage for girls compared to boys in psychological complaints through well-being factors (life satisfaction, self-confidence, helplessness, and body image) they were evaluated on. In another study conducted in Italy, the correlation between physical activity and psychological well-being during this time of crisis were evaluated using the PGWBI scores of six health domains comprising anxiety, depressed mood, positive well-being, self-control, general health, and vitality of

participants [33].

There was a significant association between gender and psychological health and the total score of females interpreted reflected moderate distress, thus concluding a higher impairment. Underlying mental conditions has been a concerning factor among undergraduates especially during this pandemic. True enough, the data tabulated shows a significant association between underlying mental/physical health and physical and psychological health. A study was conducted to explore the association of loneliness, typically observed in those suffering from chronic health conditions, mental health conditions, and neurodivergent populations with the mental and physical health [34].

Similarly, the results correspond to our study as there is a significant association and positive detrimental effects on mental and physical well-being. In another study, pre-lockdown and lockdown assessments of depressive symptoms were evaluated and found to have a significant association too [35].

Lastly, another study done in China reported significant association between those with pre-existing mental health conditions and physical and psychological health, having a higher vulnerability to the negative influence of COVID-19 on their physical and psychological health [36].

There were some limitations in our study. The first of many would be our method of data collection which was an online survey using a questionnaire on google forms, without proper face to face explanations and clarifications there could have been less understanding on how to complete the questionnaire and what we expect from it. Secondly, the majority of our sample were clinical year MBBS students compared to pre-clinical year students, the level of exposure and stress between these two groups could vary which would result in a bias in our study. To add on to this, our results are based on our sample which only consists of MBBS students from a private medical university and therefore generalization of the findings might be limited for other medical schools whether in Malaysia or overseas. Future researchers are recommended to increase their sample size by incorporating students from different universities to make the results more representative of medical students. We've also come to terms that different individual has different learning style and educational capacity which could affect our results when it comes to academic strain caused by the COVID-19 pandemic. Hence, future research could maybe explore more on individual learning styles and understanding capacity of a subject matter which may influence the college students' response to stress. Students are able to adapt to the situation and cultivate stress relieving habits such as time management and problem-solving skills that will indirectly lower the impairment of physical and psychological health of the individual [37].

Lastly our study method being cross sectional prevents us from conducting follow ups to see if the students stress and health would've improved when these three stressors induced by the pandemic are no longer applicable. Thus, in the future, research should be conducted as a longitudinal data to follow up the progress of students' health and stress to ensure the conclusion reflects the causation.

CONCLUSION

In summary, our study proved that among the study participants, the increased academic strain and remoteness from school caused an increase in perceived stress, physiological and psychological impairment during the pandemic. In turn the higher perceived stress also caused an increase in physical and psychological impairment among the medical students in MUCM. There is a significant positive, correlation between academic strain, remoteness from school and perceived stress. The correlation between academic strain and physical and psychological health was significant positive too. There was a significant positive, low correlation between remoteness from school and physical and psychological health, while the correlation between perceived stress and physical and psychological health was a significant positive and moderate relationship. For fear of infection, our study showed that there is no significant association with perceived stress and physical and psychological health. It was also found that Hindus (42.14%) perceived the most stress among other religions of the medical students. To add on to this, females (57.86%) were significantly more likely to have physical and psychological impairment. There was also significant association between pre-existing mental or physical health disorders and physical and psychological health. Today's medical students play a big role in improving tomorrow's health care system. Hence, it will be beneficial providing support to cope with academic strain, remoteness from school, fear of infection and perceived stress in order to ensure good physical and psychological health among the medical students.

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What Are The Most Important Attributes Of A ‘Good’ Doctor Among Clinical Phase MBBS Students In Malaysia?

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ABSTRACT

Non-academic attributes are not taught in medical school and mostly learned from home and the upbringing of certain people. Theories and clinical learning are taught in medical schools by experienced professors. A survey and study were done in the United Kingdom with 10 specialists and asked the doctors to rank the most important attributes needed in a good doctor. A cross sectional study was conducted on medical students in a private medical university in Malaysia in April 2021 to study the relationship between demographic profile and the most important factor attributes of a ‘good’ doctor among clinical phase MBBS students. Purposive non-probability sampling method was used, and data was collected through a questionnaire via Google form. Epi info v7.2.4 was used to analyse the data and mean, standard deviation and range was calculated. Based on our results, certain demographic details such as gender, academic performance, race, academic performance, parent monthly income, parent highest education, family members work in medical field had significant association with certain attributes. In conclusion, we were able to understand that certain demographic details had an impact on how medical students in the clinical phase ranks the most important attributes needed in a good doctor.

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INTRODUCTION

Are you a professional doctor? Patients, governments, third-party healthcare payers, and reporters from newspapers, radio, and television are constantly asking this issue. As we known doctor is a professional duty, this job involves knowledge, skills, attitudes, behaviour and also humanity [1].

Every student has ideas to become a good doctor but are they going to fulfil patient expectation? Medical education should instil the ideals and qualities that are needed in the medical profession. The importance of basic medical knowledge and logic should be emphasised, as should moral-ethical problems and communication skills. Humanistic, non-cognitive characteristics should be included in medical school admissions requirements [2].

The 'good doctor', every patient wants. However, what makes a good doctor, is a difficult question to answer. A study carried out by Verena Steiner-Hofbauer, et al had shown good doctors must have few characteristics such as general interpersonal qualities, communication and patient involvement, medical competence, ethics and medical management [3].

Besides that, The European Task Force on Patient Evaluations in General Practice conducted a comprehensive analysis of the literature on patients' preferences for general practise treatment as part of a programme (EUROPEP). "Humaneness" was the most highly rated aspect of treatment. Following that came the words "competence/accuracy," "patients' confidence in decisions," and "treatment time." Themes that are similar have been found in studies that used various approaches to determine the preferences of patients in Scotland, for example, valued having a "doctor who listens and does not rush me," and most studies of patient satisfaction or disappointment emphasise the availability of knowledge and opportunities for participation. Patients are increasingly expecting to have a say in their treatment, but this expectation is rarely fulfilled. Communication breakdowns and erroneous assumptions regarding patients' expectations are all too popular [4].

Medical professionals' education must be presented not only in terms of academic excellence, but also in terms of the development of an intrinsic being surrounded by human values and ethical standards, with the goal of making their professional success in society more humanised and less commodified. We must not ignore the Hippocratic Oath, which establishes the doctor's moral code, which includes confidentiality and professional secrecy. The findings show that medical students in the United States of America have little understanding of the human principles that a doctor in the twenty-first century must understand and apply in his professional performance. Values that he ought to perform his position as a doctor in society, treating the sick as human beings, based on the idea that "there are no diseases, but sick people." Human values and ethics must be prepared, organised, coordinated, and applied as a recommendation in every subject and discipline in the Medical Career and all Careers of the Faculty of Medicine. It must first be developed as a cross-cutting topic in academic management and then integrated into the curriculum of medical careers with sufficient time load [5-12].

To be a good doctor, you need to be a good person: "a supportive partner, a good colleague, a good supermarket customer, a good driver on the route." It's easier to be a good doctor if you like people and genuinely want to assist them. A general practitioner from Wolverhampton wrote: "To like others, from this all else follows. Patients you like will help you get through the tedium of your workday, and patient interaction will provide you with motivation and renewal. You may even do some good." Finally, in contrast to good engineers, accountants, or firefighters, good doctors are not simply above average at their jobs. They're special in a differently way. Extra hardworking, extra compassionate, or extra selfless. Ancient contributors wished for doctors to create personal sacrifices for the sake of their patients. Others argued that doctors must take care of themselves first, otherwise they won't be able to support others. Doctors are also patients [13-15].

Professional expectations of medicine are determined by how the profession and community define a "healthy doctor's" medical practise [16].

High-profile failures to live up to standards have tarnished this reputation and heightened the debate [17,18], however consistent expectations of what makes a successful doctor should guide medical education design [19], the provision of patient-centered services, as well as the quality assurance of both. Despite much discussion, however, empirical research on the good doctor has been limited [20-26]. A study was conducted to find out what moral values medical students value in their education and what values the university has promoted during their graduation. A total of 153 public university students in the state of Rio de Janeiro participated in this quantitative, descriptive, and cross-sectional analysis. Respect, duty, patience, and modesty were identified as the most essential moral principles for medical education by participants, and responsibility, respect, patience, and prudence were identified as the most stimulated during graduation. Students understand the importance of moral education in vocational training and are interested in learning more about it [27-33].

Referencing the points mentioned above, all these bring us to the question, how are medical students going to become a good doctor in the future? In Malaysia, medical schools have not come to a conclusion about what are the non-attributes of a 'good' doctor. This study aimed to identify the most important non-academic attributes of a 'good' doctor and the factors affecting the attributes of a 'good' doctor.

METHODS

STUDY DESIGN AND SETTING

A cross sectional study was conducted in the month of April 2021 among the clinical phase students at a private medical university in Malaysia.

SAMPLING

Previous research about the most important non-academic attributes of good doctors was done in The United Kingdom by Mr. Paul Lambe and Mr. David Bristow from Peninsula College of Medicine and Dentistry, University of Plymouth using The Delphi method. The sampling method that was used is a purposive non-probability sampling. The inclusion criteria consisted of Malaysian and International students of clinical phase from the study institution. The students who did not give their consent and those who failed to complete all the questions were excluded in the data collection.

DATA COLLECTION

The questionnaire included independent variable consisting of demographic profile and dependent variable consisting of ten attributes of 'good' doctor in our survey form. The Google survey form link was sent via WhatsApp to each class representative to distribute among their class group. Each student volunteered to participate in this survey form.

Independent variables included were age, gender, racial or ethnic identification, religion, nationality, semester, parent highest education, family members working in the medical field, parent's occupation, anyone in family owning nursing home/hospital/medical college, parent's monthly income and academic performance. Independent variable part included recognition if patient care was the primary concern of a doctor, probity (being honest, trustworthy and acting with integrity), good communication and listening skills, recognition of own's limits and those of others, pro-social attitude (empathy and non-judgmental), ability to cope with emergency, change complexity and uncertainty, commitment to lifelong learning, competence and performance development, compassion, motivation and commitment and ability to be a team player. For dependent variables, participants were asked to rate using five-point Likert scale 1 (not at all important), 2 (moderately important), 3 (important), 4 (very important) and 5 (always important) [44].

DATA ANALYSIS

The data collected was entered into Microsoft Excel and the compiled data was then statistically analysed using Epi Info version 7.2.4.0. In this study, the qualitative data such as gender, race, nationality, religion, highest education, family income, batch, academic performances and attributes of a good doctor were analysed to derive percentage and frequency. For the quantitative data such as age was analysed to derive mean, standard deviation and range. For inferential statistics, Mann Whitney U test and Kruskal Wallis test were used for data analysis.

ETHICAL CONSIDERATION

An informed consent was obtained from the participants, and the information was kept confidential. This research approved by the Research Ethics Committee of the Faculty of Medicine, Melaka Manipal Medical College, Melaka, Malaysia.

RESULTS

Table 1 shows the demographic profile of the respondents. A total number of 109 responses were received out of 600 clinical phase students from the online questionnaire (response rate of 18.17%). The mean age of the participants was 23 years (SD1.38). Among the participants, 48 (55.96%) were male and 61 (44.04%) were females. For racial/ethnic identification, 10 respondents were Malay (9.17%), 43 respondents were Chinese (39.45%), 39 respondents were Indian (35.78%) and 17 respondents were from other races (15.60%) (Table 1).

Table 1: Demographic of the participants (n=109)

Variables	Frequency (%)
Age	
<22	48 (44.04)
≥22	61 (55.96)
Mean (SD)	23 (1.38)
Minimum – Maximum	20.0 – 30.0
Gender	
Male	48 (55.96)
Female	61 (44.04)
Racial/Ethnic identification	
Malay	10 (9.17)
Chinese	43 (39.45)
Indian	39 (35.78)
Other	17 (15.60)
Parent highest education	
PMR	3 (2.75)
SPM	33 (30.28)
Degree	44 (40.37)
Master	23 (21.10)
PHD	6 (5.50)
Religion	
Islam	15 (13.76)
Buddhist	39 (35.78)
Hindu	30 (27.52)
Christian	22 (20.18)
Other	3 (2.75)
Nationality	
Malaysian	94 (86.24)
Others	15 (13.76)

Anyone in family members work in medical field	
Father	5 (4.59)
Father; Mother	4 (3.67)
Father; Mother; Sibling	2 (1.83)
Mother	1 (0.92)
Mother; Sibling	3 (2.75)
Sibling; No	1 (0.92)
Sibling	10 (9.17%)
No	83 (76.15%)

* multiple answered can be chosen

Table 2 shows Q1, Q2 and Q3 of the non-academic attributes of ‘good’ doctor. Recognition that patient care was primary concern of a doctor, probity (being honest, trustworthy and acting with integrity), recognition of one’s own limits and those of others, pro-social attitude (has empathy and is non-judgemental), ability to cope with ambiguity, change, complexity and uncertainty, commitment to lifelong learning, competence and performance development, compassion, motivation and commitment and ability to be a team player share the same 4.0(Q1),5.0(Q2) and 5.0(Q3). Good communication and listening skills had shown 5.0 in Q1, Q2 and Q3 (Table 2).

Table 2: Non-academic attributes of a ‘good’ doctor (n=109)

Attributes	Q1 (25%)	Median	Q3 (75%)
Recognition that patient care is primary concern of a doctor	4.0	5.0	5.0
Probity (being honest, trustworthy and acting with integrity)	4.0	5.0	5.0
Good communication and listening skills	5.0	5.0	5.0
Recognition of one’s own limits and those of others	4.0	5.0	5.0
Pro-social attitude (has empathy and is non-judgemental)	4.0	5.0	5.0
Ability to cope with ambiguity, change, complexity and uncertainty	4.0	5.0	5.0
Commitment to lifelong learning, competence and performance development	4.0	5.0	5.0
Compassion	4.0	5.0	5.0
Motivation and commitment	4.0	5.0	5.0
Ability to be a team player	4.0	5.0	5.0

Table 3 shows association between various independent variables with recognition that patient care is the primary concern of a doctor (attribute 1). Parent monthly income less than RM 4360 and more than RM 9619 had shown 4.0(Q1), 5.0(Q2) and 5.0(Q3) whereas parent with monthly income between RM 4360 to RM 9619 shows 5.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.018. This showed that only parent monthly income was associated with patient care being the primary concern of a doctor (attribute 1) (Table 3).

Table 3: Recognition that patient care is the primary concern of a doctor compared to the characteristics of the participants (n=109)

Attributes 1: Recognition that patient care is primary concern of a doctor				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.942
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.096
Chinese	4.0	5.0	5.0	
Indian	4.0	5.0	5.0	
Other	5.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	0.365
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.585
No	4.0	5.0	5.0	
Parent monthly income				
< RM 4360	4.0	5.0	5.0	0.018
RM 4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	4.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	5.0	0.0898
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Table 4 shows probity and its association with the demographic characteristics of the participants. Parent monthly income less than RM 4360 showed 4.0(Q1), 5.0(Q2), 5.0(Q3) and parent with monthly income between RM 4360 to RM 9619 showed 5.0(Q1), 5.0(Q2) , 5.0(Q3) whereas more than RM 9619 showed 4.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.029 (significant). In terms of academic performance, poor performance showed 3.0(Q1), 4.0(Q2) and 5.0(Q3) whereas average shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and good performance show 4.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.059 (significant) (Table 4).

Table 4: Probity (being honest, trustworthy, and acting with integrity) compared to the characteristics of the participants (n=109)

Attributes 2: Probity (being honest, trustworthy and acting with integrity)				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.805
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.086
Chinese	4.0	5.0	5.0	
Indian	4.0	5.0	5.0	
Other	5.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	
Undergraduate/ postgraduate	4.0	5.0	5.0	0.652
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.117
No	4.0	5.0	5.0	
Parent monthly income				
< RM 4360	4.0	5.0	5.0	0.029
RM 4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	4.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	5.0	0.059
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Table 5 shows good communication and listening skills compared to the characteristics of the

participants. In terms of academic performance, poor performance shows 3.0(Q1), 4.0(Q2) and 5.0(Q3) whereas average shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and good performance show 4.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.032 (significant) (Table 5).

Table 5: Good communication and listening skills compared to the characteristics of the participants (n=109)

Attributes 3: Good communication and listening skills				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.751
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.209
Chinese	4.0	5.0	5.0	
Indian	4.0	5.0	5.0	
Other	5.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	0.819
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.139
No	4.0	5.0	5.0	
Parent monthly income				
< RM 4360	4.0	5.0	5.0	0.103
RM 4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	4.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	5.0	0.032
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Table 6 shows recognition of one’s own limits and those of others compared to the characteristics

of the participants. Parent highest education where high school shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and undergraduate/postgraduate shows 4.0(Q1), 5.0(Q2), 5.0(Q3) with P-value 0.025 (significant) (Table 6).

Table 6: Recognition of one’s own limits and those of others compared to the characteristics of the participants (n=109)

Attributes 4: Recognition of one’s own limits and those of others				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.400
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.192
Chinese	4.0	5.0	5.0	
Indian	4.0	5.0	5.0	
Other	5.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	0.025
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.108
No	4.0	5.0	5.0	
Parent monthly income				
< RM4360	4.0	5.0	5.0	0.062
RM4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	4.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	5.0	0.107
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Regarding pro social attitude, there was no significant association with gender, race, parent highest education, family members working in the medical field, parent monthly income, and

academic performance of the participants (Table 7).

Table 7: Pro-social attitude (has empathy and is non-judgemental) compared to the characteristics of the participants (n=109)

Attributes 5: Pro-social attitude (has empathy and is non-judgemental)				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.296
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.239
Chinese	4.0	5.0	5.0	
Indian	4.0	5.0	5.0	
Other	5.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	0.508
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.540
No	4.0	5.0	5.0	
Parent monthly income				
< RM4360	4.0	5.0	5.0	0.090
RM4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	4.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	5.0	0.141
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Table 8 shows ability to cope with ambiguity, change, complexity, and uncertainty compared to the characteristics of the participants. Parent monthly income less than RM 4360 shows 4.0(Q1), 5.0(Q2) , 5.0(Q3) and parent with monthly income between RM 4360 to RM9619 shows 5.0(Q1),

5.0(Q2) , 5.0(Q3) whereas more than RM 9619 shows 4.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.014 (significant). In terms of academic performance, poor performance show 3.0(Q1), 4.0(Q2) and 5.0(Q3) whereas average shows 4.0(Q1), 5.0(Q2) , 5.0(Q3) and good performance show 4.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.005 (significant) (Table 8).

Table 8: Ability to cope with ambiguity, change, complexity, and uncertainty compared to the characteristics of the participants (n=109)

Attributes 6: Ability to cope with ambiguity, change, complexity, and uncertainty				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.712
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.201
Chinese	4.0	5.0	5.0	
Indian	4.0	5.0	5.0	
Other	5.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	0.200
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.082
No	4.0	5.0	5.0	
Parent monthly income				
< RM 4360	4.0	5.0	5.0	0.014
RM 4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	4.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	5.0	0.005
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Table 9 shows commitment to lifelong learning, competence, and performance development compared to the characteristics of the participants. Parent highest education where high school shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and undergraduate/postgraduate shows 4.0(Q1), 5.0(Q2), 5.0(Q3) with P-value 0.026 (significant). For family members working in the medical field, results show 4.0(Q1), 5.0(Q2) and 5.0(Q3) for yes and shows 4.0(Q1), 5.0(Q2), 5.0(Q3) for no with P-value 0.021 (significant) (Table 9).

Table 9: Commitment to lifelong learning, competence and performance development compared to the characteristics of the participants (n=109)

Attributes 7: Commitment to lifelong learning, competence, and performance development				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.536
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.086
Chinese	4.0	5.0	5.0	
Indian	4.0	5.0	5.0	
Other	5.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	0.026
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.021
No	4.0	5.0	5.0	
Parent monthly income				
< RM 4360	4.0	5.0	5.0	0.054
RM 4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	4.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	5.0	0.102
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Table 10 shows compassion compared to the characteristics of the participants. In gender, male shows 4.0(Q1), 5.0(Q2) , 5.0(Q3) , female shows 5.0(Q1), 5.0(Q2) ,5.0(Q3) with P value of 0.015 (significant). In terms of academic performance, poor performance show 4.0(Q1), 4.0(Q2) and 5.0(Q3) whereas average shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and good performance show 5.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.017 (significant) (Table 10).

Table 10: Compassion compared to the characteristics of the participants (n=109)

Attributes 8: Compassion				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.015
Female	5.0	5.0	5.0	
Race				
Malay	5.0	5.0	5.0	0.281
Chinese	4.0	5.0	5.0	
Indian	5.0	5.0	5.0	
Other	4.0	5.0	5.0	
Parent highest education				
High school	5.0	5.0	5.0	0.234
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.811
No	5.0	5.0	5.0	
Parent monthly income				
< RM 4360	4.0	5.0	5.0	0.061
RM 4360 to RM 9619	5.0	5.0	5.0	
> RM 9619	5.0	5.0	5.0	
Academic performance				
Poor	4.0	4.0	5.0	0.017
Average	4.0	5.0	5.0	
Good	5.0	5.0	5.0	

Table 11 shows motivation and commitment compared to the characteristics of the participants. In gender, male shows 4.0(Q1), 5.0(Q2), 5.0(Q3), female shows 4.0(Q1), 5.0(Q2) ,5.0(Q3) with P value of 0.046 (significant). Race wise, Malay shows 4.0(Q1), 5.0(Q2), 5.0(Q3), Chinese shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and Indian shows 5.0(Q1), 5.0(Q2) , 5.0(Q3) and others show 5.0(Q1), 4.0(Q2) and 5.0(Q3) with P-value 0.037 (significant). In terms of academic performance, poor performance show 4.0(Q1), 4.0(Q2) and 5.0(Q3) whereas average shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and good performance show 4.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.023 (significant) (Table 11).

Table 11: Motivation and commitment compared to the characteristics of the participants (n=109)

Attributes 9: Motivation and commitment

Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.046
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.037
Chinese	4.0	5.0	5.0	
Indian	5.0	5.0	5.0	
Other	5.0	4.0	5.0	
Parent highest education				
High school	4.5	5.0	5.0	0.589
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	4.0	5.0	5.0	0.380
No	4.0	5.0	5.0	
Parent monthly income				
< RM 4360	5.0	5.0	5.0	0.111
RM 4360 to RM 9619	4.0	5.0	5.0	
> RM 9619	5.0	5.0	5.0	
Academic performance				
Poor	4.0	4.0	5.0	0.023
Average	4.0	5.0	5.0	
Good	4.0	5.0	5.0	

Table 12 shows the ability to be a team player compared to the characteristics of the participants. Race wise, Malay shows 4.0(Q1), 5.0(Q2) , 5.0(Q3), Chinese shows 4.0(Q1), 5.0(Q2) , 5.0(Q3) and Indian shows 5.0(Q1), 5.0(Q2) , 5.0(Q3) and others show 4.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.005 (significant). Parent monthly income less than RM 4360 shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and parent with monthly income between RM 4360 to RM 9619 shows 4.0(Q1), 5.0(Q2), 5.0(Q3) whereas more than RM9619 shows 5.0(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.031 (significant). In terms of academic performance, poor performance shows 3.0(Q1), 4.0(Q2) and 4.0(Q3) whereas average shows 4.0(Q1), 5.0(Q2), 5.0(Q3) and good performance show 4.5(Q1), 5.0(Q2) and 5.0(Q3) with P-value 0.003 (significant) (Table 12).

Table 12: Ability to be a team player compared to the characteristics of the participants (n=109)

Attributes 10: Ability to be a team player				
Independent variable	Q1	Median	Q3	P value
Gender				
Male	4.0	5.0	5.0	0.109
Female	4.0	5.0	5.0	
Race				
Malay	4.0	5.0	5.0	0.005
Chinese	4.0	5.0	5.0	
Indian	5.0	5.0	5.0	
Other	4.0	5.0	5.0	
Parent highest education				
High school	4.0	5.0	5.0	0.947
Undergraduate/ postgraduate	4.0	5.0	5.0	
Anyone in family members work in medical field				
Yes	5.0	5.0	5.0	
No	4.0	5.0	5.0	0.052
Parent monthly income				
< RM 4360	4.0	5.0	5.0	
RM 4360 to RM 9619	4.0	5.0	5.0	0.031
> RM 9619	5.0	5.0	5.0	
Academic performance				
Poor	3.0	4.0	4.0	0.003
Average	4.0	5.0	5.0	
Good	4.5	5.0	5.0	

DISCUSSION

This cross-sectional study investigated association between the demographic factors on clinical phase MBBS students in a private medical institution in Malaysia on selection of the non-academic attributes of a 'good' doctor. Besides that, we aimed to find out what were the most important non-academic attributes of 'good' doctor and its relationship to demographic profile. However, in our study we have found that all clinical phase participants agreed that all the attributes listed are important. Next, academic performance has the most significant association with non-academic attributes of 'good' doctor. A cross-sectional study which involved 153 public university students in the state of Rio de Janeiro have shown respect, duty, patience, and modesty are the most important moral principles for medical education [27-33].

Based on our results, it was found that there was no significant association between gender and recognition that patient care is primary concern of a doctor, probity (being honest, trustworthy and acting with integrity), good communication and listening skills, recognition of one's own limits and those of others, pro-social attitude (has empathy and is non-judgemental), ability to cope with ambiguity, change, complexity and uncertainty, commitment to lifelong learning, competence and performance development, and ability to be a team player. However, there was a positive association between gender and compassion, in which female is higher compared to male. As The Ethics Committee of the American "Society of Academic Emergency Medicine (SAEM)" states: "Compassion is a part of professional competence and is perhaps as technical competence, because both are required to effect meaningful healing" [34].

This came to support the findings of a previous study that compassion is an important moral element for the healthcare system [35], and thus the same finding was found in clinical phase MBBS students. A previous study of gender differences in compassion showed that males had slightly higher levels of compassion than females [36]. As for our study, females had slightly higher compassion compared to male. This might be due to the number of females participating in our study being more than male. There was also a significant association between gender and motivation and commitment. Previous study on motivation as an independent and a dependent variable in medical education showed that female students have significant higher motivation compared to male students [37,38]. Similar to our results, female students have higher motivation and commitment compared to male students.

Furthermore, there was no significant association between race and recognition that patient care is primary concern of a doctor, probity (being honest, trustworthy and acting with integrity), good communication and listening skills, recognition of one's own limits and those of others, pro-social attitude (has empathy and is non-judgemental), ability to cope with ambiguity, change, complexity and uncertainty, commitment to lifelong learning, competence and performance development and compassion. However, there was a significant association between race and motivation and commitment. In our study, we have found that Malay, Chinese and Indian have the same median score which is 5.0 whereas others have 4.0 which is slightly lower. Race and ability to be a team player also showed significant association in which Malay, Chinese, Indian and others have shared the same median score, 5.0. McLelland and Steele (1973) found that there were many factors influenced in individual student on motivation and one of the factors was race [39].

This has supported our finding that there is association between race and motivation. Additionally, our study also revealed that parent highest education and recognition that patient care was primary concern of a doctor, probity (being honest, trustworthy, and acting with integrity), good communication and listening skills, pro-social attitude (has empathy and is non-judgemental), ability to cope with ambiguity, change, complexity and uncertainty, compassion, motivation and commitment, ability to be a team player has no association. However, there was a significant association between parent highest education and recognition of one's own limits and

those of others. In our study, we have found that both high school education and graduate have the same median score of 5.0. Next, there was significant association between parent highest education and commitment to lifelong learning, competence, and performance development. From a previous research, parents' education has made a big impact on children's education and aspiration which support our findings today [40].

Nevertheless, children of more educated parents study in their adulthood more in comparison with children with sons of lower-educated parents [42].

Conclusion, parents receiving higher education have a bigger influence on their child in terms of recognition of one's own limits and lifelong learning. Moreover, there was no association between family members in medical field and recognition that patient care is primary concern of a doctor, probity (being honest, trustworthy, and acting with integrity), good communication and listening skills, pro-social attitude (has empathy and is non-judgemental), compassion, motivation and commitment, ability to be a team player. However, there is significant association between family members work in the medical field with commitment to lifelong learning, competence, and performance development. A previous study has proved that parents who are lifelong learners have influenced almost half of their children to be a lifelong learner too. This article indirectly has proven our result as most of their parents who are involved in the medical field are a lifelong learner, and therefore has a big impact on their children too [41].

Thus, our result strongly recommended that parents play an important role model on influencing their children to become a lifelong learner in their life. In our study, we also found out that there was no significance between parent monthly income and good communication and listening skills, recognition of one's own limits and those of others, pro-social attitude (has empathy and is non-judgemental), commitment to lifelong learning, competence and performance development, compassion, and motivation and commitment. Previous study showed that households with higher income are more likely to make their children participate in lifelong learning. In contrast, our study does not reveal the same result as previous study [42].

In other hand, there is significance between parent monthly income and recognition in patient care being the primary concern of a doctor, probity (being honest, trustworthy and acting with integrity), ability to cope with ambiguity, change, complexity and uncertainty, and ability to be a team player. Next, in our study also showed academic performance has no association with recognition that patient care is the primary concern of a doctor, probity (being honest, trustworthy and acting with integrity), recognition of one's own limits and those of others, pro-social attitude (has empathy and is non-judgemental), and commitment to lifelong learning, competence and performance development [43].

On the other side, academic performance has significant association with good communication and listening skills, ability to cope with ambiguity, change, complexity and uncertainty, compassion, motivation and commitment, and ability to be a team player. There are some limitations to this research. First, only clinical phase medical students from a private medical university in Malaysia were allowed to participate in this research due to the study being done in a short span of time and pre-clinical students have not yet been exposed to posting in hospital yet thus the research will not be able to be generalizable. Secondly, there was concern about the low response rate, which could lead to selective non-response bias. Further researchers are recommended to increase their sample size by incorporating students from different universities in order to make the result more generalizable. Moreover, we recommend that more talks should be held by experienced doctors about the attributes that patients look for in a good doctor. This will be able to cultivate the important attribute for a doctor in students even before stepping into clinical practise.

CONCLUSION

In summary, academic performance is the most important factor affecting clinical phase MBBS students on selection of the non-academic attributes of 'good' doctor. We have also studied the association between demographic profile and non-academic attributes of 'good' doctor in which academic performance has the most significant association. It is significantly associated with good communication skills, ability to cope with ambiguity, change, complexity and uncertainty, compassion, motivation and commitment, and ability to be a team player. Last but not least, all clinical phase MBBS students in this study also agreed that all the attributes listed are the most important non-academic attributes of 'good' doctor.

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Unusual Spontaneous Passing Of Large Renal Calculi

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ABSTRACT

Urolithiasis is among the most common urological diseases encountered in this modern time. This report recounts a case of a 65-year-old Chinese Malaysian gentleman, presenting with left sided flank pain and symptoms suggestive of benign prostatic hyperplasia and recurrent urinary tract infection for 2 years. His pain worsened over the last 2 weeks with a newly developed bladder outlet obstruction. On the 14th day, he passed a stone measuring 10mm x 6mm. Three days later, he passed a second stone measuring 14mm x 9mm x 5mm, followed by haematuria and transient urinary incontinence. Most surgical literature and guidelines draw the cut-off point for spontaneous passing of calculi at 5mm in diameter. This unusual case of spontaneous passage of large urinary calculi serves as another excellent reminder that there are no absolutes in medicine.

INTRODUCTION

Urolithiasis, the presence of a stone or calculus anywhere along the urinary tract, is among the most common urological diseases encountered in this modern time [1,2]. A study done by Yu Liu (2018) revealed that the prevalence of urolithiasis in Asia is between the range of 1% to 19.1% of its entire population [3]. The prevalence in females is approximately 3%-7.1% and nearly double that in males, 8%-19% [4]. In Malaysia, Hussein (2013) reports an incidence of 9.8-27 per 100000 population with a male to female ratio of 4.6 [5]. The financial and clinical burden of urolithiasis on the country's health care system is increasingly worrying.

The formation of urinary calculi is influenced by multiple predisposing factors which can be divided into two categories: intrinsic and extrinsic risk factors [3]. Intrinsic factors are mostly non-modifiable risks like age, gender, ethnicity and familial background whereas extrinsic factors encompass a person's lifestyle, dietary habits, occupation, education level, living environment and climate [3]. Risk factors for recurrence include a young age

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of onset, recurrent urinary tract infections (UTIs), medical diseases like hyperparathyroidism or renal tubular acidosis and a strong familial predisposition for the disease [6].

Stones are an amalgamation of organic and inorganic crystals with proteins [6]. Calcium stones are the most prevalent type. They account for approximately 70%-80% of urinary calculi [6]. Other forms of stone can be uric acid stones (5-10%), cystine stones (1%), struvite and mixed types [6]. Out of these, calcium-based stones, struvite and cystine stones are radio-opaque [6]. Therefore, about 90% of calculi can be easily made out in radiographs.

Urolithiasis may not always manifest with symptoms. Some may remain asymptomatic especially if the size of the calculus is less than 5mm in diameter and deemed insignificant by several guidelines [7,8]. Only 10% to 25% progress to become symptomatic, requiring intervention [7]. Typical clinical presentations are acute renal colic, cramping and intermittent flank pain radiating from loin to groin as the renal calculi make their way down the urinary tract from the kidney to the urinary bladder [9]. The pain is usually associated with nausea, vomiting, and malaise [9]. Fever, chills and rigour may manifest [9]. Microscopic haematuria, detectable by dipstick frequently accompanies pain [9-11]. A thorough physical examination should be performed to rule out other differential diagnoses such as UTIs, ectopic pregnancy in the case of a female in the reproductive age group, testicular torsion, malignancy etc [9, 11-13].

The gold standard for confirming urinary calculi is non-contrast computed tomography (CT) [10]. Aside from diagnosing the presence of calculi, CT imaging can assess the size and position of the calculi while ruling out hydronephrosis [7, 9, 11]. However, ultrasonography remains a preferred first-line imaging technique due to its wide availability and cost-effectiveness, though inferior to a CT scan's sensitivity and specificity [7, 11,14]. Besides, plain radiographs are routinely performed to supplement diagnosis by assessing if the stone(s) are radio-opaque and if they can be used in further follow-ups in patients who are expected to spontaneously pass them. [10]. A urine full examination and microscopic examination (FEME) together with a sample for culture and sensitivity should be done to exclude UTIs [7,9,11].

Depending on the patient's presentation, either emergency or elective, treatment modalities vary. If the stone is less than 5mm in diameter, it may be passed out spontaneously [10]. Medical expulsive therapy, though controversial, may be attempted. For larger stones, non-invasive therapy includes extracorporeal shockwave lithotripsy (ESWL) while invasive intervention involves ureteroscopy, percutaneous nephrolithotomy (PCNL) and/or open stone surgery. This report recounts a case of an elderly Malaysian man spontaneously passing unusually large renal calculi.

CASE PRESENTATION

A 65-year-old Chinese Malaysian gentleman, working as a construction coordinator, with a background of uncontrolled type 2 diabetes mellitus first diagnosed 10 years ago but defaulted follow-up, presented with left sided flank pain for 2 years. Pain was insidious in onset, intermittent, colicky in nature, radiating from the left loin to groin with a severity of 8-9/10. Timing of pain varies, at times lasting from a 2-3 hours to a full day. It is exacerbated by cold beverages, and standing and walking from sitting position. Pain is relieved (2-3/10) by taking over-the-counter (OTC) oral analgesics, naproxen sodium 550mg 2 - 4 tablets a day. Progress worsened over the last 2 years.

He also reports having episodic burning sensation on micturition for the same duration. Each episode lasting 2 - 3 days, every other 2 - 3 weeks.

There was also increase frequency of micturition, nocturia (2 - 3 times a night), weak stream, dribbling, intermittency and sensation of incomplete bladder emptying.

Starting from 14 March 2022, the left flank pain worsened and became continuous throughout the day with excessive sweating, oliguria, incomplete voiding, dribbling, straining on micturition, suprapubic distention and discomfort, and constipation (evacuating bowels once every 3 - 4 days; normal: daily) for 2 weeks. Analgesics provided little to no relief. His activity of daily living was significantly disturbed, being by the toilet almost all day and night. At the end of the 14th day, he described passing out a stone-like mass in his urine, measuring up to about 10mm x 6mm. He crushed it and threw it away.

3 days later, he developed urinary retention and severe suprapubic pain for 24 hours. He felt a hard mass along the length of the penile urethra and milked it proximally until the external urethral orifice. He manually removed the mass using a pair of tweezers (Figure 2). It was later identified as a urinary stone, measuring up to 14mm x 9mm x 5mm (Figure 1). Urine gushed out immediately following the removal of the stone and suprapubic pain was relieved. Haematuria was present following the incident for half a day only and urinary incontinence developed, but is gradually improving.



Figure 1: Second urinary calculus passed spontaneously in urine.



Figure 2: Tweezer used to remove the second urinary calculus at the external urethral orifice.

He sought medical attention for the first time 2 days following the passage of the second stone upon advice of a friend regarding these issues.

There was no history of fever, chills and rigour, loss of appetite or weight, vomiting, epigastric pain/discomfort and jaundice. He takes a westernized diet, mostly high in protein and lipids. He is also taking OTC calcium, fish oil and various other health supplements inconsistently.

DISCUSSION

This case report recounts a 65-year-old Malaysian Chinese man, spontaneously passing, based on gross morphology (Figure 1), what looks to be a calcium oxalate stone in two separate events, 3 days apart, with the dimensions 7mm x 3mm (based on description) and 14mm x 9mm x 5mm (based on observation) respectively. These occurrences, especially the latter, are highly unusual as most surgical literature and guidelines draw the cut-off point for spontaneous passing of calculi during micturition to be about 5mm in diameter [6, 10, 15]. This is because the lumen of the ureters is on average, 3mm in diameter with constrictions at five locations: 1) pelvic-ureteric junction, 2) at the brim of the lesser pelvis, 3) point of crossing of the ductus deferens in male; broad ligaments in female, 4) vesicoureteric junction (VUJ) and 5) its opening at the lateral angle of trigone of bladder [16]. VUJ is the most frequent site of obstruction [15]. Furthermore, the average length of the male urethra is 20cm in length, 8mm in diameter, with the membranous part being the least distensible portion due to the external urethral sphincter and the external urethral orifice being the narrowest part of its entire length [16,17].

This case has clearly shown that both stones, each exceeding the standards of literature, have succeeded in overcoming all the potential sites of obstruction to ultimately present themselves at the external urethral orifice only to be manually extracted by the patient with a pair of tweezers. Under normal circumstances, renal calculi with such dimensions are indicated for surgical intervention. Aggarwal (2017) states that stones less than 4mm are more likely to pass spontaneously and stones more than 8mm are unlikely to pass without providing surgical intervention [15]. Barnela (2012) concurs by adding that 95% of stones larger than 8mm require intervention [6]. For stones larger than 5mm, treatment options include extracorporeal shockwave lithotripsy (ESWL), ureteroscopy, percutaneous nephrolithotomy (PCNL) and/or open stone surgery.

Risks factors identified in this patient for the development of urinary calculi are age, gender, occupation- laborious work and dietary habits. This is in concordance with the risks described by Liu (2018) [3].

Aside from the typical presentation of a loin to groin, ureteric colic that strongly points toward a renal calculus, the patient's history also suggests a high probability of benign prostatic hyperplasia (BPH) with possible recurrent UTIs as evident by the presence of incomplete emptying, frequency, intermittency, weak stream, straining and nocturia, ticking off 6 out of the 7 symptoms screened in the International Prostate Symptom Score (IPSS), overlapped with recurring periods of dysuria.

The worsening of flank pain, increasing suprapubic distention and discomfort and the subsequent development urinary retention over the last 2 weeks would suggest that the renal calculi had travelled down the ureter into the bladder, obstructing the urinary outflow tract. Constipation during this period may be attributed to the distended bladder compressing on the rectum posteriorly. Suppose he were to present as an emergency case at this stage, the first line of treatment would be to catheterize the bladder for immediate relief. Adequate analgesics should be given for pain management before proceeding with further investigations to determine the cause.

The onset of haematuria and transient urinary incontinence after the passing of the second calculus suggest damage along the outflow tract, namely the urethral sphincters and urethral mucosa. Fortunate enough, these complications have either completely resolved or are gradually improving, avoiding the need for further treatment.

A few investigations are warranted to ensure complete expulsion of the stone, diagnose BPH and recurrent UTI and monitor diabetes mellitus. Firstly, a renal function test (RFT) should be done, paying close attention to eGFR, urea and creatinine to rule out renal impairment. High serum calcium and uric acid levels are risk factors. Next, an X-ray of the kidney, ureter and bladder (KUB) should be taken to look for any remaining calculi and their location if present. Ultrasonography or non-contrast CT can be done to assess kidney size, ruling out hydronephrosis and/or remaining stone. Prostate-Specific Antigen (PSA) is used to suggest the diagnosis of BPH. A digital rectal examination must be done to assess the size, consistency and presence of the median groove of the prostate. If further indicated, other modes of confirmation, such as transrectal ultrasonography, uroflowmetry, pressure-flow studies, postvoid residual urine (PVR) measurements and/or urethroscopy can be performed [18]. If the diagnosis of BPH is confirmed, medical or surgical therapeutic options are offered. In addition, a urinalysis and a midstream urine sample for culture and sensitivity testing are done to rule out a UTI. Appropriate antibiotic therapy must be initiated if significant bacterial colony forming units (CFU) is reported. Lastly, a diabetic work-up, including physical examination, should be performed to monitor blood sugar levels and check for macrovascular and microvascular complications of diabetes mellitus.

CONCLUSION

Spontaneous passage of urinary calculi measuring more than the standard cut-off of 5 mm in diameter is rarely reported. This unusual case serves as another excellent reminder that there are no absolutes in medicine. There are always exceptions to the rule.

ACKNOWLEDGEMENT

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ETHICAL CONSIDERATION

An informed consent form detailing all the important and relevant particulars of the case report was provided to the patient. The patient was given full freedom of choice to volunteer information for this case report. No incentives were given to encourage cooperation, nor was the patient coerced or forced into taking part in this study. Whatever information that was provided by the participants is kept strictly confidential and served only the purpose of this case report. Anonymity and privacy of the patient were ensured.

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A Synopsis on the Kinds and Functions of Human Hormones

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Key words: *Classification, Functions, Hormones, Amine, Peptide, Steroid, Eicosanoid, Deficiency, Organ systems*

ABSTRACT

Based on the classification of human hormones, there is no solid idea in most books. In this view, this article could exemplify a concrete solution, especially for medical and university students. Hormones have many life-saving roles in the human body. With the deficiency of hormones, our body might fall into lots of severe problems. Data analyses of much information from books, articles, as well as online supplements provided different ideas on the total hormones. The result suggested that some hormones were secreted from the same glands. Out of 110 hormones (when the same hormone produced from different sources), different types of hormones were 88. Analyzed hormones consisted of four major groups- amine (4 hormones), eicosanoid (4), steroid (15), and peptide (65) out of 88 endocrine chemicals. The endocrine and reproductive system (56) jointly secreted most of the hormones, and secondly gastrointestinal tract (26 hormones). Besides the organ system or glands, some were secreted from the cell, tissue, tissue system, and placenta. This paper also mentioned that many sex hormones were found both in males and females. In future, it is needed to enhance more research on the classification of the hormones in human body.

MOTIVATION

Secretin, gastrin, and cholecystokinin were the first gastrointestinal hormones [1, 2, 3] and also the first structurally identified and are the largest endocrine organ in the body. Knowledge about the physiology and anatomy of the gut endocrine system is most helpful for the clinician to understand the pathophysiology of certain diseases (excess hormone production from gut endocrine tumours) [4]. Neuronal sensitivity may be involved in common gastrointestinal diseases like irritable bowel syndrome [5]. The latest research will relate to gut peptides associated with deficiency diseases as potential growth factors in malignancies [6]. The posterior pituitary gland is not a true gland [7], but a collection of

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axons extending from the hypothalamus supraoptic and paraventricular nuclei terminating behind the anterior pituitary gland [8, 9]. The phylogenetic story of the gastrin family reveals that gastrointestinal hormones indeed are very old, and has evolved from a single ancestor [10]. Secretin was believed to exist only as a carboxyamidated peptide of 27 amino acid residues for many years [11, 12]. The gut or digestive system is the largest hormone-producing organ in the body (number of endocrine cells and number of hormones) [13, 14]. A study of the 1960s showed that gastrointestinal hormones could be peptides of 20-30 amino acid residues [10]. Hair follicles and sebaceous glands are the targets for androgens secreted by the gonads and adrenal cortex [15, 16] and melanocytes are directly influenced by polypeptide hormones of the pituitary gland [17]. Glucocorticoid receptor expressed in basal keratinocytes, Langerhans cells, and dermal fibroblasts [18, 19]; androgen receptor [16, 20, 21, 22], and progesterone receptor is expressed in basal epidermal keratinocytes only [23]; thyroid hormone receptor [24, 25], and estrogen receptor [22, 26, 27, 28, 29]. It has been recognized that estrogens are important in the maintenance of human skin [26] because the skin is also a source of corticosteroids [30]. Circulatory testosterone is a co-produced chemical in the skin and other peripheral organs [31]. There is no doubt that human skin is the largest peripheral endocrine organ [32]. More than 30 peptide hormone genes express more than 100 bioactive peptides, and monoamines and eicosanoids hormonal messenger [33]. Hormonal differences between males and females, their body muscles differ [34].

HYPOTHESES

The total number of hormones depends on the chemical composition, same hormones from the different organs/glands, as well as organ systems of the human body.

METHODS

In the higher secondary course of Bangladesh, there are some ideas on human hormones in the Zoology textbook, but those are not adequate. A Biology teacher undergoes lack of clarification about the hormones for the students. A Textbook of Medical Physiology [34], most of the hormones were elaborated with proper classification and functions. On the internet, a list of human hormones exhibited eighty plus hormones. Research articles and books were helpful for the qualitative analyses of chemicals and quantitative method was applicable for ensuring the maximum number of such hormones (Appendix 1).

RESULTS

Out of 88 hormones, 65 were in the peptide group, steroid 15 and others (amine and eicosanoid) 4 each (Table 1; Figure 1). Androstenedione is a steroid hormone available in the kidney, testis, and ovary. Dehydroepiandrosterone was second in their position secreted from the same organs (Table 2). Since the 'endocrine system' and 'reproductive system' are different in the human body but based on secreted hormones, these two systems secrete hormones jointly. Total 56 types of hormones were secreted from here that were the highest. From the digestive system 26 hormones (Table 3; Figure 2) were secreted that covered many biological activities through supplying the nutrients within the cell.

Table 1. Chemical composition of the hormones with their numbers

Chemical composition	Name of hormones	Number
Peptide	Brain natriuretic peptide, endothelin, thrombopoietin, adiponectin, lepsin, galanin, cortistatin, orexin, pituitary adenylate cyclase-activating peptide, prolactin-releasing hormone, vasoactive intestinal peptide, somatostatin, thyrotropin-releasing hormone, gastrin, ghrelin, oxyntomodulin, cholecystokinin, enterocrinin, gastric inhibitory polypeptide, glucagon-like peptide I, enteroglucagon, secretin, motilin, guanylin, angiotensinogen, angiotensin I, hepcidin, insulin-like growth factor I, lipasin, amylin, pancreatic polypeptide, glucagon, insulin, incretin, somatotropin, thyroid stimulating hormone, adrenocorticotrophic hormone, follicle stimulating hormone, prolactin, luteinizing hormone, lipotropic, endorphin, melanocyte stimulating hormone, oxytocin, vasopressin, melatonin, triiodothyronine, calcitonin, parathormone, atrial natriuretic peptide (ANP), thymosin, thymulin, thymopoietin, thymic humoral factor, enkephalin, erythropoietin, uroguanylin, renin, anti-mullerian hormone, inhibin, relaxin, human placental lactogen, human chorionic gonadotropin hormone, angiotensinogen II, osteocalcin	65
Steroid	calcidiol, calcitriol, dehydroepiandrosterone, dihydrocholecalciferol, androstenedione, cortisol, aldosterone, testosterone, dihydrotestosterone, estrogen, estradiol, gonadocorticoid, estrone, estriol, progesterone	15
Amine	dopamine, thyroxine, adrenaline, nonadranaline	4
Eisosanoid	thromboxane, leukotrienes, prostaglandin, prostacyclin	4

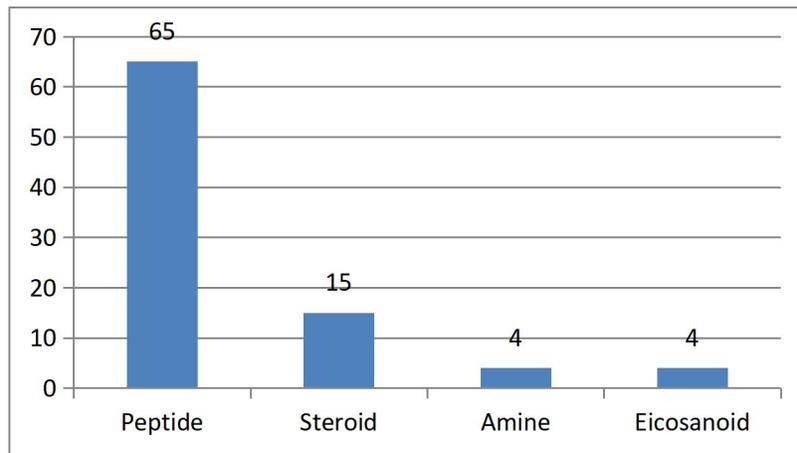


Figure 1. Number of hormones corresponding with their chemical composition

Table 2. Same hormones from the different portions

Hormones	Glands/Organs	Found in places
Androstenedione	kidney, adrenal cortex, adrenal medulla, testis, ovary	5
Dehydroepiandrosterone	testis, ovary, kidney	3
Estradiol	testis, ovary	2
Estriol	ovary, placenta	2
Estrogen	testis, ovary, placenta	3
Gastrin	stomach, pancreas	2
Gonadocorticoid	testis, ovary	2
Inhibin	testis, ovary, fetus	3
Progesterone	ovary, placenta	2
Ralaxin	decidual cell, prostate gland	2

Somatostatin	hypothalamus, pancreas	2
Thrombopoietin	striated muscle, liver, kidney	3
Vasoactive intestinal peptide	hypothalamus, from duodenum to rectum (gut), pancreas	3

Table 3. Organ system-wise secreted hormones

Organ system/Others	Secreted hormones
Integumentary system	1
Circulatory system	4
Muscular system	2
Nervous system	9
Digestive system	26
Endocrine system + Reproductive system	56
Respiratory system	1
Skeletal system	1
Others (nucleated cells, adipocytes, decidual cells, placenta, fetus)	10

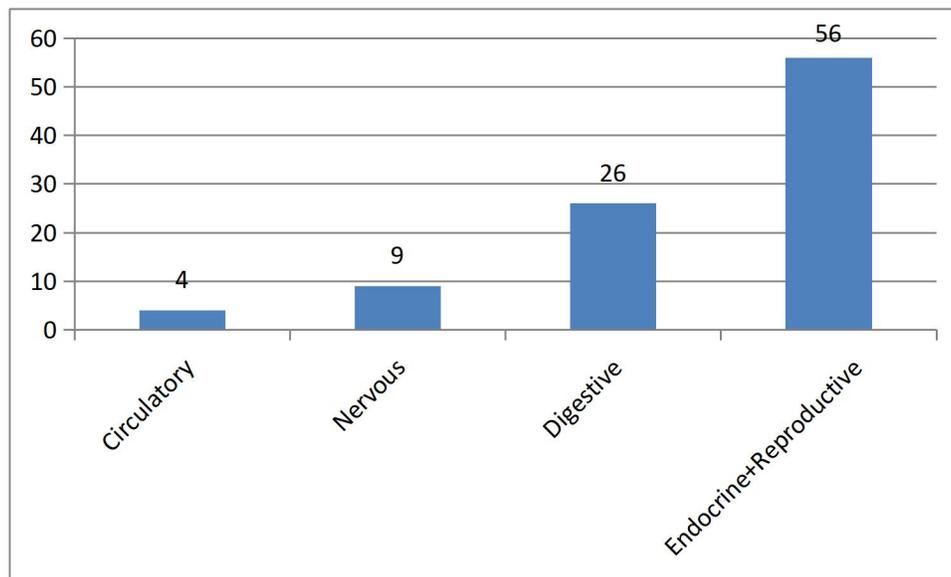


Figure 2. Number of hormones depending on the organ systems

CONCLUSION

Our body is composed of many chemicals, and all have a remarkable impact on the body. Identified 88 hormones are not an easy task to know their all functions shortly. Studied hormones have unbelievable acts in our 12 organ systems. Moreover, all nucleated cells, tissue, and tissue system play a significant role as a whole. Hormonal deficiencies have a very negative role in our life. Through the proper classification of these hormones make us more curious to discover their unseen functions. In the future, it needs to enhance more research on the division of hormones in the human body.

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Appendix 1. Total hormones and their functions

Name	Status	Secreted hormone(s)	Chemical composition	Functions
Skin	Organ system	Calcidiol	Steroid	Inactive form of vitamin D ₃
Heart	Organ	Brain Natriuretic Peptide (BNP)	Peptide	Reducing bile production
Blood	Tissue	Thromboxane	Eicosanoid	Vasoconstriction, platelet aggregation
	Tissue	Leukotrienes	Eicosanoid	Increase vascular permeability
Endothelial cell	Cell	Endothelin	Peptide	Smooth muscle contraction
All nucleated cells	Cell	Prostaglandin	Eicosanoid	Vasodilation
Striated muscle	Organ	Thrombopoietin	Peptide	Produce platelets
Vascular muscle cells	Cell	Prostacyclin	Eicosanoid	Vasodilation; Platelet activation inhibitor
Adipocytes	Cell	Adiponectin	Peptide	Regulating glucose levels
	Cell	Leptin	Peptide	Inhibits appetite, stimulates thermogenesis
Central Nervous System (CNS)	Organ system	Galanin	Peptide	Action potentials in neurone
Cerebral cortex	Tissue system	Cortistatin	Peptide	Neural activity (slow wave sleep)
	Organ	Orexin	Peptide	Increased appetite
	Organ	Pituitary adenylate cyclase-activating peptide	Peptide	Stimulates enterochromaffin-like cells
	Organ	Prolactin-releasing hormone	Peptide	Release prolactin
	Organ	Prolactin-inhibitory factor/Dopamine	Amine	Inhibits release of prolactin

Hypothalamus	Organ	Vasoactive intestinal peptide	Peptide	Blood pressure; Relax smooth muscle of trachea; Stomach; Gall bladder
	Organ	Somatostatin (growth hormone-inhibiting hormone/growth hormone release-inhibiting hormone/somatotropin release-inhibiting factor/somatotropin release-inhibiting hormone)	Peptide	Prevent the production of other hormones (may occur in tumours); Act as neurotransmitter; Role in gastrointestinal tract
	Organ	Thyrotropin-releasing hormone	Peptide	Release thyroid stimulating hormone; Stimulates prolactin release
Stomach	Organ	Gastrin	Peptide	Stimulates HCl secretion by parietal cells
	Organ	Ghrelin	Peptide	Stimulate appetite
	Organ	Oxyntomodulin	Peptide	Suppress appetite
Duodenum	Organ	Cholecystokinin	Peptide	Release digestive enzyme and bile juice
	Organ	Enterocrinin	Peptide	Increase the secretion of alkaline mucous
Duodenum and jejunum	Organ	Gastric inhibitory polypeptide	Peptide	Induce insulin secretion
Ileum	Organ	Glucagon-like peptide I	Peptide	Release of insulin
	Organ	Enteroglucagon	Peptide	Intestinal growth and dilation; Reduce the chance of apoptosis
	Organ	Secretin	Peptide	Stimulates

Small intestine				pancreatic acinar cells to release bicarbonate and water
	Organ	Motilin	Peptide	Stimulates gastric activity
Intestine (from duodenum to rectum (gut))	Organ	Vasoactive intestinal peptide	Peptide	Blood pressure; Relax smooth muscle of trachea; Stomach; Gall bladder
	Organ	Guanylin	Peptide	Regulates electrolytes
Liver	Organ	Angiotensinogen	Peptide	Vasoconstriction
	Organ	Angiotensin I	Peptide	Vasoconstriction
	Organ	Hepcidin	Peptide	Inhibits iron export from cells
	Organ	Insulin-like growth factor I	Peptide	Insulin-like effects
	Organ	Thrombopoietin	Peptide	Produce platelets
	Organ	Lipasin/Betatrophin	Peptide	Stimulates the insulin-secreting beta cells
Pancreas	Organ	Amylin (Islet amyloid polypeptide)	Peptide	Inhibits digestive secretion
	Organ	Pancreatic polypeptide	Peptide	Pancreatic secretions
	Organ	Vasoactive intestinal peptide	Peptide	Blood pressure; Relax smooth muscle of trachea; Stomach; Gall bladder
	Organ	Somatostatin (growth hormone-inhibiting hormone/growth hormone release-inhibiting hormone/somatotropin release-inhibiting factor/somatotropin release-inhibiting hormone)	Peptide	Prevent the production of other hormones (may occur in tumours); Act as neurotransmitter; Role in gastrointestinal tract

	Organ	Glucagon	Peptide	Increase glucose
	Organ	Insulin	Peptide	Decrease glucose
	Organ	Incretin	Peptide	Stimulates pancreas including insulin release
	Organ	Gastrin	Peptide	Stimulates HCl secretion by parietal cells
Anterior pituitary	Gland	Growth hormone/Somatotropin	Peptide	Maintain growth
	Gland	Thyroid stimulating hormone	Peptide	Stimulates thyroid gland
	Gland	Adrenocorticotrophic hormone	Peptide	Stimulates adrenal glands
	Gland	Follicle stimulating hormone	Peptide	Stimulates follicle cells
	Gland	Luteotrophic/Lactogenic/Prolactin	Peptide	
	Gland	Luteinizing hormone/Lutropin/Gonadotrophic hormone/Interstitial cell-stimulating hormone in male	Peptide	Stimulates gonads
	Gland	Lipotropin	Peptide	Lipolysis; Stimulates melanocytes
	Gland	Endorphin	Peptide	Act as analgesics (diminish the perception of pain)
Mid pituitary	Gland	Melanocyte stimulating hormone/Melanotropin/Intermedin	Peptide	Stimulates melanocytes
Posterior pituitary	Gland	Oxytocin	Peptide	Uterine contraction in birth
	Gland	Vasopressin/Anti-diuretic hormone	Peptide	Water absorption
Pineal gland	Gland	Melatonin	Peptide	Sleep patterns (circadian rhythms)
Thyroid	Gland	Thyroxine	Amine	Maintains metabolic rate

	Gland	Triiodothyronine	Peptide	Maintains metabolic rate
	Gland	Calcitonin	Peptide	Regulate levels of calcium and phosphate
Parathyroid	Gland	Parathyroid hormone/Parathormone/Parathyrin	Peptide	Absorption of calcium
	Gland	Atrial Natriuretic Peptide (ANP)	Peptide	Powerful vasodilator
Thymus	Gland	Thymosin	Peptide	Stimulate the production of T cell, which are important for immune system
	Gland	Thymulin/Thymic factor	Peptide	Circadian rhythm
	Gland	Thymopoietin	Peptide	Process of T cells differentiation
	Gland	Thymic humoral factor	Peptide	It increases immune response to particular virus
Kidney	Gland	Calcitriol	Steroid	Increase absorption of vitamin D3 and calcium
	Gland	Enkephalin	Peptide	Regulate pain
	Gland	Thrombopoietin	Peptide	Produce platelets
	Gland	Erythropoietin	Peptide	Erythrocyte production
	Gland	Uroguanylin	Peptide	Regulate electrolytes
	Gland	Dehydroepiandrosterone	Steroid	Virilization, anabolic
	Gland	Renin	Peptide	Conversion of angiotensinogen to angiotensin I
	Gland	Dihydroxycholecalciferol	Steroid	Bone mineralization
	Gland	Androstenedione	Steroid	Substrate for estrogen
	Gland	Androstenedione	Steroid	Substrate for

Adrenal cortex				estrogen
	Gland	Cortisol/Hydrocortisone/ Glucocorticoid	Steroid	Immune response
	Gland	Aldosterone/Mineralocorticoid	Steroid	Control blood pressure
Adrenal medulla	Gland	Androstenedione	Steroid	Substrate for estrogen
	Gland	Epinephrine/Adrenaline	Amine	Solve any unwanted situation
	Gland	Nor-epinephrine/Nor-adrenaline	Amine	Make people calm
Testis	Gland	Anti-Mullerian hormone	Peptide	Inhibit release of prolactin and TRH (thyrotropin-releasing hormone) from anterior pituitary
	Gland	Inhibin	Peptide	Inhibit production of FSH
	Gland	Testosterone	Steroid	Male sexual characteristics
	Gland	Dehydroepiandrosterone	Steroid	Virilization; Anabolic
	Gland	Dihydrotestosterone	Steroid	Male puberty and adult characteristics
	Gland	Androstenedione	Steroid	Substrate for estrogen
	Gland	Estrogen	Steroid	Male physical feature and reproduction; Need to produce testosterone
	Gland	Estradiol	Steroid	Essential for the production of sperm
	Gland	Sex steroid/Gonadocorticoid	Steroid	Stimulates sexual organs
Prostate gland	Gland	Relaxin	Peptide	It relaxes pelvic

				ligaments
Ovary	Gland	Estrogen	Steroid	Female physical feature and reproduction; Need to produce testosterone
	Gland	Estrone	Steroid	Female sexual development
	Gland	Estradiol	Steroid	Ovulation; Thickening of the uterine wall; Implantation
	Gland	Estriol	Steroid	Female physical feature and reproduction; Need to produce testosterone
	Gland	Progesterone	Steroid	Menstrual cycle; Menopause; Pregnancy; Need to produce testosterone
	Gland	Inhibin	Peptide	Inhibit production of FSH
	Gland	Testosterone	Steroid	Male-like sexual characteristics in female
	Gland	Dehydroepiandrosterone	Steroid	Virilization; Anabolic
	Gland	Androstenedione	Steroid	Substrate for estrogen
	Gland	Sex steroid/Gonadocorticoid	Steroid	Stimulates sexual organs
Decidual cells	Cell	Relaxin	Peptide	Relaxes pelvic ligaments
	Organ	Human placental lactogen/Human somatomammotropin hormone	Peptide	Increase production of insulin; Metabolism of pregnant woman;

Placenta				Probably development of fetal tissue and mother's breast
	Organ	Human chorionic gonadotropin hormone	Peptide	Growth of corpus luteum
	Organ	Estrogen	Steroid	Female physical feature and reproduction; Need to produce testosterone
	Organ	Estriol	Steroid	Uterine growth
	Organ	Progesterone	Steroid	Menstrual cycle; Menopause; Pregnancy; Need to produce testosterone
Fetus	Organ	Inhibin	Peptide	Inhibit production of FSH
Lung	Organ	Angiotensin II	Peptide	Regulates haemodynamic profile
Skeleton	Organ system	Osteocalcin	Peptide	Muscle function; Testosterone synthesis and energy expenditure

Source: [34, 35]

N. B. Total secreted hormones (same hormones from the different organs/glands) 110; but the different kinds are 88.

REVIEW ARTICLE

Application of Gagne's Theory of Instructional Design in Training Statistics to Medical Students

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Keywords: *Statistics, Biostatistics, Gagne's Theory of Instruction, medical education.*

ABSTRACT

Research methodology and statistical training are relevant to both undergraduate and postgraduate healthcare students. Medical educators play a crucial role to provide well-planned, effective training on statistics, which should be student-centered to equip the skill in data analysis and interpretation. In order to deliver effective teaching or training, educators use the instructional design models and integrate them into the curriculum. In this article, Gagne's theory of nine-step instructional model design is applied to the biostatistics training of undergraduate medical students. It will provide a sample framework for future statistical training programmes.

INTRODUCTION

A new paradigm of evidence-based medicine has been emphasized in the medical practice worldwide (1, 2). Evidence-based medicine covers the scope of individual clinical expertise, patient values and circumstances, and research evidence, that aims to improve the patient outcome (3). Therefore, medical research and statistics training is essential and integrated into the undergraduate curriculum (4). Medical students revealed that learning statistics is challenging to comprehend which could negatively

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affect their future application and interpretation of medical research (4). Therefore, medical educators play a crucial role to provide well-planned, effective training on statistics, which should be student-centered to equip the skill in data analysis and interpretation.

In order to deliver the effective teaching or training, educators use the instructional design models to create a session, course, or curriculum (5). There are several instructional model designs in medical education, however, most of them include the essential phases of setting learning outcomes, designing the activities to achieve the learning outcomes, implementation, evaluation, and reflection (6). Gagne's framework is useful and systemic in designing a lesson plan, which is based on the information processing model (7). It has been applied in various teaching sessions including for communication training, skills improvement, and web-based instructional courses (7-9).

In this article, we will present the application of Gagne's theory of instructional model design for training statistics to undergraduate medical students. Gagne proposed nine phases of instructions will include the example of training biostatistics by using Epi info statistical software (10).

PRE-REQUISITE LEARNING

In Gagne's framework, the pre-requisite is considered as "internal conditions for learning" that must be fulfilled prior to the current teaching session (7, 11). The consideration of prior knowledge is an essential step in lesson planning. Based on the prior knowledge, the teaching or training session could be planned to add new knowledge. This concept is in line with the constructivism learning theory in which new knowledge is added to the pre-existing learning (12, 13).

In our medical university, early exposure to research is encouraged and students participated in the mentored student projects (MSP) during their pre-clinical years. When the students get to the clinical years, student-led medical research projects are conducted which is mentored and supervised by the medical educators.

This lesson plan is intended for the clinical-year undergraduate medical students to train statistical analysis by using Epi info software. In this statistical analysis training, the pre-requisite should be prior knowledge on types of variables, selection of statistical tests based on the variables and objectives, basic knowledge on data processing, and analysis in Microsoft excel during their MSP. Based on this prior knowledge, students will be able to proceed with learning practical session for Epi info software.

GAGNE'S NINE STEPS OF INSTRUCTIONAL DESIGN

1. GAINING ATTENTION

In this first step, the teacher will introduce and welcome the students who attend the session. After that student will do self-introduction and will share their prior experience with statistics.

As an educator, the first step is important to grasp students' attention, which could be further maintained in the next steps of learning Cheung (5). Students' attention will be attained by emphasizing the importance of statistical analysis in medical research. The importance of data analysis skills will be explained with examples of research studies. This will stimulate the learner's intrinsic motivation that could enhance the subsequence of training (5).

2. INFORMING LEARNER OF OUTCOMES

In this step, we would prefer to include learning outcomes although the original Gagne's framework described as "learning objectives" (11). Learning outcomes describe a broader perspective, which provides an overview and is usually student-centred (14).

The learning outcomes for this training session are prepared according to Bloom's taxonomy (15).

- 1) Select the appropriate statistical test for categorical and continuous variables

The first learning outcome aims to achieve cognitive domain, comprehension of the learned information.

- 2) Analyse the descriptive statistics for the research project data

The second learning outcome aims to achieve cognitive domain, analysis by breaking into different parts of the statistic procedure.

- 3) Analyse the inferential statistics for the research project data

The third learning outcome aims to achieve cognitive domain, analysis of inferential statistics tests (eg, t-test, ANOVA, correlation, regression) by breaking up into individual tests.

- 4) Interpret the statistical analysis results

The last learning outcome aims to achieve the cognitive domain, evaluation which is the ability to make a judgment, consideration based on the statistical analysis outputs (16, 17).

When the training section clearly describes the learning outcomes, and the programme is designed as goal-directed, learners' intrinsic motivation will be stimulated, and aspire to achieve the outcomes (18).

3. STIMULATE RECALL OF PRIOR LEARNING

In this stage, students will be asked to reflect on their prior experience with their mentored student project. They will be asked to focus specifically on the data analysis process by using Gibb's reflective cycle framework including six steps (19). The students will be reflecting on (1) a description of the data analysis process during MSP, (2) the feelings they had at that time, (3) an evaluation of the statistical analysis process

on what went well and what did not go well, (4) analysis of the situation, (5) conclusion on what they had learned at that time and what else could have done better, and (6) action plan for improvement in future (19, 20).

Furthermore, they will be asked to recall theory lectures on choosing the statistical test that they recently learned. Cognitive reflection intervention fostered the motivation to achieve deep learning and has proven benefits on the exam assessment in a prior study (21).

4. PRESENTING STIMULUS

The teacher will be presenting a practical research scenario using the PowerPoint slide and projector. The scenario is related to the cross-sectional survey on insomnia among the university student population. Research objectives will be explicitly shown to the students. Practical or clinical scenarios have been applied in learning and teaching strategies (22). In educational intervention research, problem-based scenarios have shown an improvement in knowledge and achievement goals (23, 24).

5. PROVIDING LEARNING GUIDANCE

In this section, the teacher will demonstrate data processing using Microsoft excel and data analysis using Epi info statistical software. The computer screen will be projected to the class and step by step explanation will be done.

The teacher will demonstrate the data process in the Microsoft Excel sheet for computing the total score and recoding continuous variables into categorical variables. After that, the teacher will demonstrate data analysis in the Epi info software including importing data files, descriptive analysis, inferential analysis, and interpretation of results. The details of the steps are mentioned in Appendix 1. In Merrill's principles of instruction, the learning process is explained as follows (1) engagement in real-world problem-solving process, (2) activation of prior knowledge, (3) demonstration of new knowledge, (4) application of new knowledge, and (5) integration of new knowledge to learners' world (25). Providing learning guidance is a demonstration to the students in my training and that could lead to the next step to apply this new knowledge.

6. ELICITING PERFORMANCE

When the demonstration session is over, the students will be asked to perform data analysis as an individual task. They will be using the data file provided to them with a clear explanation of the study objectives. Based on each objective, the student will select the variable, decide the statistical test to use, and run the analysis with the Epi info software. Visualization of statistical analysis screencast was found to be more effective compared to the reading of hardcopy guides (26). In our lesson plan, the teacher will first perform and visualize the process with the projector to enhance learning.

Once students have done the analysis individually, they will be transferring the findings to the tables in a Microsoft word document. The tables and interpretations document will be directed and submitted to the teacher for the assessment (part 2).

7. PROVIDING FEEDBACK

Providing feedback to students is an integral part of medical education (27). The cognitive level of providing feedback could be in various levels, such as feedback on the task-learning process which is directed to complete the assigned tasks, feedback on the task-motivating process which is encouraging the effort of students, and meta-task process which is self-regulation and putting efforts repeatedly to accomplish the task (28). In this training session, feedback will be informally given to the whole small group on the common challenges they faced during the data analysis. Teachers should provide constructive, relevant, motivational feedback while supporting students for further reflection to be constructivist in their learning process (27). The feedback provision and clarification of students' doubts would be beneficial for students to improve the data analysis process.

8. ASSESSING PERFORMANCE

The concept of assessment in medical education is designed to promote the learning process (29). In this training, computer-based MCQ assessments will be tested at the end of the session. Furthermore, the submission of exercise results and interpretation will be assessed for their performance, skills, and understanding of the subject matter. This classroom assessment type could enhance the students to achieve higher-order thinking, can assess achievement of learning outcomes, can integrate with the ongoing teaching or training session, could formatively support the students, could enhance students to be active in assigned tasks (30).

9. ENHANCING RETENTION AND TRANSFER

As the last step, the teacher will recap the statistical analysis training section and will link back with the learning objectives. Bernard and Coldevin reported that recap strategies were effective for recall and retention of memory (31). Providing the handout could be beneficial for self-practice in the future. Furthermore, reference books will be provided to expand their knowledge regards to statistical analysis.

Student feedback is an effective tool for the further improvement of training and faculty development (32). It is essential to understand the perspective of students and suggestions for improvement. Therefore, the teacher will be collecting student feedback at the end of the training. This feedback will serve as a tool for teachers to the reflection on their teaching process (33).

CONCLUSION

As medical educators, we aim for our students' acquisition of good learning experience, knowledge, retention, and application of knowledge in real-life situations. Planning a lesson or training in advance helps the educators and students to teach and learn systematically. Our review article serves as an example of planning and implementing biostatistics training for healthcare students. It could be adjusted and amended according to the learning outcomes of the intended lesson or training in the future.

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Appendix: Gagne Lesson Plan Template

Session title: Statistical analysis by using Epi info software

Student / trainee level: Undergraduate Medical Students (clinical years)

Level		Activity
1	Gaining attention (10 minutes)	Hello and welcome to the statistical analysis training session Inform the students about the importance of data analysis in the research project.
2	Informing learner of outcomes (5 minutes)	By using the PowerPoint, the students will be informed of the learning outcomes of this session. At the end of this session, the students should be able to 1) Select the appropriate statistical test for categorical and continuous variables 2) Analyse the descriptive statistics for the research project data 3) Analyse the inferential statistics for the research project data 4) Interpret the statistical analysis results
3	Stimulate recall of prior learning (15 minutes)	Students will be asked to reflect on their previous mentored student project (MSP) data analysis. Printed sheets of Gibb's reflective cycle will be distributed. Students will be asked to reflect and share their experiences during MSP data analysis. (10 minutes) After 10 minutes of the reflection process, we will continue to recall choosing appropriate statistical tests that have been discussed in small group teaching before this Epi info software training. (5 minutes)
4	Presenting stimulus (5 minutes)	The teacher will provide the example research project scenario, study objects, and raw data. This session will be conducted in the computer lab, and therefore, each student will have access to the computer, Epi info downloaded software, and soft copy of research project scenario and raw data. Research scenario "A cross-sectional study was conducted among undergraduate students in a private institution in Malaysia to identify the prevalence of insomnia and its association with academic performance. The respondents were recruited by using simple random sampling from the undergraduate student population in that institution. The estimated sample size was 253. The data was collected between August 2021 to September 2021."

		<p>Research objectives</p> <ol style="list-style-type: none"> 1. To estimate the prevalence of insomnia among undergraduate students 2. To identify the association between demographic characteristics (gender, ethnicity, personality) and insomnia among undergraduate students 3. To identify the association between the insomnia and academic performance among undergraduate students
5	Providing learning guidance (45 minutes)	<p>This section will be hands-on training for data analysis. The teacher will demonstrate the data process in the Microsoft excel sheet as follow.</p> <ul style="list-style-type: none"> - Computing the total score - Recoding the age variable to categorical data <p>After that, the teacher will demonstrate data analysis in the Epi Info software.</p> <ul style="list-style-type: none"> - Opening Epi info software - Importing excel data file to Epi info software - Analysing frequency distribution of gender, age, ethnicity, and personality - Analysing “Chi-square test” to assess the association between categorical independent and dependent variables - Analysing “Unpaired T-test and ANOVA” to assess the association between the categorical independent variable and continuous dependent variables - Conducting correlation analysis between two continuous variables (independent and dependent variables) - Conducting logistic regression analysis to identify the association between categorical (or) continuous independent variable and categorical dependent variable <p>This demonstration will be projected (with a projector) while the teacher is conducting a demonstration of analysis and application of Epi Info software.</p>
10 minutes break		
6	Eliciting performance (60 minutes)	<p>Students will ask to perform data analysis with Epi info software (individual task) to analyse the findings for the research objectives.</p> <p>The teacher will move around and will be facilitated if they have any issues or any questions.</p> <p>Once students have done the analysis, they will be transferring the findings to the tables in Microsoft word document. The tables and interpretations document will be directed submitted to the teacher for the assessment (part 2).</p>

7	Providing feedback (10 minutes)	Feedback will be informally given to the whole small group on the common challenges they faced during the data analysis. The teacher will invite the students' questions and will ask their difficulties in the data analysis process. The teacher will address all the issues raised by the students.
10 minutes break		
8	Assessing performance (15 minutes)	Assessment will include 2 parts. Part 1. Computer-based MCQ assessment. 10 MCQs will be assessed, and the questions are related to choosing the type of variables, choosing the appropriate statistical tests, and interpreting the analysis outputs. Part 2. Assessment of the exercise result tables and interpretations Students' knowledge and skills on data analysis will be assessed by the submitted documents during the practical section.
9	Enhancing retention and transfer (10 minutes)	The teacher will recap the statistical analysis training section and will link back with the learning objectives. Provide the handout for self-practice which includes a step-by-step guide for data analysis. Provide the list of reference books for further study. At the end of the session, students will fill up a feedback form for the Epi info data analysis training.

Emergency Medicine Department Continuous Medical Education (CME) 6-step Transformation

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Keywords: *continuing medical education (CME), continued professional development, emergency, medicine, transformation, steps*

ABSTRACT

Continuous medical education (CME) is an effort by a medical department to implement teachings of a particular specialty to improve the knowledge of the staffs within a department that will translate to better clinical practice. Traditional CME modules have always involved gathering of medical officers with a preset of topics that are rotate at a regular basis with or without supervision by a specialist sees many rooms for improvements. A more flexible CME module with emphasis placed on newer topics, without constant rotations, supervision from even before the beginning of the CME and inter departmental or hospital involvement can be fostered to ensure a continuous and longer lasting seasonal CME module. In this article we introduce a 6 step transformation that was done to improve the CME module.

INTRODUCTION

The Continuous Medical Education (CME) has been a standard way to deliver teachings and education within emergency departments across Malaysia and the world. A CME is an education or academic session focusing on medical conditions commonly seen in the emergency departments with medical officers at least once a week or month [1].

CME can impact the practice of Emergency department staff by increasing their awareness of a certain service, a proper approach, investigation modality and treatment options. It can translate onto the clinical grounds and help detect early lesions with proper techniques that had been learnt in the CME [2].

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When the world was hit by Covid-19, many CME were not held or had been altered due to work, busy emergency departments, contact and spacing restrictions. Waiting times for patients had been very long and emergency department staffs were too busy to attend the CME [3].

This has given the academic enthusiast a well-deserved pause to sit back and reflect on the current repetitive trends of CME and improvements strategies in delivering education within departmental learning activities. In this article we introduce the 6 step method that had been done by an emergency department in a local Malaysian Hospital to improve its weekly departmental CME.

METHODS

The first step that was done was to create an academic governance of the CME. A group of officers consisting of specialist, registrars and medical officers were included in the team to cover a wide range of inputs and implementation strategies. This group had come out with the remaining steps, each member has been in charge of one step and ensuring its successful implementation. Continuous open communication between the staff in charge has helped troubleshoot problems and solutions in implementing the other 5 steps to ensure a successful CME.

The second step was to adjust the timing of the CME. The CME has been introduced as the grand ward rounds of education and academics in the department. Thus all the staff will gather at 8 am once a week, similar to a grand ward round from the previous shift and the next shift before passover and start the day with the CME and education before proceeding to the passover and other department related activities.

The third step is to create new presentations without repetitions that were too often. Instead of blocks of topics at the same time, a CME module was created mixing the topics related to medical/surgical and trauma without repetitions for 6 months. Inclusion of topics of subspecialties and special interest groups such as toxicology, Pre hospital care, disaster medicine, traumatology, critical care medicine, wilderness medicine was also included including drills and simulations [4].

The fourth step is to include specialist supervision into the CME. The specialist will be consulted before the medical officer presents the CME. This is to ensure that the CME is in tally with the learning objectives. The same specialist will also be present during the CME presentation on the day to ensure that the learning objective is met and the CME is guided in the right direction.

The fifth step is to include a register input after the CME presentation. This is a senior medical officer with special interest in emergency medicine, pursuing Masters in Emergency Medicine or involved in the parallel pathways of specialization in emergency

medicine. The role of the registrar is to present a slide or verbal input of the latest trails, studies and developments in the topics of the week.

The sixth and final step is inviting other departments to the CME. This will not only help interdepartmental relations but also discuss with subspecialists of other specialties on how to guide the patients treatment within the hospital local protocol and setting.

DISCUSSION

An academic governance of the CME is very important because it acts as a regulatory body of the CME. The academic governance must be represented by all levels of staff involved in the CME such as the medical officers, registrars, specialists and consultants. This is so that the voices of all parties are heard and it creates an awareness to the feasibility of new steps implementation to the CME. The modifications of the schedule, attendance recording, involvement of registrars, involvement of other departments and timing of CME can be better regulated and the highest standards can be maintained [5].

The timing of the CME is also important. This is because a late CME or a CME only involving one shift will lead to reduce number of attendees, tiring the staffs of a certain shift to be in charge of the floor and attend the teachings, and creates a sense of responsibility of the staffs towards a departmental interest of CME rather than an individual interest, creating a team based learning approach towards the CME.

Creating new topics, without repetitions of similar topics, mixing topics without block teachings, involvement of subspecialty of special interest topics will increase the interest of the attendees and increase the compliance of attendee to the CME. Newer methods of teaching and learning material with involvement of drills and practical teaching will diversify the learning methods. Together with the presence of a specialist in the CME to check the presentations to ensure it is in line with the learning objectives and then being present in the CME together with specialist /subspecialist from other departments to help guide the CME in the direction with in hospital protocols will provide a more goal oriented learning with answers to queries on the topics that may arise [6].

CONCLUSION

A CME is an academic effort by the department to improve education knowledge and academics within a department. A well-structured CME, with the right governance to oversee the efforts, with proper time regulation, incorporation of new and special interest topics, latest updates on literature reviews and landmark trials, involvement of specialist from within and outside of the department as supervisors and advisors will help transform the CME into an academic strength which will surely translate into the clinical floor and practice.

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Original research article

Cross-sectional Study of Perception on Mobile Phone Health Hazard and Behavioral Risk among Undergraduate Medical Students

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ABSTRACT

There is major concern about the hazards that electromagnetic waves emitted by mobile phones may pose to human health. We aimed to assess the perception of undergraduate medical students regarding mobile phone health hazards and behavioral risk, side effects that mobile phone hazards cause, behaviors affected due to mobile phone hazards, and whether mobile phone hazards may affect classroom habits. A cross-sectional study was conducted among pre-clinical and clinical year MBBS students in a private medical university in Malaysia. An online questionnaire was distributed and a total of 120 responses were collected. Epi info V7.0 was used to analyze the data. Findings revealed our participants perceived mobile phone usage could contribute to occurrence of fatigue, sleep disturbances, headache, and loss of mental attention. As for behavior risk associated with mobile phone usage, our participants thought that there were high behavioral risks such as to sleep all night with a turned-on mobile phone resting on the bedside and to stop a conversation to answer the mobile phone. With regards to side effects, the result reveals sleep disturbances as the side effects after mobile phone usage, concentration problems

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and blurred vision are experienced by the most. The results of how mobile phone hazards affect classroom habits shows that participants use mobile phone internet less than 7 hours a day, receive or send text messages during class but do not play games nor make or receive calls in class. In summary, the perceived mobile phone hazards among MBBS students were 62%. This study reveals the presence of a higher percentage of perceived mobile phone hazards among undergraduate medical students.

INTRODUCTION

A mobile phone, also known as cellular phone, cell phone or hand phone is a portable telephone that enables us to make and receive calls over radio frequency links while the user is moving within a telephone service range. The radio frequency link establishes connections to the switching systems of the mobile phone operator, which can provide access to the public switched telephone network (PSTN) [1]. Mobile phones enable two-way communications by providing some technical functions, such as voice and messaging services [2]. When calls are made, voices which are sound energy are converted into radiofrequency waves also known as electromagnetic energy [3]. There is major concern about the hazards that electromagnetic waves emitted by mobile phones may pose to human health. Mobile phones are increasingly used throughout the world within a very short period of time [4]. The mobile phone industry has been one of the fastest growing industries recently. Since the existence of mobile phones, it has gained increasing popularity for the ease and convenience of communication. There has always been a counter argument and much more research over the more frequent use of mobile phones and its short term and long-term health effects. Social scientists have pointed out that overuse or addiction to mobile phones may affect social and psychological well-being and health in people of all age groups [5]. While some of these often-seen consequences are critical like malignancy, others that cause definite morbidity are both physical and mental. On 31 May 2011, the World Health Organization confirmed that the usage of mobile phones indeed represents a health menace and has also classified mobile phone radiation as a carcinogenic hazard, possibly carcinogenic to humans [6].

In a study of common health effects of mobile phone in medical students in India where both sexes between age of 17-23 years were included revealed that headache was the commonest side effect experienced by the students, followed by irritability, lack of concentration, anxiety, eye strain, lack of sleep, exhaustion, and body ache [7]. On the other hand, a study related symptoms due to mobile phone use and school electromagnetic field levels shows that high numbers and duration of calls per day will cause more headache, dizziness, depressive symptoms, throat dryness, difficulty to concentrate, and sleep disturbances. The same symptoms were also experienced by those who send and receive more than 200 messages per day. In the same study, several behaviors such as carrying mobile phones on themselves, keeping their mobile phones switched on and making calls during charging were associated with increased experience of symptoms [8]. Besides, an article titled 'Health Hazards of Mobile phones' reveals that radiation produced by the mobile phone can cause changes in sperm count and mobility. Head is also exposed to

much of the radiation which will increase the risk of brain tumor if exposed for more than 10 years. Some non-specific symptoms such as neurasthenic and vegetative symptoms (concentration difficulties, palpitation, digestive disturbances), psychological problems (ringtone anxiety) also have been described [9].

From the aspect of risky behavior, in a study of mobile phone use while motorcycle riding and crashes, it is found that 64% of the participants have experienced/been injured in a crash/fall while riding. Another study regarding the effects of cell phone distraction on children injury risk, it is also found that safety of the child was also compromised when the child is distracted by cell phone and, at the same time, traffic attention was also decreased [10,11]. Using the phone while charging is one of the risky behaviors, as it might result in explosion causing facial and hand burn [12].

Research on mobile phone usage and its effect towards health has been carried out by the department of physiotherapy, GJUST in Haryana, India. One of the riskiest long-term effects is miscarriage, and for boys it will reduce the sperm count. This shows more couples will present with fertility problems and one of the causes in this era could be excessive usage of mobile phone. This study also shows that due to excessive emission of radiation (about 900-1800 HZ), there is a high chance for the individual to develop cancer especially on the side of the ear frequently used to answer the calls [13]. Furthermore, gadgets have now become one of the essential items among the school going children. Parents get them smartphones so that they will not feel lonely as the parents spend most of their time at work. However, parents are not aware about the side effects. A study on duration of gadget usage affecting eye fatigue in students aged 16-18 years old revealed that one of the most severely affected organs will be eyes. Students will experience eye fatigue due to excessive usage of hand phone. The reason could be because of excessive use of muscles that control eye movements. Eventually after some time, children will have blurry vision and tend to get spectacles on at a very early age [14,15]. Next, excessive phone usage also will bring a negative impact on academic performances. For instance, a study was done on how mobile phone usage affects academic performance. Students tend to get easily distracted while studying. As soon as they log into social media, they will get attracted to all the interesting news. Students will also get distracted easily if they turn on their phone during lecture classes. This can affect their concentration [16].

Since we are in this pandemic era, mobile phones have been an essential need for medical students to attend online classes. Besides, medical students need to face the gadgets throughout the day as they have a more hectic schedule. However, literature on perception about mobile phone health hazard among medical students is limited in Malaysia. Therefore, this study aimed to assess the perception of undergraduate medical students regarding mobile phone health hazards and behavioural risk. Besides that, the perception of medical students about behaviour affected due to mobile phone hazards is also assessed in this study.

METHODS

STUDY DESIGN AND STUDY POPULATION

A cross-sectional study was conducted in March 2021 in a private medical institution in Malaysia. This study aimed to determine the perception of mobile phone health hazard and behavioural risk and a total of 1300 MBBS students from the study university were selected as the study population.

SAMPLE SIZE

Sample size was calculated by using Epi info software (version 7.0) with the population size 1300, expected frequency 62% from a previous study [1], and precision error of 8.0%, a confidence level of 95%. While considering non-response of 30%, the final estimated sample size was 183.

SAMPLING METHOD

Purposive sampling was the sampling method that was used in this study. The inclusion criteria were the medical students in MBBS (clinical and preclinical) in the university and those who voluntarily agreed to participate. The exclusion criteria include those who failed to complete all the questions in the questionnaire and those whose consent was not given.

DATA COLLECTION

This questionnaire was developed by combining questions from previous research on mobile phone hazards [1]. This questionnaire consists of consent form and students need to give their consent before proceeding to the next part. Questionnaire is composed of two parts. First part focusing on demographic details (batch, gender, nationality, ethnicity, family income, number of mobile phone used currently, average messages, call duration, and the ear used to answer the phone). The second part of the questionnaire consists 30 questions focusing mainly on the perception on health hazards, side effects and classroom behaviour. As for the side effects and perception on health hazards, students were allowed to grade themselves according to severity and for classroom behaviour students need to choose 'yes' or 'no' based on their activity in the classroom. This questionnaire was referred from a previous study done by AIMST University regarding mobile phone hazardness towards medical students [1].

DATA ANALYSIS

Epi info V7.0 was used to statistically analyze the data. For quantitative data (age), the range, mean along with standard deviation and median along with interquartile range was calculated. For qualitative data (gender, ethnicity, nationality, and batch), frequency and percentage were calculated. Chi square was used to calculate odds ratio (OR) for association between the mobile phone hazards among medical students which includes demographic details, perception on health hazard, side effects, affects towards behavior in and outside the classroom. Level of significance was set at 0.05.

ETHICAL CONSIDERATION

The informed consent was signed by the participants before answering the research questions. This research was approved by the Research Ethics Committee, Faculty of Medicine of Manipal University College Malaysia.

RESULTS

A total of 136 students participated in this study. Among them, 77.21% were from the clinical years. Approximately one-third (34.56%) were male students. The details of the demographic characteristics were presented in the Table 1.

Table 1. Socio-demographic profile of the participants (n=136)

Variable	Frequency (%)
Batch	
Pre-clinical	31(22.79)
Clinical	105(77.21)
Age	
>22	63(46.32)
≤22	73(53.68)
Gender	
Male	47(34.56)
Female	89(65.44)
Nationality	
Malaysian	126(92.65)
Non-Malaysian	10(7.35)
Ethnicity	
Chinese	31(22.79)
Indian	74(54.41)
Malay	9(6.62)
Others	22(16.18)
Family income	
<RM 4360	18(13.24)
RM 4360-9619	66(48.53)
>RM 9619	52(38.24)
Number of phones	
≤1	124(91.18)

>1	12(8.82)
Number of call averages	
<5	97(71.32)
≥5	39(28.68)
Number of SMS average	
<50	112(82.35)
≥50	24(17.65)
Duration of call average	
<20min	81(59.56)
≥20min	55(40.44)
Ear used to answer phone	
call	19(13.97)
Left	89(65.44)
right	28(20.59)
Both	

Figure 1 represents the participants' mobile phone usage information. Approximately 60% of the participants utilized less than 20 minutes for phone calls, average number of SMS received or sent daily was less than 50 in the majority of the participants, approximately 70% had an average less than 5 times of calls received or dialed daily (Figure 1).

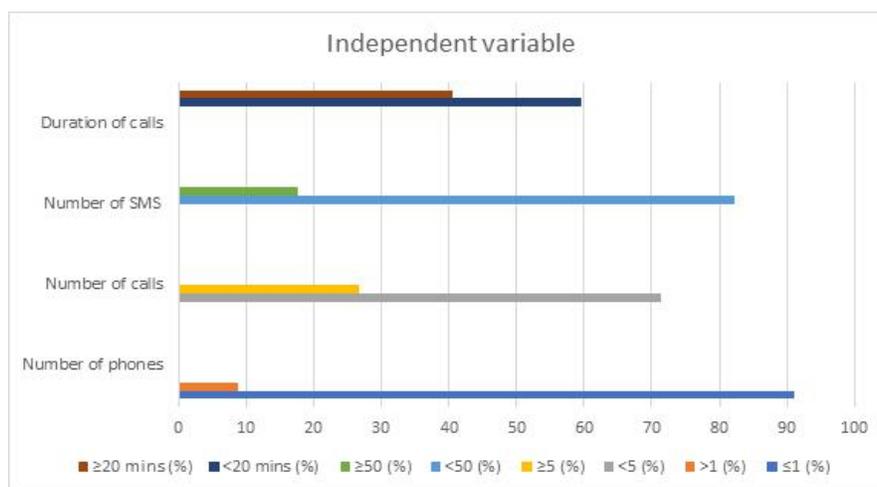


Figure 1. Mobile phone usage information among the participants

The result shows that among all the perceptions of health hazard, most of the participants (22.79%) thought that mobile phone usage could contribute to the occurrence of headache, followed by loss of mental attention (21.32%). It also showed the highest percentage of our participants (66.91%) felt that diarrhea and constipation was very unlikely caused by mobile phone usage (Table 2).

Table 2. Perception of health hazard on mobile phone usage (n=136)

Health hazard	Strongly disagree Frequency (%)	Disagree Frequency (%)	Slightly agree Frequency (%)	Agree Frequency (%)	Strongly agree Frequency (%)
Fatigue	10(7.35)	27(19.85)	42(30.88)	42(30.88)	15(11.03)
Sleep disturbance	5(3.68)	13(9.56)	20(14.71)	55(40.44)	43(31.62)
Dizziness	22(16.18)	35(25.74)	32.35(32.35)	17.65(17.65)	11(8.09)
Loss of mental attention	8(5.88)	25(18.38)	29(21.32)	45(33.09)	29(21.32)
Memory loss	30(22.06)	40(29.41)	36(26.47)	23(16.91)	7(5.15)
Headache	16(11.76)	16(11.76)	40(29.41)	33(24.26)	31(22.79)
Tachycardia	49(36.03)	48(35.29)	30(22.06)	6(4.41)	3(2.21)
Diarrhea	91(66.91)	23(16.91)	17(12.50)	3(2.21)	2(1.47)
Constipation	91(66.91)	24(17.65)	15(11.03)	4(2.94)	2(1.47)

Majority of participants (55.15%) experienced sleep disturbance as the side effect after mobile phone usage, followed by concentration problems (43.38%), and blurred vision (33.82%). Long term memory impairment was only experienced by 16.91% of our participants, which is the lowest percentage (Table 3).

Table 3. Perceived side effect of mobile phone (n=136)

Perceived side effect	Yes (%)	No (%)
Headache	33(26.26)	103(75.74)
Concentration problem	59(43.38)	77(56.62)
Long term memory impairment	23(16.91)	113(83.09)
Recent memory impairment	38(27.94)	98(72.06)
Sleep disturbance	75(55.15)	61(44.85)
Blurred vision	46(33.82)	90(66.18)

The results in Table 4 show median and mean of behavior risks associated with mobile phone hazards among the participants. The median score was highest for the item “To stop a conversation to answer the mobile phone” (Q1=4.0, Q3=5.0; standard deviation= 1.141) (Table 4).

Table 4. Behavioral risk associated with mobile phone hazards among the participants (n=136)

Variables	Q1	Median	Q3	Mean	SD
1) To make a mobile phone call which takes 20minutess	2.0	3.0	3.0	2.8	1.0598
2) To carry a turned-on mobile phone during the whole day	2.0	3.0	4.0	3.1	1.1486
3) To make a mobile phone call which takes an hour	2.5	3.0	4.0	3.3	1.0879
4) To sleep all night with a turned-on-mobile phone resting on the bed side table	3.0	4.0	4.5	3.5	1.1732
5) To make a mobile phone call on the bus	2.0	2.0	3.0	2.5	0.9259
6) Keeping your mobile phone open on the bus	2.0	3.0	3.0	2.7	0.9923
7) To make a mobile phone call in the public area (Metro, cafe)	2.0	3.0	3.0	2.7	1.0102
8) To leave a family lunch to answer the mobile phone	2.0	3.0	3.0	2.7	1.0549
9) To have one’s mobile phone ring in a public area	2.0	3.0	4.0	2.9	1.0041
10)To stop a conversation to answer the mobile phone	4.0	5.0	5.0	4.2	1.1416

Table 5 shows the result of how mobile hazards can lead to different classroom habits. Regarding usage hour of mobile data downloading/WIFI internet per day, 30.88 percent spent less than 7 hours and 69.12% spent more than 7 hours. 80.15% had their phones turned on during lectures and 19.85% had their mobile phones switched off during classes. When asked whether participants received or sent text messages during classes, 71.32% responded yes and 26.68% responded denied receiving or sending texts during classes (Table 5).

Table 5. Classroom habits of mobile phone usage among the participants (n=136)

Variables	Frequency (%)
1)How many hours do you use mobile data downloading/WiFi internet per day?	
▪ > 7 hours	42 (30.88)
▪ ≤ 7 hours	96 (69.12)
2) Is your phone turned on during lectures?	
▪ Yes	109 (80.15)
▪ No	27 (19.85)
3) Do you receive or send text messages during class?	
▪ Yes	97 (71.32)
▪ No	39 (26.68)
4) Do you play games during class?	
▪ Yes	20 (14.71)
▪ No	116 (85.29)
5) Do you make or receive calls in class?	
▪ Yes	28 (20.59)
▪ No	108 (79.41)

In Table 6, the results show there is no statistical significance between gender and perception of health hazard, except for sleep disturbance and diarrhoea, where P value was 0.003 and 0.013 respectively. Significant association between number of phones and perception of fatigue, P value is 0.034. Significant association between number of calls and perception of headache is seen with the P value of 0.011. There is no significant association between the number of SMS and all the perceptions of health hazards. Duration of calls and perception of fatigue shows significant association with the P value of 0.022 (Table 6).

Table 6. Association between demographic and perception of health hazard (n=136)

Fatigue						
Strongly disagree frequency(%)	Disagree frequency(%)	Slightly agree frequency(%)	Agree frequency(%)	Strongly agree frequency(%)	P value	

Gender	Male	7(14.89)	12(25.53)	13(27.66)	11(23.40)	4(8.51)	0.070
	female	(3.37)	15(16.85)	29(32.58)	31(34.83)	11(12.36)	
Number of phone	≤1	10(8.06)	23(18.55)	39(31.45)	41(33.06)	11(8.87)	0.034
	>1	0	4(33.33)	3(25)	1(8.33)	4(33.33)	
Number of calls	<5	10(10.31)	17(17.53)	29(29.90)	33(34.02)	8(8.25)	0.075
	≥5	0	10(25.64)	13(33.33)	9(23.08)	7(17.95)	
Number of SMS	<50	10(8.93)	20(17.86)	36(32.14)	35(31.25)	11(9.82)	0.330
	≥50	0	7(29.17)	6(25)	7(29.17)	4(16.67)	
Duration of calls	<20m	10(13.35)	18(22.22)	26(32.10)	21(25.93)	6(7.41)	0.022
	≥20m	0	9(16.36)	16(29.09)	21(38.18)	9(16.36)	
Sleep disturbance							
Gender	Male	4(8.51)	8(17.02)	10(21.28)	17(36.17)	8(17.02)	0.003
	female	1(1.12)	5(5.62)	10(11.24)	38(42.70)	35(39.33)	
Number of phone	≤1	5(4.03)	12(9.68)	19(15.32)	48(38.71)	40(32.26)	0.719
	>1	0	1(8.33)	1(8.33)	7(58.33)	3(25)	
Number of calls	<5	5(5.15)	8(8.25)	16(16.49)	42(43.30)	26(26.88)	0.164
	≥5	0	5(12.82)	4(10.26)	13(33.33)	17(43.59)	

Number of SMS	<50	4(3.57)	9(8.04)	19(16.96)	45(40.18)	35(31.25)	0.434
	≥50	1(4.17)	4(16.67)	1(4.17)	10(41.67)	8(33.33)	
Duration of calls	<20m	5(6.17)	9(11.11)	13(16.05)	30(37.04)	24(29.63)	0.2904
	≥20m	0	4(7.27)	7(12.73)	25(45.45)	19(34.55)	
Dizziness							
Gender	Male	9(19.15)	13(27.66)	17(36.17)	5(10.64)	3(6.38)	0.545
	female	13(14.61)	22(24.72)	27(30.34)	19(21.35)	8(8.99)	
Number of phone	≤1	18(14.52)	33(26.61)	41(33.06)	22(17.74)	10(8.06)	0.551
	>1	4(33.33)	2(16.67)	3(25)	2(16.67)	1(8.33)	
Number of calls	<5	16(16.49)	25(25.77)	33(34.02)	14(14.43)	9(9.28)	0.577
	≥5	6(15.38)	10(25.64)	11(28.21)	10(25.64)	2(5.13)	
Number of SMS	<50	17(15.18)	29(25.89)	36(32.14)	23(20.54)	7(6.25)	0.195
	≥50	5(20.83)	6(25.00)	8(33.33)	1(4.17)	4(16.67)	
Duration of calls	<20m	15(18.52)	18(22.22)	27(33.33)	14(17.28)	7(8.64)	0.774
	≥20m	7(12.73)	17(30.91)	17(30.91)	10(18.18)	4(7.27)	

Loss of mental attention

Gender	Male	6(12.77)	10(21.28)	10(21.28)	12(25.53)	9(19.15)	0.111
	femal e	2(2.25)	15(16.85)	19(21.35)	33(37.08)	20(22.47)	
Numbe r of phone	≤1	8(6.45)	21(16.94)	28(22.58)	41(33.06)	26(20.97)	0.478
	>1	0	4(33.33)	1(8.33)	4(33.33)	3(25.00)	
Numbe r of calls	<5	8(8.25)	20(20.62)	21(21.65)	27(27.84)	21(21.65)	0.136
	≥5	0	5(12.82)	8(20.51)	18(46.15)	8(20.51)	
Numbe r of SMS	<50	8(7.14)	22(19.64)	21(18.75)	35(31.25)	26(23.21)	0.203
	≥50	0	3(12.50)	8(33.33)	10(41.67)	3(12.50)	
Durati on of calls in	<20m	6(7.41)	13(16.05)	17(20.99)	29(35.80)	16(19.75)	0.722
	≥20m in	2(3.64)	12(21.82)	12(21.82)	16(29.09)	13(23.64)	
Memory loss							
Gender	Male	9(19.15)	16(34.04)	15(31.91)	3(6.38)	4(8.51)	0.096
	femal e	21(23.60)	24(26.97)	21(23.60)	20(22.47)	3(3.37)	
Numbe r of phone	≤1	25(20.16)	37(29.84)	33(26.61)	22(17.74)	7(5.65)	0.457
	>1	5(41.67)	3(25)	3(25)	1(8.33)	0	
Numbe r of calls	<5	21(21.65)	31(31.96)	25(25.77)	14(14.43)	6(6.19)	0.597
	≥5	9(23.08)	9(23.08)	11(28.21)	9(23.08)	1(2.56)	

Number of SMS	<50	24(21.43)	30(26.79)	30(26.79)	21(18.75)	7(6.25)	0.355
	≥50	6(25.00)	10(41.67)	6(25.00)	2(8.33)	0	
Duration of calls	<20m	17(20.99)	25(30.86)	22(27.16)	13(16.05)	4(4.74)	0.983
	≥20m	13(23.64)	15(27.27)	14(25.45)	10(18.18)	3(5.45)	
Headache							
Gender	Male	8(17.02)	9(19.15)	13(27.66)	11(23.40)	6(12.77)	0.082
	female	8(8.99)	7(7.87)	27(30.34)	22(24.72)	25(28.09)	
Number of phone	≤1	14(11.29)	14(11.29)	35(28.23)	31(25.00)	30(24.19)	0.604
	>1	2(16.67)	2(16.67)	5(41.67)	2(16.67)	1(8.33)	
Number of calls	<5	16(16.49)	11(11.34)	31(31.96)	23(23.71)	16(16.49)	0.011
	≥5	0	5(12.82)	9(23.08)	1(25.64)	15(38.46)	
Number of SMS	<50	14(12.50)	16(14.29)	29(25.89)	26(23.21)	27(24.11)	0.128
	≥50	2(8.33)	0	11(45.83)	7(29.17)	4(16.67)	
Duration of calls	<20m	9(11.11)	11(13.58)	23(28.40)	20(24.69)	18(22.22)	0.945
	≥20m	7(12.73)	5(9.09)	17(30.91)	13(23.64)	13(23.64)	

Tachycardia

Gender	Male	18(38.30)	16(34.04)	11(23.40)	1(2.13)	1(2.13)	0.903
	female	31(34.83)	32(35.96)	19(21.35)	5(5.62)	2(2.25)	
Number of phone	≤1	44(35.48)	43(34.68)	28(22.58)	6(4.48)	3(2.42)	0.859
	>1	5(41.67)	5(41.67)	2(16.67)	0	0	
Number of calls	<5	37(38.14)	33(34.02)	19(19.59)	6(6.19)	2(2.06)	0.412
	≥5	12(30.77)	15(38.46)	11(28.21)	0	1(2.56)	
Number of SMS	<50	39(34.82)	38(33.93)	26(23.21)	6(5.36)	3(2.68)	0.574
	≥50	10(41.67)	10(41.67)	4(16.67)	0	0	
Duration of calls	<20m	30(37.04)	29(35.80)	14(17.28)	6(7.41)	2(2.47)	0.179
	≥20m	19(34.55)	19(34.55)	16(29.09)	0	1(1.82)	
Diarrhea							
Gender	Male	24(51.06)	14(29.79)	8(17.02)	0	1(2.13)	0.013
	female	67(75.28)	9(10.11)	9(10.11)	3(3.37)	1(1.12)	
Number of phone	≤1	82(66.13)	21(16.94)	16(12.90)	3(2.42)	2(1.61)	0.939
	>1	9(75.00)	2(16.67)	1(8.33)	0	0	
Number of calls	<5	66(68.04)	14(14.43)	13(13.40)	3(3.09)	1(1.03)	0.531
	≥5	25(64.10)	9(23.08)	4(10.26)	0	1(2.56)	

Number of SMS	<50	77(68.75)	17(15.18)	14(12.50)	2(1.79)	2(1.79)	0.666
	≥50	14(58.33)	6(25.00)	3(12.50)	1(4.17)	0	
Duration of calls	<20m	53(65.43)	13(16.05)	12(14.81)	2(2.47)	1(1.23)	0.886
	≥20m	38(69.09)	10(18.18)	5(9.09)	1(1.82)	1(1.82)	
Constipation							
Gender	Male	28(59.57)	11(23.40)	7(14.89)	0	1(2.13)	0.265
	female	63(70.79)	13(14.61)	8(8.99)	4(4.49)	1(1.12)	
Number of phone	≤1	82(66.13)	23(18.55)	14(11.29)	3(2.42)	2(1.61)	0.670
	>1	9(75.00)	1(8.33)	1(8.33)	1(8.33)	0	
Number of calls	<5	66(68.04)	14(14.43)	14(14.43)	2(2.06)	1(1.03)	0.140
	≥5	25(64.10)	10(25.64)	1(2.56)	2(5.13)	1(2.56)	
Number of SMS	<50	75(66.96)	18(16.07)	14(12.50)	3(2.68)	2(1.79)	0.607
	≥50	16(66.67)	6(25.00)	1(4.17)	1(4.17)	0	
Duration of calls	<20m	57(70.37)	9(11.11)	12(14.81)	2(2.47)	1(1.23)	0.090
	≥20m	34(61.82)	15(27.27)	3(5.45)	2(3.64)	1(1.82)	

In Table 7, the results show the majority had no significant association between the side effect and number of phones except for having concentration problems.

Table 7. Association between number of phone and side effect among the participants (n=136)

Variables	≤1 phone	>1 phone	Odd ratio	Chi square	P-value
Headache					
yes frequency (%)	33 (26.61)	0	-	-	-
no frequency (%)	91 (73.39)	12(100)	-	-	-
Concentration problem			0.23 (0.058-0.87)	5.36	0.021
Yes	50(40.32)	9(75)			
No	74(59.68)	3(25)			
Long term memory impairment			2.37 (0.29-19.3)	0.69	0.41
Yes	22(17.74)	1(8.33)			
No	102(82.26)	11(91.67)			
Recent memory impairment			2.05 (0.43-9.8)	0.83	0.36
Yes	36(29.03)	2(16.67)			
No	88(70.97)	10(83.33)			
Sleep disturbance			0.87 (0.26-2.88)	0.054	0.82
Yes	68(54.84)	7(58.33)			
No	56(45.16)	5(41.67)			
Blurring of vision			0.48 (0.14-1.57)	1.54	0.21
Yes	40(32.26)	6(50)			

No 84(67.74) 6(50)

Table 8 shows mostly no significant association between the number of phone calls and the side effect except for a significant association between headache and the number of phone calls (P= 0.001).

Table 8. Association between number of phone calls and side effect among the participants (n=136)

Variables	less than 5 calls	more than 5 calls	Odd ratio	Chi square	P-value
Headache (yes/no)			6.80 (2.88-16.04)	21.72	0.001
Yes	13(13.40)	20(51.28)			
No	84(86.60)	19(48.72)			
Concentration problem (yes /no)			1.17 (0.55-2.47)	0.17	0.68
yes	41(42.27)	18(46.15)			
No	56(57.73)	21(53.85)			
Long term memory impairment (yes/no)	(57.73)		0.32 (0.19-1.15)	3.31	0.069
yes	20(20.62)	3(7.69)			
No	77(79.38)	36(92.31)			
Recent memory impairment (yes/no)			0.85 (0.37-1.97)	0.14	0.70
Yes	28(28.87)	10(25.64)			
no	69(71.13)	29(74.36)			
Sleep disturbance (yes/no)			1.68 (0.78-3.61)	1.77	0.18
yes	50(51.55)	25(64.10)			
No	47(48.45)	14(35.90)			
Blurring of vision (yes/no)			1.14 (0.52-2.48)	0.11	0.75

Yes	32(32.99)	14(35.90)
no	65(67.01)	25(64.10)

From table 9, we found that more male students compared to females used their phone during class hour to play games. This showed that there was significant association between gender and usage of mobile phone during class. But there were no significant association between gender and usage of mobile data/WIFI in class, phone turned on during class, usage of mobile phone to text message and receive calls in class (Table 9).

Table 9: Association between gender and classroom habits among the participants (n=136)

Classroom habits	Male n (%)	Female n (%)	Odds ratio (95%CI)	X2	P value
How many hours do you use mobile data downloading/ WIFI internet per day?					
≤7 hours	29(30.85%)	65(69.15%)	0.595	1.850	0.174
>7 hours	18(42.86%)	24(57.14%)	(0.281-1.262)		
Is your phone turned on during lectures?					
Yes	38(34.6%)	71(65.4%)	1.07	0.023	0.881
No	9(33.33%)	18(66.67%)	(0.44-2.61)		
Do you receive or send text messages during class?					
Yes	34(35.05%)	63(64.95%)	1.08	0.036	0.849
No	13(33.33%)	26(66.67%)	(0.49-2.34)		

Do you play games during class?

Yes	11(55.00%)	9(45.00%)	2.71	4.33	0.037
No	36(31.03%)	80(68.97%)	(1.02-7.13)		

Do you make or receive calls in class?

Yes	14(50.00%)	14(50.00%)	2.27	3.71	0.054
No	33(30.56%)	75(69.44%)	(0.97-5.30)		

DISCUSSION

This study assessed the perception of mobile phone health hazards and behavioural risk among all the MBBS pre-clinical and clinical year students in a private medical university in Malaysia. With regards to side effects experienced by the participants, we have found the majority of our participants experienced sleep disturbance after mobile phone usage, followed by concentration problems and blurred vision. Long term and recent memory impairment was only experienced by few. According to a research done in another private medical university in Malaysia, most of their participants also strongly agree that they experienced sleep disturbance and loss of mental attention, only a few of the participants experienced memory loss after the usage of mobile phone [1].

In analysis of students' perception of health hazard on mobile phone usage, we found out that, majority of the participants thought mobile phone usage can contribute to occurrence of fatigue, sleep disturbance, headache, and loss of mental attention. Results also showed that many of the students felt that diarrhea and constipation is very unlikely caused by mobile phone usage. A similar result was also found in the study done in AIMST, Kedah, Malaysia, where most of their participants agreed that mobile phone usage can cause headache, loss of mental attention, and sleeping disturbances, whereas constipation and diarrhoea caused by mobile phone usage were disagreed by most of the participants [1]. While researching about behaviour risk associated with mobile phone usage, we found that students were neutral to the behavioral risk of mobile phone usage such as to make a mobile phone call which take 20 minutes, to carry a turned on mobile phone during the whole day, to make a mobile phone call which takes an hour, keeping their mobile phone switched on while on the bus, making phone calls in public areas, to leave family lunch to answer mobile phones and to have their phones ring in public areas. Students also think there is high behavioural risk of mobile phone usage such as to sleep all night with a turned on mobile phone resting on the bedside and to stop a conversation to answer mobile phone

calls. Students responded low to the behaviour risk of mobile phone usage such as making a mobile phone call on the bus. In a study done by medical students in Chennai, it shows that their students make calls lasting less than an hour, carry switched-on mobile phone during the day, and sleep at night with a switched-on phone resting on the bedside table [21].

In the study of association between mobile phone hazards with the side effects seen among the participants, it shows the students who had more than 5 phone calls a day are most likely to have headache as a side effect but majority of them did not suffer from concentration problem, long term memory impairment, recent memory impairment, sleep disturbance, blurring of vision. In the long run, these facts are also proven from a similar study done by medical students back in 2011 [1]. Beyond that, through our study we found that number of messages received in a day had no significant association with headache, concentration problem, long term memory impairment, recent memory impairment, sleep disturbance, and blurring of vision. Results also show that students did not suffer any side effects regardless of number of messages received. Most students who had more than 20 minutes of phone call experienced blurring of vision. However, having calls less than 20 minutes has no significant association with headache, concentration problem, long term memory impairment, recent memory impairment, sleep disturbance.

In analysis of how mobile phone hazards affects classroom habits, our study shows most participants use mobile phone internet less than 7 hours a day. We also found that mobile phones of most of the participants were switched on during classes. Our study also shows mobile phone hazards affect classroom habits where the majority receive or send text messages during class. Most participants do not play games nor make or receive calls in class. Results from a previous study done in Oman Medical College shows that the majority of participants use their mobile phones for less than 7 hours. Majority of their phones are also switched on. Most of the participants also receive or send text messages and do not play games during class or make or receive calls during classes. This shows a lot of similarities in all aspects of classroom habits between the study done by us and by researchers in Oman Medical College [22]. Analysis of gender and classroom habits shows most females will turn their phone on during the lecture class. Results from a study done in a medical university shows similar results where mobile phone usage among females are higher compared to males [1]. In another study done by Oman Medical College revealed the same thing where majority of students turn their phone on during class which can affect their level of attentiveness. On the other hand, majority of males use their phone to play games in class and similar result is obtained in the Oman Medical College research [22].

This study had a few limitations. Since the study was carried out in one private medical university in Malaysia, generalization of the findings might be limited. This study was carried out within a short duration of 5 weeks and is cross-sectional in nature, hence mobile phone use hazards over time were not able to be assessed.

From this study we are able to conclude that medical students have good perception and understanding on mobile phone hazards. For future research, we would like to recommend to focus study on mobile phone usage among committed medical students as we strongly

believe that this group of people tend to use for longer hour. Besides, association between mobile phone usage with students' academic performance could be explored.

CONCLUSION

The perception of mobile phone use hazards among MBBS students was 62%. This study discovered a higher percentage of perception of mobile phone hazards among undergraduate medical students. Mobile phones have added new dimensions after its invention. Future research should investigate the advantages and disadvantages of mobile phone usage, and the risk of using them while driving. Furthermore, the perception of usefulness of mobile phones are being considered for further studies.

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Original Article

Pulmonary Complications and Peri-Operative Outcomes of Open Renal Surgery in HSAJB During COVID-19 Pandemic

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Key words: Outcome, Complications, Open Renal Surgery, COVID-19 treating Hospital

ABSTRACT

Perioperative Covid-19 infection is associated with high risk of pulmonary complications and death. This study aimed to describe the pulmonary complications and peri-operative outcomes of open renal surgery done and to identify the possible associated factors for development of postoperative pulmonary complications. This is a clinical audit of all non COVID-19 patients underwent open renal surgery in Hospital Sultanah Aminah, Johor Bahru from January 2020 to January 2022. Socio-demographic data and factors associated with development of pulmonary complication were collected. Intraoperative outcome and post-operative pulmonary complications and outcomes were described. Bivariate analysis was performed to determine the association of the factors with the development of pulmonary complications. A total of 30 patients were included. 22 open radical nephrectomies, 7 open radical nephroureterectomies with bladder cuff excision and 1 open pyeloplasty were done. The mean operation time was 200±58.5 min (100-335 min) and blood loss was 1578±1930ml (200-8000 ml). The pulmonary complication rate was 10%. The mean hospital stay was 13±8.8days (6-45days). Thirty days mortality rate was 3.3%. ASA grades were found to be significant association with the development of pulmonary complications. Open renal surgery is safe to be done in Covid-19 treating hospital during COVID-19 pandemic.

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INTRODUCTION

Coronavirus disease 19 (COVID-19) infections are increasing in Malaysia. There are 30,246 new infections reported on average each day in March 2022. There have been 3,711,199 infections cumulative and 33,496 COVID-19 deaths reported in Malaysia since the pandemic started (1). Due to the risk of in-hospital transmission during the early phase of pandemic, about 2.3 million cancer operations worldwide were delayed (2). This is because perioperative Covid-19 infection is associated with high risk of pulmonary complications and death (3-4).

Since the surging of COVID-19 cases in Malaysia, in order to increase intensive care capacity for patients with COVID-19 and to mobilize more doctors to support wider hospital responses in government hospital Malaysia, elective surgery was reduced. However, patients with resectable cancer, whom alternative treatment modalities would be ineffective, will still be prioritized to undergo elective surgery.

Perioperative Covid-19 infections and pulmonary complications

Studies have showed that perioperative Covid-19 infection rate ranging from 7.7% - 23%. 30-day mortality was 23.8%. Pulmonary complications occurred in 51.2%. (5,6). Pulmonary complications, defined as pneumonia, acute respiratory distress syndrome, or unexpected postoperative ventilation.(5) Studies have showed that patient's pulmonary complication rates were lower with COVID-19-free surgical pathways (2.2% vs 4.9%). Lower pulmonary complication rates was significantly associated with ASA (American Society of Anesthesiologists grade 1/2), and patients with negative COVID-19 preoperative tests. The postoperative COVID-19 infection rate was also lower in COVID-19-free surgical pathways (7). However local data regarding above mentioned data for open renal surgery in Covid-19 treating hospitals still remain scarce.

30-day mortality was associated with male sex, age 70 years or older American Society of Anesthesiologists (ASA) grades 3-5, emergency surgery, and major surgery according to an international cohort study (5).

Perioperative outcomes of open renal surgery

For perioperative outcomes, studies show that open radical nephrectomy has shorter operative time compared to laparoscopic approach (165.3 minutes vs 180.8 minutes), and there is no difference in 5-year survival data. (8). However, studies also shows that open approach has significant more blood loss (160.8ml vs 110.6ml), more narcotic was required postoperatively, longer the fasting period (2.9 days vs 1.3 days) and hospital stays (8.9 days vs 4.6 days).

The potential value of our study might provide patient-level outcomes local data for urology patients who had open renal surgery and acquired perioperative Covid-19 infection. This might aid in developing local guideline for urology surgery during this pandemic.

OBJECTIVES OF THE STUDY

This study aimed to describe the rate of pulmonary complications (unexpected ventilation, acute respiratory distress syndrome and pneumonia), the peri-operative outcomes for open renal surgery patients (operative time, blood loss, length of hospital stay and incidence of inpatient acquired COVID-19 infections and 30-day mortality rate) and the associations of potential risk factors (BMI, ASA, respiratory comorbidity, smoking, pre-operative COVID-19 screening (RTK/PCR)) with the development of pulmonary complications.

MATERIALS AND METHODS

Study design

This is a clinical audit included all patients posted for open renal surgery (open radical nephrectomy, open radical nephroureterectomy with bladder cuff excision, open pyeloplasty) from January 2020 to January 2022.

Data collection

The operative theatre census, patient medical records, blood investigations, operative notes and clinic follow up cards were reviewed retrospectively to collect all the data. Timing for data collection started from January 2020 because on 25th January 2020, the first case of COVID-19 was detected in Malaysia. (9) A total number of 30 patients were included based on the urology operative census. Surgeries were done using standard Personal Protective Equipment (PPE), including face shield or goggles, 3-ply surgical face masks, gloves, and gown. The following parameters were collected, socio demographic information (age, sex and ethnicity), factors associated with development of pulmonary complications (BMI, ASA, respiratory comorbidity, smoking, pre-operative COVID-19 screening (RTK/PCR)), intraoperative outcome (operative time and blood loss) and post-operative outcomes (pulmonary complications (pneumonia, acute respiratory distress syndrome, unexpected ventilation), length of hospital stay, and incidence of inpatient acquired COVID-19 infections.

Patient selection eligibility

Inclusion Criteria

1. All patient underwent open renal surgery (Open Radical Nephrectomy, Open Simple Nephrectomy, Open Radical Nephroureterectomy and bladder cuff excision, Open Pyeloplasty)

Exclusion Criteria

1. COVID-19 positive patients

Statistical analysis

The data were recorded and processed using Microsoft Excel. The data analysis was done using the SPSS version 22. Descriptive data was expressed as mean \pm standard deviation (SD) for normally distributed data and median (Interquartile range) for non-parametric data. The data collected was analysed using an intention-to-treat basis. In order to verify the potential risk factors with pulmonary complications, bivariate analysis was done and level of significance was set at 0.05.

Ethical committee approval

This study was registered with National Medical Research Registry (NMRR) [NMRR ID-21-01981-SP1 (IIR)]. Ethical approval was obtained from Medical Research and Ethics Committee (MREC), Ministry of Health, Malaysia on 14 Dec 2021 (Reference No: 21-01981-SP1)

Privacy and confidentiality

Subject's names were kept on a password-protected database and were linked only with a study identification number for this research. The identification number instead of patient identifiers was used on subject data sheets. All data was entered into a computer that was password protected. On completion of study, data in the computer were copied to CDs and the data in the computer were erased. CDs and any hardcopy data was stored in a locked office of the investigators and maintained for a minimum of three years after the completion of the study. The CDs and data will be destroyed after that period of storage. Subjects were not allowed to view their personal study data, as the data would be consolidated into a database.

RESULTS

1. Socio-demographic characteristics of study samples and types of open renal surgery

Table 1 illustrated the socio-demographic characteristics of the study samples, types and indications of surgery. Of the 30 patients underwent surgery during this pandemic, the majority of patients are male (73.3%) and Chinese (50.0%) race. The mean age is 50.1 years with the range from 11 to 75 years old. Furthermore, 73.3% of surgery is open nephrectomy. 83.3 % of our study samples are indicated for surgery because of tumors. Other indications include trauma, non-functioning kidneys and pelvic-ureteric obstruction (PUJO).

2. Pulmonary complications and perioperative outcomes

Table 2 illustrates the peri-operative outcomes of the study samples.

Of all the 30 cases done, pulmonary complications developed in 10% of them. All of them were diagnosed to have hospital acquired pneumonia and did not

required assisted ventilation. They were tested for Covid-19 PCR post operatively and found to be negative.

The mean operation time was 200 ± 58.5 min (100-335 min) and mean blood loss was 1578 ± 1930 ml (200-8000 ml). The mean hospital stay was 13 ± 8.8 days (6-45 days). 30 days mortality rate was 3.3%.

3. Analysis of the relationship of potential risk factors with the development of pulmonary complications.

Table 3 shows the association of the risk factors with the development of pulmonary complications.

Of the 30 patients, their mean BMI was 25.2 ± 3.6 , 46.7% belonged to ASA 1 and 2, 86.7% did not have respiratory comorbidity, 50% were smoker and 53.3% underwent RTK-Ag swab preoperatively.

Bivariate analysis was done to analyse the possible risks factors with the development of pulmonary complications. American Society of Anesthesiologists (ASA) grades had significant association with the development of pulmonary complications. However, other variables like BMI, respiratory comorbidity, smoking and pre-operative Covid swab did not show any significant association with the development of pulmonary complications.

DISCUSSION

Covid-19 pandemic has caused a global impact to our healthcare system including operative surgery. This is the first clinical audit of perioperative outcomes of major urological surgery in government Covid-19 treating hospital in Malaysia.

Before pandemic, Hospital Sultanah Aminah (HSA), Johor Bahru is the tertiary referral hospital for whole southern region Malaysia, and most of complicated urology cancer surgery was done in this hospital. During the pandemic, HSA has admitted patients with COVID-19, hence increasing risk of cross infection of elective patients. Dedicated COVID-19-free surgical pathways should be established to provide safe elective cancer surgery during this pandemic as suggested by an International, Multicenter, Comparative Cohort Study (7). However, complete segregation of the operating theater, critical care, and inpatient ward areas with COVID-19 patients is challenging due to limited resources in hospital. Outbreaks of COVID-19 infections at inpatient ward and among healthcare worker are often reported. With the limited resources in government hospital, my study results show that 30 day mortality rate is 3.3% which is lower compared to the rate of 18.9% reported in literature (7). The cause of death of the subject in my study was not related to COVID-19 infections.

In Department of Urology HSA, JB, open approach is the preferred modality for most of our major renal surgery since the pandemic began. This is because safety

of laparoscopic surgery is debated out of fear for COVID-19 transmission, arising from the potential generation COVID -19 contaminated aerosols from CO2 leakage and the creation of smoke from the use of energy devices (10). Open surgery is also less time consuming and recommended by several studies (11). The mean blood loss of 1.5litre in this study was higher compared to that of available literature because of an outlier of one single case which had a blood loss of 8litre and activated massive blood transfusion protocol. The mean operative time, duration of hospital stays were fairly comparable to that reported in literature.

This study showed that ASA grades were significant associated with the development of pulmonary complications. Similar findings as also reported in several other studies (5, 13). ASA 3 patients were shown to be more susceptible to pulmonary complications thus increased post-operative mortality and ICU admission (13). Type of pre-operative swab was not significantly associated with pulmonary complications. However, it needs to be done according to MOH pre admission guidelines to ensure the safety of health care workers and in ward patients (14).

LIMITATIONS

The cases were done in one single tertiary urology centre. Types of urology surgeries done in other hospital might be differ from our centre. Besides, only those symptomatic were tested post-operatively to exclude COVID-19 infections leads to selection bias. There are problems of bias and inaccurate data because this is a retrospective study. The study sample size is small so it may not be suitably powered to look for associated factors.

CONCLUSION

Post-operative pulmonary complications and mortality rate is low among patients underwent open renal surgery in Covid-19 treating hospital. This shows that urology surgery is safe to be done in government tertiary centre during Covid-19 pandemic with negligible risk of perioperative Covid-19 infections.

CONFLICT OF INTEREST

The investigators declare they have no conflict of interest

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This is a self-funded investigator initiated research.

Table 1: Study Samples Socio Demographic Characteristics

Variables	Total N(%)
Age (Years)	
Mean (SD)	50.1 (17.9)
Range	11 - 75
Gender	
Male	22 (73.3)
Female	8 (26.7)
Ethnicity	
Malay	13 (43.3)
Chinese	15 (50.0)
Indian	2 (6.7)
Types of Surgery	
Open Nephrectomy	22 (73.3)
Open Nephroureterectomy + bladder cuff excision	7 (23.3)
Open Pyeloplasty	1 (3.3)
Indications	
Tumors	25 (83.3)
Non Tumors	
Trauma	1 (3.3)
Non Functioning Kidney	3 (10.0)
PUJO	1 (3.3)

Table 2: Peri-operative Outcomes

Peri- Operative Outcomes	Total N(%)
Blood Loss (ml)	
Range	200-8000
Mean (SD)	1578 (1930.0)
Operation Time (Mins)	
Range	100-335
Mean (SD)	200 (58.5)
Pulmonary Complications	3 (10)
Hospital Stays, Days	
Range	6-45
Mean (SD)	13 (8.8)
30 Days Mortality Rate	1 (3.3)
Covid Infectons Post Op	0 (0)

Table 3: The relationship of risk factors with pulmonary complications

	Total N(%)	Pulmonary Complications		P-Value
		Yes, N(%)	No, N(%)	
BMI				
Mean (SD)	25.2 (3.6)	26.3 (2.1)	25.3 (4.1)	0.677 ^a
ASA				
1	14 (46.7)	0 (0)	14 (100)	0.007 ^b
2	14 (46.7)	1 (7.1)	13 (92.9)	
3	2 (6.7)	2 (100)	0 (0)	
Respiratory Comorbidity				
Yes	4 (13.3)	0 (0)	4 (100)	1 ^b
No	26 (86.7)	3 (12.5)	21 (87.5)	
Smoking				
Yes	15 (50.0)	3 (20)	12 (80)	0.224 ^b
No	15 (50.0)	0 (0)	15 (100)	
Pre-Operative Covid Swab				
PCR	14 (46.7)	2 (14.3)	12 (85.7)	0.586 ^b
RTK-Ag	16 (53.3)	1 (6.3)	15 (93.8)	

a: Independent T test

b: Fisher Exact test

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