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CONTENTS

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Editorial Office

Faculty of Medicine and Health Sciences,
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Phone: (6)088-320 000 Fax: (6)088-321 377
Email: bej@ums.edu.my

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EDITORIAL Open Access

Pandemic Fatigue: A Challenge in Combatting against COVID-19

Mohd Rohaizat Hassan[1,*], Syed Sharizman Syed Abdul Rahim[2], Mohammad Saffree Jeffree[2]

[1]*Department of Community Health, Faculty of Medicine, Universiti Kebangsaan Malaysia, Cheras 56000 Kuala Lumpur, Malaysia*

[2]*Department of Community & Family Medicine, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Kota Kinabalu, 88400, Sabah, Malaysia*

*Corresponding author: rohaizat@ppukm.ukm.edu.my

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The COVID -19 pandemic has hit the world for a period of a year and a half; it has been a triple crisis, with medical, economic, and psychological consequences (Hoof, E.V., 2020). After 18 months of going through a pandemic, this includes not only facing the transmission of SARS CoV-2 virus but also restricted movements. Communities are now facing pandemic fatigue starting as early as the third wave of increased cases in September 2020 (Gerada, C., 2020). Pandemic fatigue is the stage when the initial enthusiasm and eagerness to tackle the crisis is replaced by feelings of exhaustion (Murphy, J.F.A., 2020). In a simple definition, pandemic fatigue is understood as demotivation to follow recommended protective behaviours (Morrison, M., 2011 & Masten, A.S., 2020). It is a natural and expected reaction to sustained and unresolved adversity in people's lives, evolving gradually over time and affected by several emotions, experiences, and perceptions as well as the cultural, social, structural, and legislative environment (WHO, 2020).

There are several factors and signs of pandemic fatigue. Among the signs of pandemic fatigue is when there is an increase in cases of violation of standard operating procedures (SOPs) implemented by the government (Luqman A.A.K, 2020). Life-career imbalances, limited interactions, and limited social movements in addition to the need to adhere to SOPs in going about daily life have contributed to pandemic fatigue. The long period of movement control order (MCO) has also led to the occurrence of stress, loss of motivation, and emotional disturbances (Siti, M.Z., 2020). In a recent study which analysed the pandemic fatigue level in the community, adherence to SOPs and government directives, emotional stress, career-family conflict, and physical risks experienced by the public during the pandemic period, it was shown that 62.5% of respondents experienced pandemic fatigue at an alarming rate (Zakaria, S.M., 2021). The symptoms of pandemic fatigue involve emotional stress leading to sleep disturbances, labile mood, and burnout. Imbalance between family life and career commitments was very much affected too during the pandemic. Working from home (WFH) sometimes lead to long hours of working without limit. Children need to continue on with hybrid or online teaching. These create an environment transforming home into workplaces and schools, which to a certain extent reduced the quality of life and family time.

We are now still in the pandemic mitigation phase. The government has set two main strategies in combatting the pandemic; namely through public health interventions and achieving community immunity through vaccination. Public health interventions and COVID-19 vaccine will help curb the spread of the epidemic. But at the same time, pandemic fatigue also needs to be curbed so that society can survive in the crisis facing the country. Public health interventions with new norms practices such as movement control, physical distancing practices including avoiding crowded and crowded gatherings, and the wearing of face masks are still essential. New hope came with the availability of vaccines and vaccination programs that are expanding (Zakaria, S.M., 2021). However, while waiting for the full impact of vaccines and vaccination programs to providing community immunity, the public still need to deal with new norms and public health interventions. This long journey will impose the public towards pandemic fatigue; adherence to protective behaviour still needs to be observed to avoid flouters (Bador, A.H., 2021). Therefore, the government needs to take certain steps and strategies in ensuring that the public will not be affected too much by pandemic fatigue. The government must take the lead to assist public health authorities to conduct interventions in dealing with the COVID-19 pandemic. We cannot afford having too many violators and flouters to the programs and SOPs.

World Health Organization suggested few strategies to maintain and reinvigorate public support and to overcome the pandemic fatigue. These must be informed by public health, societal, cultural, and economic considerations, and must ensure that no one is left behind (WHO, 2020). First, is to understand the people by collecting and using evidence for targeted, tailored, and effective policies, interventions, and communication. Second is by engaging people as part of the solution, finding ways to involve individuals and communities at every level. Third, by allowing people to live their lives but reduce risk; considering the wide-ranging restrictions may not be feasible for everyone in the long run. And finally, acknowledging the hardship people experience and the profound impact the pandemic has had on their lives.

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REVIEW ARTICLE Open Access

Intervention to Address Childhood Undernutrition: A Systematic Review

Eric Tan Chee How[1,2], Marilyn Maluda[1], Mohd Yusof Ibrahim[1], Lim Kai Joo[1], Aza Sherin Mohd Yusuff[3,*], Khamisah Awang Lukman[2,*]

Abstract

Introduction: Childhood undernutrition while being a preventable condition remains a major public health issue because it contributes to the mortality and morbidity of children globally. Intervention strategies to improve the nutritional status of children include therapeutic food, cash transfers, antibiotics and nutritional education. The objective is to review the effects of various nutritional interventions in addressing undernutrition in children.

Methods: Comprehensive search of literature in electronic databases were conducted in PubMed, Science Direct, and Scopus containing the Medical Subject Headings (MeSH) and the title terms 'Undernutrition' OR 'Malnutrition AND 'Intervention' OR 'Management' AND 'Children' OR 'Childhood' between January 2000 and August 2019. Of the 4358 studies that were identified, 17 studies matched the inclusion criteria and were reviewed.

Results: Therapeutic food is an integral part of nutritional interventions in majority of the studies along with cash transfers and nutritional education. The most consistent outcome in most of the studies was improvement in the nutritional status which subsequently reduces the undernutrition in children.

Conclusion: Therapeutic food, conditional cash transfer and nutritional education yielded the best outcome in alleviating undernutrition in developing countries.

Keywords: Undernutrition, Malnutrition, Intervention, Children, Systematic review

*Correspondence Email: azasherin@gmail.com; khamisah@ums.edu.my

[1]*Department of Community and Family Medicine, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia*

[2]*Keningau Area Health Office, Keningau, Sabah, Malaysia*

[3]*Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai,Negeri Sembilan, Malaysia*

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Introduction

Despite the global transition to overnutrition, undernutrition while being a preventable condition remains a major public health issue among children in the developing countries because of their contribution to mortality in children and may have lasting impact to the development and growth of the child. In 2016, World Health Organization (WHO) estimated that 22.9% or 154.8 million children under-5 globally was stunted whereas 7.7% or 52 million children under-5 globally was wasted (UNICEF Data, 2017).

A malnourished child has a 9-fold increase risk of death as compared to the non-malnourished children (Bhutta, Z.A. *et al*., 2008). Undernutrition has contributed to 45% mortality in children under-5 years which amounted to 3 million deaths out of 6.9 million each year (Horton, R. 2013). Undernutrition is prevalent in Asia and Africa regions which accounts to almost 50% mortality of children under the age of 5 either directly or indirectly which equivalent to approximately 3 million mortality each year (UNICEF Data, 2017).

Based on Lancet review on maternal and child nutrition, intervention strategies to address undernutrition can be broadly divided into nutrition-specific interventions, nutrition-sensitive interventions and creating a conducive environment (Horton, R. 2013). These various intervention strategies include therapeutic food, cash transfers, nutritional behavioural interventions and nutritional education. Examples of therapeutic food are ready to use therapeutic food (RUTF), Lipid-based nutrient supplements (LNS), Micronutrient powder (MNF) and Liquid oral nutritional supplements (ONS). Therefore, the objective is to review the effects of various intervention strategies in addressing undernutrition in children.

Materials & Methods

Literature Search Strategy

Extensive search of literature regarding the interventions to reduce undernutrition in children were identified through electronic search of papers published between January 2000 and August 2019. The electronic databases that were searched are ScienceDirect Scopus and PubMed containing the Medical Subject Headings (MeSH) and the title terms ‘Undernutrition’ OR ‘Malnutrition AND ‘Intervention’ OR ‘Management’ AND ‘Children’ OR ‘Childhood’.

We used similar literature search strategy with the other electronic databases as well. Two investigators conducted systematic review of the literature independently by assessing the study eligibility from the extracted data and consulted the third investigator in case of disagreements or discrepancies so that final decision can be made with mutual consensus.

Study Selection and Eligibility Criteria

Titles and abstracts were identified by the extensive research of the electronic databases. Duplicate research papers were then removed, and the relevant papers were screened based on the titles and abstracts. Research papers that were irrelevant were excluded. The research papers full text was then retrieved to be assessed its eligibility.

Inclusion criteria for the eligible studies were studies conducted on children aged up to 18 years old that involves either community, school or clinic interventions or a combination of them. The studies selected must be in the English and Malay language that were conducted among undernutrition children and adolescents. Systematic reviews, meta-analysis, and editorials were excluded.

Data Extraction and Abstraction

The required information was extracted from all eligible papers was as follows;

i. General information regarding the study such as the first author's name, country of publication, year of publication, study design
ii. Characteristics of the study population such as age of studied participants
iii. Type and duration of the intervention
iv. Result of the study

Results

Study Selection and Characteristics of the Published Studies

Figure 1 demonstrates the flowchart for the conducted systematic review following the PRISMA-P guidelines. A total of 4358 titles were identified through our search. 17 articles were deemed appropriate for inclusion.

This systematic review showed that the quality of the studies reviewed were good as large majority of the studies (n= 13, 76 %) conducted were randomized controlled trial. An overwhelming majority of the study participants were aged less than 5 years old (94 %) with the majority of the studies' duration of intervention lasted less than 1 year (59 %). Majority of the interventions in the studies were in the form of therapeutic food (53 %) followed by cash transfers (24%), nutritional education (18%) and antibiotics (5%) (**Table 1**).

Discussion

This review evaluates different approaches in its intervention to reduce childhood undernutrition and malnutrition. One approach involves cash transfers that were reported in Brazil (Morris, S.S. *et al*., 2004), Congo (Grellety, E. *et al*., 2017), Niger (Prudhon, C. *et al*., 2017) and Indonesia (Kusuma, D. *et al*., 2017) which revolves around the government providing cash directly to poor mothers with an undernourished child.

Cash transfers which may be conditional or non-conditional cash transfer has been one of the strategies to address the inequality in children's food consumption among the poor. This targeted cash transfer can be considered a form social safety net programme intended to avert starvation and reduce undernutrition among the most vulnerable populations. A study in Indonesia explores the impact of conditional cash transfers by a government led initiative known as *Program Keluarga Harapan* which was found to reduce the probability of wasting by 33% and severe wasting by 41% (Kusuma, D. *et. al*., 2017). These findings corroborate similar study in Congo (Grellety, E. *et al*., 2017).

However, a study in Brazil discovers that there was poor weight gain in children who their parents receive unconditional cash transfer due to the perception of the parent that the benefit will be discontinued if the child started to grow well (Morris, S.S. *et al*., 2004). Thus, the researchers suggest for conditional cash transfer as a better stimulus to reduce undernutrition as compared to unconditional cash transfer (Morris, S.S. *et al*., 2004) Furthermore, cash transfers elicit less stigma to the beneficiaries in contrast to other forms of near-cash transfer namely food stamps and food vouchers which aim to increase the purchasing power of the targeted household.

Undernutrition has also been inextricably linked with inadequate food intake; therefore many various governments have taken the initiative to provide therapeutic food to those food insecure families with undernourished child. Previous study conducted in Pakistan to evaluate the impact of RUTF which consists of energy dense paste against liquid oral nutritional supplements in underweight healthy children, the researchers reported that both RUTF and liquid oral nutritional supplements are equivalently effective in improving the nutritional results in undernutrition children (Fatima, S. *et al*., 2018). This result corroborates with other very similar studies at Malawi (Gelli, A. *et al*., 2018), Burkina Faso (Nikièma, L. *et al*., 2014), Palestine (Magoni, M. *et al*., 2008) and Mali (Tranchant, J.P. *et al*., 2019) on the effectiveness of therapeutic food as a form of intervention against childhood undernutrition.

The effect of therapeutic food is even more apparent in vulnerable populations that are exposed to conflict and political instability. Invariably, the rates of undernutrition are high in countries involve in conflict because one of strategy in war is to deprive the populations from access to food. Previous study in in Mali attributed food assistance and transfers as a protective effect against food insecure population in conflict (Tranchant, J.P. *et al*., 2019). However, a qualitative study was conducted in Southern Ethiopia managed to unravel some unintended consequences of provision of RUTF in which a severe malnourished child may consume inadequate amount of RUTF provided due to sharing and/or selling of the RUTF (Tadesse, E. *et al*., 2015).

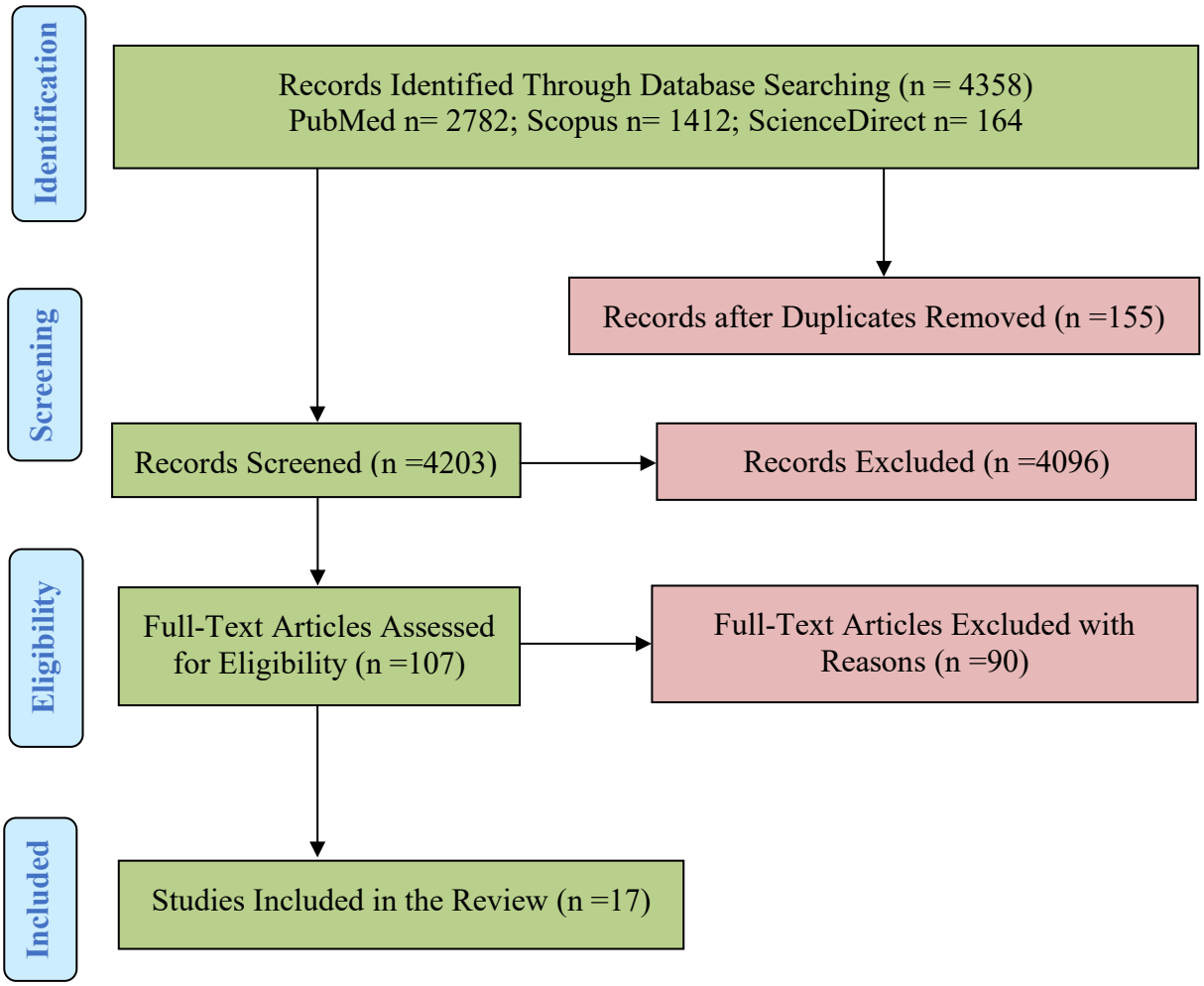

Figure 1: Flowchart of Study Selection *p*

Table 1: Effects of intervention to reduce childhood undernutrition

Author, Year, Country & Study Design	Participants Age & Intervention Duration (In Months)	Type of Intervention	Results
Gelli, A. *et al.*, 2018, Malawi, Randomized Trial	< 12 & 6	Childhood Development Centre based Agriculture & Nutrition Intervention	Greater reductions in the prevalence of stunting (17% points)
Galasso, E. *et al.*, 2018, Madagascar, Randomized Trial	6–30 & 24	Lipid based Nutrient Supplements	Reduction in stunting in children aged 6-18 months exposed to LNS
Grellety, E. *et al.*, 2017 & Bhutta, Z.A. *et al.*, 2008, Congo Randomized Trial	6-59 & 6	Cash Transfers	Increase recovery from SAM and reduce default, non-response rates
Sibson, V.L. *et al.*, 2018, Niger, Randomized Trial	6-59 & 9	Unconditional Cash Transfers	No reduction in prevalence of undernutrition
Manary. M.J. *et al.*, 2004, Malawi, Randomized Trial	> 12 & 9	3 Groups: RUTF, RUTF Supplements with Maize/ Soy Flour	Significant improvement in severe malnutrition with RUTF
Tranchant, J.P. *et al.*, 2017, Mali, Quasi-Experimental Study	60-180 & 9	Targeted Food Assistance & Supplementary Feeding	Food transfers exerted protective effect among food insecure population in conflict context
Penny, M.E. *et al.*, 2005, Peru, Randomized trial	0-18 & 18	Nutritional Education	Nutritional education reduces the rate of stunting by two-thirds
Fatima, S. *et al.*, 2018, Pakistan, Randomized trial	60-120 & 7	2 Groups: RUTF & ONS	RUTF and ONS are equally effective in improving nutritional outcome
Yousafzai, A.K. *et al.*, 2014, Pakistan, Randomized trial	5-24 & 12	Nutritional Intervention with Lady Health Worker	Growth and development of the child significantly improved
Kusuma, D. *et al.*, 2017 & Bhutta, Z.A. *et al.*, 2008, Indonesia, Randomized trial	< 60 & 24	Cash Transfers	Significantly reduce severe malnutrition
Ruel, M.T. *et al.*, 2008, Haiti, Randomized trial	< 60 & 36	Nutritional Behavioural Intervention	Preventive program more effective than recuperative treatment

Author, Year, Country & Study Design	Participants Age & Intervention Duration (In Months)	Type of Intervention	Results
Trehan, I. *et al.*, 2016, Malawi, Randomized trial	6-59 & 24	3 Groups: Amoxicillin, Cefdinir & Placebo	Improvement in recovery SAM from antibiotics and reduction in mortality
Van der, K.S. *et al.*, 2012, Nigeria, Randomized trial	6-59 & 7	RUTF and MNF	RUTF and MNF given for 2 weeks did not reduce the incidence of malnutrition
Morris, S.S. *et al.*, 2004, Brazil, Quasi-experimental Study	< 84 & 6	2 Groups: Cash Transfers & Control	Poor weight gain to children that receive cash transfer due to perception that the benefit will be discontinued if the child started to grow well
Prudhon et al., 2017 & Bhutta, Z.A. *et al.*, 2008, Niger, Prospective intervention	6-23 & 15	2 Groups: LNS-LQ/ LNS-MQ	Provision of LNS-LQ more appropriate when food insecurity is high while when food security is better LNS-MQ more appropriate
Nikièma, L. *et al.*, 2014, Burkina Faso, Randomized trial	6-24 & 3	Nutritional Education & Supplement	Effective in treating moderate acute malnutrition
Magoni, M. *et al.*, 2008, Palestine, Random survey	6-59 & 2	Nutrition Education & Supplementation	70% reduction in acute malnutrition

RUTF: Ready-to-Use Therapeutic Food; ONS: Liquid Oral Nutritional Supplements; LNS: Lipid Based Nutrient Supplements; LNS-LQ: Large Quantity Lipid Based Nutrient Supplements; LNS-MQ: Medium Quantity Lipid Based Nutrient Supplements; SAM: Severe Acute Malnutrition; MNF: Micronutrient Powder.

On the contrary, a previous study in Nigeria regarding the effect of short term supplementation RUTF and micronutrient powder for 2 weeks failed to reduce the incidence malnutrition (Van der, K.S. *et al*., 2016). The lack of effect can be explained by the short duration of RUTF and micronutrient powder given which is insufficient to overcome the effects of high morbidity and pre-existing malnutrition (Van der, K.S. *et al*, 2016). Thus, it is recommended for supplementation such as RUTF and micronutrient powder to be consumed for a longer duration of more than 2 weeks.

Another intervention strategy in reducing child undernutrition is nutritional education as evidence in a previous study in Peru that concludes that nutrition education intervention reduces the rate of stunting in children by two-thirds (Penny, M.E. *et al*, 2005). Nutritional

education involves health care worker imparting knowledge and information to the parents or caretaker to instil the importance of exclusive breastfeeding for the first 6 months followed by complementary feeding, promote preventive health care seeking behaviour, proper methods of feeding practices and dietary intake. A study by (Fawzi, W.W. *et al*, 1998) points out those women with low education level or no education level is usually less exposed to the information regarding on how to prepare food with sufficient nutrients and may also delay the introduction of complementary feeding after 6 months of exclusive breastfeeding.

A previous study was conducted in Malawi to ascertain the role of providing antibiotic by the outpatient department for severe acute malnourished children (Trehan, I. *et al*., 2016). The researchers concluded that there were improvement in the recovery of severe acute malnutrition and reduction in mortality after antibiotics were given (Trehan, I. *et al*., 2016). This finding parallels another study conducted in Kenya (Maitland *et al*., 2006). As recurrent childhood infections have been identified as the immediate cause of malnutrition, hence it is warranted for antibiotic treatment for uncomplicated severe acute malnourished child in the outpatient setting. However, further studies are required to evaluate the need antibiotic in mild and moderate acute malnutrition as unrestricted use of antibiotics may give rise to antibiotic resistance.

There are some certain limitations that need to be considered in interpreting the findings of this review because several of the studies were conducted at different regions with different socio-demographics population and service providers which makes comparison difficult and biased. In addition, the improvement in the nutritional status of children in several of the studies reviewed cannot be entirely attributed to the interventions alone as other factors such as improvement in the hygiene, water quality and sanitation may also contribute to the improvement of the nutritional status of children. Since only studies in English and Malay are included in this review, hence there may be studies not included in this review and this has contributed to bias.

Conclusion

Undernutrition is still rampant many developing countries as compared to the developed countries and unfortunately children are the most vulnerable group to undernutrition. This review has demonstrated that therapeutic food, conditional cash transfer and nutritional education yielded the best outcome in alleviating undernutrition in developing countries.

Conflicts of Interest

There are no financial and non-financial conflicts of interest in this review.

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Comparative Changes in Psychological Mindedness, Mindfulness, and Concordance Attitudes between Online and Face-to-Face Undergraduate Psychiatry Education in a University in Borneo, Malaysia

Nicholas Tze Ping Pang[1], Mohd Amiruddin Mohd Kassim[1,*], Wendy Diana Shoesmith[1], Sandi James[2]

Abstract

Introduction: Psychiatry posting is one of essential posting for medical students in Universiti Malaysia Sabah. Apart from learning about mental health disorder, students are also exposed to various psychotherapies techniques are crucial in psychiatric practise. However, in view of COVID-19, online learning had to be adopted, instead of the traditional face-to-face learning.

Methods: The study aimed to assess the difference in diverse psychological constructs, such as psychological mindedness, flexibility, and mindfulness; pre- & post-psychiatry posting, and to determine whether online learning was comparable to face-to-face learning. The study was done on 58 undergraduate medical student populations, utilizing a set of scales to determine the psychological constructs, *viz.*, balanced Index of psychological mindedness, Leeds attitudes to Concordance Scale II (LATCon II), the mindful attention awareness scale, and the acceptance and action questionnaire-II, which were administered before & after completion of the posting.

Results: Results were subsequently analysed using IBM SPSS. Interestingly, both control group (mean difference= 15.155, p= 0.004) and online psychiatry posting (mean difference 12.691, p= 0.014) had higher mindfulness level when compared to face-to-face psychiatry posting. Despite the common perception that psychiatry posting raises awareness regarding mental health, it was found that there were no significant differences in psychological constructs pre- and post-psychiatry posting. Interestingly, the online psychiatry posting also found to be as effective as the face-to-face psychiatry posting.

Conclusion: This study highlighted the applicability of online learning in psychiatry, which could be crucial in maintaining continuity of learning during these uncertain times.

Keywords: Online learning, Psychiatry, Psychological mindedness, Psychological flexibility, Mindfulness.

*Correspondence Email: amiruddink@ums.edu.my

[1]*Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400 Sabah, Malaysia*

[2]*Department of Social Work and Social Policy, School of Science, Health and Engineering, La Trobe University, Melbourne Victoria 3000, Australia*

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Introduction

Psychotherapy skills are crucial in the global mental health agenda of creating higher levels of mental health literacy, increasing access to crucial psychotherapy interventions, and improving the psychological wellbeing of the general public as a primary prevention initiative. Despite efforts by the United Kingdom in its Increasing Access to Psychological Therapies (IAPT) nationwide initiative, persistent shortfalls in clinical psychologist yields indicate that a more realistic approach is to task shift core psychotherapeutic skills to non-specialist providers, including all junior doctors. Moreover, psychotherapy training is known to have positive effects on various psychological indices, including psychological mindedness (Boylan, M.B. *et. al.,* 2006), mindfulness, and psychological flexibility. Psychological mindedness is defined as having interest into one's own psychological processes and the psychological processes of others (Farber, B.A. *et. al.,* 1985). Mindfulness is defined as a state of being able to remain in the present moment and be non-judgemental to one's thoughts and feelings (Kabat, Z.J. *et. al.,* 1993), and treating oneself with flexibility, openness to experience, curiosity, and kindness to oneself. Psychological flexibility on the other hand is defined as flexible psychological reactions in line with an individual's values, with the converse being psychological inflexibility, namely rigidity of psychological reactions in order to avoid distress, uncomfortable feelings and thoughts (Hayes, S.C. *et. al.*, 2006). All these are psychological process variables that may be theoretically improved by a course of psychotherapy training.

At the same time, in training a new generation of medical professionals, it is increasingly crucial to instil values of collaborative practise from the onset. Collaborative practise refers to when "multiple healthcare workers from different professional backgrounds work together with families, patients, carers and communities to deliver the highest quality of care" (Gilbert, J.H. *et. al.,* 2010). One important method of doing so is via a shared decision making (SDM) model. SDM encourages teams and patients to discuss reasonable healthcare options together, using the best available evidence, so patients are supported to construct informed preferences about available options (Charles, C. *et. al.,* 1999). It is a major tenet of evidence-based medicine as one of the prerequisites is to incorporate patient's values and preferences, i.e. employing SDM (Montori, V.M. *et. al.,* 2008).

In the medical curriculum of Universiti Malaysia Sabah, a comprehensive public university in Borneo, as part of the psychiatry posting of six weeks, medical students are given brief exposures to three types of psychotherapies, namely Motivational Interviewing, Acceptance and Commitment Therapy, and Cognitive Behavioural Therapy, both as a seminar and a roleplay form. Concurrently there is also a three-hour SDM tutorial provided in roleplay form. There have as yet been no efforts to adequately assess whether there is any efficacy in teaching such skills, and whether they lead to corresponding increases in relevant indices.

One other spanner in the works in recent months for the psychiatry posting has been the advent of COVID-19, which has necessitated transitioning of all educational activities to online teaching via video call applications. This pandemic has certainly caused huge implications in terms of mental health and social norms of students and public alike (Pang N.T.P. *et. al.,* 2020; Kassim, M.A.M. *et. al.,* 2020; Wan, M.Y.W.M.A. *et. al.,* 2021; Dawson, D.L. *et. al.,* 2020; Kumar, A. *et. al.,* 2020; Lee, S.C. *et. al.,* 2020; Grover, S. *et. al.,* 2020; Zainudin, S.P. *et. al.,* 2020; Rab, S. *et. al.,* 2020 & Cahapay, M.B. *et. al.,* 2020), and has been responsible for increased prevalence of psychopathologies among university students

(Kassim, M.A.M. *et. al.,* 2020; Wathelet, M. *et. al.,* 2020; Padrón, I. *et. al.,* 2021; Liu, C.H. *et. al.,* 2020; Marelli, S. *et. al.,* 2021 & Mudenda, S. *et. al.,* 2020). Hence all psychotherapy and SDM training were transferred to online teaching for three postings spanning a total of six months. Hence, there is an imperative to assess whether online modalities yield the same benefits in terms of improvement of indices of psychological process variables and SDM skills. This is a crucial question to address, as if online skills training modules work with similar efficacy as face-to-face skills training modules, they can be used as suitable modalities to train larger numbers of people remotely.

Hence this study aims to assess a few things. Firstly, the study assesses whether exposure to the psychiatry posting would lead to increases in various constructs that reflect the following psychological processes: psychological mindedness, mindfulness, and psychological flexibility. Secondly, this study assesses the effectiveness of the posting in improving attitudes towards concordance, which represent a corollary measurement of student attitudes towards paternalism. Thirdly, this study aims to see if there are any differences between the face-to-face batches, the online batches, and a control group comprised of students who had not undergone the psychiatry posting.

Methods

Prior to the study commencement, the Medical Research Ethics Committee of Universiti Malaysia Sabah provided regulatory consent and vetting. Informed consents were obtained from all participants. The participants were recruited by applying convenience sampling in an undergraduate medical faculty in Borneo. Three groups of medical students were enrolled into this study. One group was the students who were in the six-week psychiatry posting which had been done all face-to-face (Group A1). The second group was the students who had undergone the entire six weeks posting through online classes (Group A2). The control group was a group of medical students who did not undergo the psychiatry posting as they were in the year below (Group C). There were 58 students participated

Students will be given explanations with regard the study, and only those students who provide informed consent will then proceed to sign informed consent sheets. Inclusion criteria were students who fell into the groups as above, gave informed consent, and did not have any acute medical or psychiatric issues.

At the baseline, all students will complete 5 questionnaires - a sociodemographic questionnaire, the Leeds Attitudes to Concordance Scale II (LATCon II) measuring attitudes towards paternalism and concordance, the Balanced Index of Psychological Mindedness, the Mindful Attention Awareness Scale, and the Acceptance and Action Questionnaire-II measuring psychological flexibility. For Group A1 and Group A2, measurements were performed at two separate time points – at T1: the beginning of their posting, and at T2: the end of their posting. For Group C, measurements for T1 and T2 were measured six weeks apart, to simulate the duration of time undergoing a psychiatry posting.

Leeds Attitudes to Concordance Scale II (LATCon II)

The LATCon II is a revised and more concise form of the previous Leeds Attitudes to Concordance Scale (LATCon), assessing practitioners' and patients' attitudes to concordance (Knapp, P. *et. al.,* 2009). It has 20-item scale measured using a 4-point Likert scale: strongly disagree (0), disagree (i), agree (ii), and strongly agree (iii). It also includes five items (*i.e.*

Items 11, 14, 15, 18, and 20) in the scale which were reversely scored. Higher scores on the LATCon II indicate a more positive attitude, while lower scores indicate a more negative attitude (Way, D. *et. al.,* 2013). The scale has satisfactory psychometric properties with Cronbach's α of 0.82, as well as good test-retest reliability (Pearson's correlation coefficient = 0.64).

Balanced Index of Psychological Mindedness (BIPM)

BIPM was developed in 2009 as a brief scale to measure the psychological mindedness level in individuals (Nykliček, I. *et. al.,* 2009). It consists of 14 items and two factors, namely Interest and Insight. Items are rated on five-point Likert scale ranging from 0 (not true) to 4 (very much true), and a total score and two subscale scores (Interest and Insight) are calculated (Pang, N.T.P. *et. al.,* 2020). Scores of the subscales can range from 0–28, with a higher score reflects a higher Interest, more Insight, and higher PM (Kassim, M.A.M. *et. al.,* 2021). BIPM showed good psychometric properties, with Cronbach's α of 0.85 and 0.76 for Interest and Insight respectively, test-retest (r = 0.63 for Interest; r = 0.71 for Insight), and concurrent validity (r > 0.40 with related constructs).

Mindful Attention Awareness Scale (MAAS)

Mindful Attention Awareness Scale (MAAS) is designed to assess a core characteristic of mindfulness, namely, a receptive state of mind in which attention, informed by a sensitive awareness of what is occurring in the present, simply observes what is taking place (Brown, K.W. *et. al.,* 2003). It has 15 items on a 6-point Likert scale ranging from 1 (almost always) to 6 (almost never). Higher scores reflect higher levels of dispositional mindfulness (Zainal, N.Z. *et. al.,* 2015). It has Cronbach's α of 0.82, with good CFA model data fits (χ 2 (90, N = 327) 189.57, GFI = .92, CFI= .91, IFI =.91, PCFI = .78, and RMSEA = .058). It has been validated in medical students' population in Malaysia with Cronbach's α of 0.92 (Phang, C.K. *et. al.,* 2016).

Acceptance and Action Questionnaire-II (AAQ-II)

Acceptance and action questionnaire (AAQ II) is an instrument to assess experiential avoidance and psychological inflexibility (Bond, F.W. *et. al.,* 2011 & Shari, N.I. *et. al.,* 2019). It consists of 7 questions, rated on a 7-point Likert type scale from 1 (never true) to 7 (always true). Higher score on AAQ II indicates a greater level of experiential avoidance. AAQ-II has Cronbach's α of 0.88, with the 3- and 12-month test–retest reliability is 0.81 and 0.79, respectively. It also demonstrated good model data fit on confirmatory factor analysis.

Data Analysis

SPSS IBM version 25.0 was employed for statistical analysis. Skewness and kurtosis were calculated for all study variables to assess normality. Subsequently, paired T-tests were performed to assess for significant pre- and post-changes for psychological mindedness, concordance, psychological flexibility, and mindfulness in all three groups. ANOVA was employed to assess the difference in scores between Groups A1, A2 and C, and to assess if there were any statistically significant variations between (T2-T1) between the three groups. Bivariate correlations were done using the relevant correlation coefficient between all study variables. Through hierarchical multiple regression too, the effect of the sociodemographic variables was calculated.

Results

Table 1 shows the demographic variables of the participants. The majority of participants were students in face-to-face psychiatry posting group, female, Bumiputera Sabah in ethnicity, and of Islam religion. As per **Table 2** and **3**, the skewness and kurtosis for all items are well within the accepted limits of +/-2 suggesting they fall within the bounds of statistical normality. We also performed skewness and kurtosis for the three groups separately (pre-, post-, and control group), and all items fell within the bounds of statistical normality, even though each group had less than 30 participants. There was no significant difference seen in all scales between pre- and post-psychiatry posting in all groups as shown in **Table 4**. However, control group had the highest score for MAAS, followed by online Psychiatry posting, and face-to-face Psychiatry posting. The correlation of the treated data has been provided in **Table 5**.

Table 1: *The respondents' background information (n = 58)*

Background	Category	N	Percentage
Students Group	Face-to-face psychiatry posting group	23	39.70
	Control Group	16	27.60
	Online psychiatry posting group	19	32.80
Gender	Male	12	20.70
	Female	46	79.30
Ethnic	Malay	08	13.80
	Chinese	10	17.20
	Indian	10	17.20
	Bajau	06	10.30
	Kadazan-Dusun	08	13.80
	Murut	01	01.70
	Bumiputera Sabah	13	22.40
	Others	02	03.40
Religion	Islam	25	43.10
	Christianity	16	27.60
	Buddhism	10	17.20
	Hinduism	07	12.10

Table 2: *Descriptive statistics of pre-Psychiatry posting (n = 58)*

Item	N	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis
BIPM	58	19	49	36.09	06.817	-0.185	-0.510
MAAS	58	28	89	61.12	15.317	-0.019	-0.684
AAQ-II	58	07	49	22.71	09.852	0.418	-0.111
LATCon-II	58	33	60	45.14	05.995	0.346	0.160

Table 3: *Descriptive statistics of the post-Psychiatry posting (n = 58)*

Item	N	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis
Item 1	58	25	50	36.26	06.217	0.261	-0.499
Item 2	58	17	90	60.19	16.819	-0.396	-0.320
Item 3	58	07	49	22.10	09.711	0.381	-0.284
Item 4	58	34	57	46.48	04.893	-0.479	-0.073

Table 4: Statistical treatment of Group I & J

Item$^{\Delta}$	Group 'I'	Group 'J'	(I – J)$^{\#}$	Standard Error	Significance	L$^{\$}$	U$^{\$}$
BIPM	1	2	-3.755	2.196	0.279	-9.18	1.67
		3	-0.551	2.091	1.000	-5.72	4.61
	2	1	3.755	2.196	0.279	-1.67	9.18
		3	3.204	2.289	0.502	-2.45	8.86
	3	1	0.551	2.091	1.000	-4.61	5.72
		2	-3.204	2.289	0.502	-8.86	2.45
MAAS	1	2	-15.155*	4.534	.004	-26.35	-3.96
		3	-12.691*	4.318	.014	-23.35	-2.03
	2	1	15.155*	4.534	.004	3.96	26.35
		3	2.464	4.726	1.000	-9.21	14.13
	3	1	12.691*	4.318	.014	2.03	23.35
		2	-2.464	4.726	1.000	-14.13	9.21
AAQ-II	1	2	3.690	3.223	.771	-4.27	11.65
		3	2.565	3.069	1.000	-5.01	10.14
	2	1	-3.690	3.223	.771	-11.65	4.27
		3	-1.125	3.359	1.000	-9.42	7.17
	3	1	-2.565	3.069	1.000	-10.14	5.01
		2	1.125	3.359	1.000	-7.17	9.42
LAT Con-II	1	2	-.177	1.949	1.000	-4.99	4.64
		3	-2.529	1.856	.536	-7.11	2.05
	2	1	.117	1.949	1.000	-4.64	4.99
		3	-2.352	2.032	.756	-7.37	2.66
	3	1	2.529	1.856	.536	-2.05	7.11
		2	2.352	2.032	.756	-2.66	7.37
Post BIPM	1	2	-4.383	1.972	.091	-9.25	.49
		3	-2.275	1.878	.693	-6.91	2.36
	2	1	4.383	1.972	.091	-.49	9.25
		3	2.109	2.056	.929	-2.97	7.19
	3	1	2.275	1.878	.693	-2.36	6.91
		2	-2.109	2.056	.929	-7.19	2.97
Post MAAS	1	2	-19.302*	4.714	.000	-30.94	-7.66
		3	-17.108*	4.489	.001	-28.19	-6.02
	2	1	19.302*	4.714	.000	7.66	30.94
		3	2.194	4.913	1.000	-9.94	14.33
	3	1	17.108*	4.489	.001	6.02	28.19
		2	-2.194	4.913	1.000	-14.33	9.94
Post AAQ-II	1	2	.402	3.213	1.000	-7.53	8.34
		3	1.336	3.059	1.000	-6.22	8.89
	2	1	-.402	3.213	1.000	-8.34	7.53
		3	.934	3.348	1.000	-7.33	9.20
	3	1	-1.336	3.059	1.000	-8.89	6.22
		2	-.934	3.348	1.000	-9.20	7.33
Post LAT Con-II	1	2	.804	1.599	1.000	-3.15	4.75
		3	-1.222	1.523	1.000	-4.98	2.54
	2	1	-.804	1.599	1.000	-4.75	3.15
		3	-2.026	1.667	.688	-6.14	2.09
	3	1	1.222	1.523	1.000	-2.54	4.98
		2	2.026	1.667	.688	-2.09	6.14

Δ, Item: Dependent Variable; #, I-J: Mean Difference; *I-J denoted with significant at the 0.05 level; $ Lower Bound (L) & Upper Bound (U) @ 95% Confidence Interval; Legends: 1: Face-to-face psychiatry posting (N=23); 2: Control group (N=16); 3: Online psychiatry posting (N=19);

Table 5: Correlation of the statistical treated data[$]

Item	Treatment	BIPM	MAAS	AAQ-II	LAT ConII	Post BIPM	Post MAAS	Post AAQ-II	Post LATConII
BIPM	Pearson Correlation	1	0.430**	-0.440**	0.140	0.582**	0.443**	-0.390**	-0.107
	Sig. (2-tailed)		0.001	0.001	0.296	0.000	0.001	0.002	0.424
	N	58	58	58	58	58	58	58	58
MAAS	Pearson Correlation	0.430**	1	-0.696**	0.082	0.325*	0.828**	-0.513**	0.092
	Sig. (2-tailed)	0.001		0.000	0.541	0.013	0.000	0.000	0.494
	N	58	58	58	58	58	58	58	58
AAQ-II	Pearson Correlation	-0.440**	-0.696**	1	-0.013	-0.294*	-0.611**	0.705**	-0.053
	Sig. (2-tailed)	0.001	0.000		0.923	0.025	0.000	0.000	0.6.90
	N	58	58	58	58	58	58	58	58
LAT ConII	Pearson Correlation	0.140	0.082	-.013	1	0.259*	0.076	-0.020	0.299*
	Sig. (2-tailed)	0.296	0.541	0.923		0.049	0.571	0.879	0.023
	N	58	58	58	58	58	58	58	58
Post-BIPM	Pearson Correlation	0.582**	0.325*	-0.294*	0.259*	1	0.357**	-0.417**	0.59
	Sig. (2-tailed)	0.000	0.013	0.025	0.049		0.006	0.001	0.649
	N	58	58	58	58	58	58	58	58
Post - MAAS	Pearson Correlation	0.443**	0.828**	-0.611**	0.076	0.357**	1	-0.577**	0.070
	Sig. (2-tailed)	0.001	0.000	0.000	0.571	0.006		0.000	0.600
	N	58	58	58	58	58	58	58	58
Post-AAQ-II	Pearson Correlation	-.390**	-.513**	.705**	-0.020	0-.417**	-0.577**	1	-0.237
	Sig. (2-tailed)	0.002	0.000	0.000	0.879	0.001	0.000		0.074
	N	58	58	58	58	58	58	58	58
Post-LAT ConII	Pearson Correlation	-0.107	0.092	-0.053	0.299*	0.059	0.070	-0.237	1
	Sig. (2-tailed)	0.424	0.494	0.690	0.023	0.659	0.600	0.074	
	N	58	58	58	58	58	58	58	58

**Correlation is significant at the 0.01 level (2 tailed); *Correlation is significant at the 0.05 level (2 tailed); $: It was noted that there were significant correlations seen between all variables, with exception of Leeds Concordance Scale-II (LatCON-II).

Discussion

The key findings are that there is no difference before and after the posting in terms of mindfulness, psychological mindedness, psychological flexibility, and concordance. This finding is true for both online and face-to-face intervention groups. This may be due to multiple reasons. Firstly, the levels pre-posting may have already been sufficiently high, hence the ability of skills training and education to create significantly different changes in these markers may have been attenuated somewhat. Moreover, postings may be too short in terms of psychotherapy education compared to a full skills training course that lasts typically days, or a full session of psychotherapy as a client that can happen weekly and last months.

Otherwise there are significant differences between mindfulness for the three groups, both pre- and post-posting. The highest mindfulness was experienced in the control group, followed by the online posting group, and surprisingly the face-to-face group had the lowest levels of mindfulness pre- and post-posting. There are multiple possibilities that can explain this finding. The MAAS employed measures more of state, rather than trait, mindfulness (Kotzé, M. *et. al.,* 2016 & Brown, K.W. *et. al.,* 2007). The control and online groups both experienced clinical education from their home, whereas the face-to-face group had to attend all clinical sessions in hospitals, and subsequently had to face the potential feelings of judgement of being observed face-to-face by teachers and fellow medical students. Also, due to the more hectic nature of a face-to-face posting, there is potentially less opportunity to perform mindfulness activities and to be more mindful in their daily lives, as opposed to the online and control groups, who were able to demonstrate more state mindfulness. Psychological mindedness and psychological flexibility, on the other hand, may be more stable constructs that do not differ as much amongst individuals in different situations, and may require more time to be malleable (Bond, F.W. *et. al.,* 2003; Bond, F.W. *et. al.,* 2013; Lloyd, J., *et. al.,* 2013 & McCallum, M. *et. al.,* 2003).

One of the somewhat interesting findings also is that there is no statistical difference between the online and face-to-face posting in terms of outcomes in terms of mindfulness, psychological mindedness, psychological flexibility, and concordance. This is important as it suggests that online modalities of skills development may not be as crippling as perceived. This corresponds to numerous studies that suggested that online learning is as effective as traditional face-to-face learning (Anggrawan, A. *et. al.,* 2018; Neuhauser, C. *et. al.,* 2002 & Kalpokaite, N. *et. al.,* 2020). Current literatures also suggested that learning medicine through online learning have big potential and shown encouraging impacts, especially in these challenging COVID-19 period (Torda A. *et. al.,* 2020; Khalil, R. *et. al.,* 2020; Agarwal, S. *et. al.,* 2020; Rajab, M.H. *et. al.,* 2020; Kassim, M.A.M. *et. al.,* 2020). Using the breakout room functions of online teleconferencing applications, small group training and roleplay sessions can be simulated the same way as in face-to-face. Preliminary evidence from end of psychiatry posting examinations that have been undertaken by the online psychiatry postings also suggests that their examination results are similar to face-to-face postings. Though there is certainly no substitute to a face-to-face clinical education especially for surgical or hands-on rotations, for psychiatry training there is certainly no obstacle to using online methods.

The limitations of this study are certainly the small sample size per individual group, as the number of respondents in the online group is limited by the number of students who were required to undergo an online posting due to the COVID-19 lockdown. Hence, it was decided to match the control group numbers correspondingly. Otherwise, this study is limited due to the length of the psychiatry posting and the number of psychotherapy and SDM classes offered. However, this is beyond the researchers' control as it is related to the core learning outcomes.

Conclusion

In conclusion, it appears that psychiatry education can be done as efficaciously online as it can be done face-to-face. There is difference in levels of state mindfulness between online and face-to-face groups, which may actually suggest differences in circumstances surrounding rather than actual variations in level of mindfulness abilities. Psychotherapy is a crucial skill to be taught to budding doctors, as there is plenty of psychological distress out in the open, and it is crucial that we perhaps increase the provision of psychotherapeutic skill

training in the medical education system in order to further increase levels of psychological mindedness, psychological flexibility, state mindfulness, and attitudes towards concordance in the doctors of tomorrow.

Informed Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

Conflicts of Interest

NTPP, WDS and SJ were lecturers in psychiatry in the medical faculty. MAMK declares no conflict of interest. No funding was received for this study.

Ethical Approval

Ethical approval was obtained from the Universiti Malaysia Sabah Medical Research Ethics Committee prior to commencement of this project. All participants provided informed consent.

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Perceived Status towards COVID-19 Mitigation Measures among Medical Students in Malaysian Borneo

Marieanne Florence[1], Ateeqah Abdul Said[1], Chong Wen Jing[1], Jaya Dhaarshini Sundara Rajan[1], Karrthigeyan Ramachandaran[1], Muhamad Luqman Hakim Mohd Yamin[1], Nur Syahierra Azmi[1], Yeap Jia Han[1], Azman Atil[1,*], Awang Setia Musleh[1], Azizan Omar[1], Mohd Yusof Ibrahim[1]

Abstract

Introduction: Mitigation measures are important in curbing COVID-19 infection. However, people's adherence to the control measures is depending upon their knowledge, attitudes and practices (KAP) towards the disease. This study aims to determine the KAP on COVID-19 and its associated factors among medical students in Malaysian Borneo during the period of the pandemic.

Methods: A cross-sectional online survey of 248 medical students from University Malaysia Sabah was conducted from August to September 2020. The survey instrument was adapted from a previously validated questionnaire on COVID-19. Descriptive statistics and simple logistic regression were conducted.

Results: The mean age of respondents was 22.0 (SD 1.4) years. Majority (65.7%, n= 163) were clinical students, female gender (70.6%, n= 175), and Bumiputera ethnic (46.8%, n= 116). 211 (85.1%), 191 (77.0%) and 163 (65.7%) of the respondents have good level of knowledge, positive attitude and good practice respectively.

Conclusion: The medical students are updated with the current health issues especially on COVID-19. They are aware of the attributes of the disease and have concerns in taking good care of themselves. Further study needs to be implemented among the groups of non-medical student of the same institution to compare their KAP on COVID-19.

Keywords: KAP, COVID-19, Medical Students, Malaysian Borneo.

*Correspondence Email: azman.azmi.atil@ums.edu.my

[1]*Department of Community and Family Medicine, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Kota Kinabalu 88400, Malaysia*

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Introduction

Coronavirus disease 2019 (COVID-19), is an infectious disease caused by a newly discovered strain of coronavirus, a type of virus known to cause respiratory tract infections in humans (Bulut, C. *et al.,* 2020). The first case of COVID-19 in Malaysia was detected on 24th of January 2020. As of 4th September 2020, there have been total of more than ten thousand confirmed COVID-19 cases in Malaysia including more than a hundred deaths with a recovery rate of 95% (WHO, 2020).

In the merge of outbreak, the government of Malaysia enforced a Movement Control Order (MCO) to break the transmission chain of the virus, safeguard citizens and ensure their well-being (Ganasegeran, K. *et al.,* 2020). Residents were required to be compliant to Standard Operating Procedures (SOP) and to practice the "new norms" such as wearing protective masks when out in public, frequent hand-washing, working from home and avoiding mass gathering (Karim, W, *et al.,* 2020). People's acceptance to government's rules and regulations has received recognition in a global survey where Malaysia was ranked among the top five countries to have highest public approval (Abdullah, J.M. *et al.,* 2020).

Knowledge, attitudes and practices (KAP) on COVID-19 plays an important role among university's students during period of the pandemic as it may affect the adherence to the implemented control measures in an effort to reduce and prevent the rapid spread of this disease (Azlan, A.A. *et al.,* 2020). The knowledge regarding the new outbreak of the disease are fundamental in helping the students to understand thus enhancing their awareness regarding this pandemic. The attitudes toward the disease are fundamental to measure the students' positive thinking regarding this pandemic. On the other hand, the students' practices towards this pandemic also contribute to the effectiveness in mitigating this outbreak. The findings in this research can provide the baseline data supporting the roles of medical students in curbing this pandemic. Hence, this study aims to govern the KAP on COVID-19 & its associated factors among medical students in Malaysian Borneo during pandemic times.

Methods

Study design and population

A cross-sectional study was conducted among 248 students in UMS which consists of Year 1 to Year 5 medical students. Medical students were chosen as the sample because they are supposed to be the key persons in disseminating information and more updated regarding COVID-19 than other students from different faculty. UMS is located in Kota Kinabalu Sabah, Malaysian Borneo and had about thirteen thousand students at a time. According to the proportion of good knowledge towards COVID-19 done in India, 241 samples required for this study (Maheshwari, S. *et al.,* 2020). The samples were chosen conveniently and students who consented to be a part of this study were included. Meanwhile, those who have contracted COVID-19 infection were excluded. This study took approximately one month to complete, from August to September 2020.

Tools and data collection

This study utilized an online questionnaire delivered to participants through WhatsApp application due to difficulty of movements during the pandemic. The online questionnaire was adapted and modified from a previous study done in China (Zhong, B.L. *et al.,* 2020). The questionnaire was converted into a Google Form and posted on official WhatsApp group of each batch from Year 1 to Year 5 in which are easily accessible by the respective medical

students. Besides that, class representatives for each academic year were involved in distributing the questionnaire links to students directly. Independent variables are age, gender, ethnic, religion, year of study, hometown residence and family income. Dependent variables in this study were knowledge, attitudes and practices towards COVID–19. The questionnaire consisted of four main sections; 1) demographics (7 items); 2) knowledge about COVID-19 (12 items); 3) attitudes toward COVID-19 (2 items); and 4) practices relevant to COVID-19 (2 items). Scores of ten and above for knowledge, two of attitude and two of practices were taken as good knowledge, positive attitude and good practice respectively. The cut of points was adapted from study done in China (Zhong, B.L. *et al.,* 2020).

Data analysis

Data entry and analysis were done by using Statistical Package for Social Science (SPSS), version 26.0. Descriptive analysis was conducted using frequencies and percentages for categorical variables, whereas mean and standard deviation for numerical variables. Logistic regression was used to determine the association between independent and dependent variables. Statistically significant data were determined by a p-value of less than 0.05 with an odds ratio and 95% confidence interval.

Results

1. Descriptive analysis

Demographic Characteristics

A total of 248 out of 250 medical students being approached participated in the study (response rate 99.2%). The mean (SD) age of respondents was 22.0 (1.4) years. Out of the total participants, 163 (65.7%) were clinical students, 175 (70.6%) were female, 116 (46.8%) were Bumiputera ethnic, 114 (46.0%) were Muslim religions, 129 (52.0%) were from M40 group of family income and 136 (54.8%) were from hometown residence in East Malaysia. **Table 1** summarizes the sociodemographic characteristics of respondents.

Assessment of Knowledge

The mean (SD) knowledge score was 10.59 (0.99). Majority (85.1%, n=211) of the respondents have good general knowledge on COVID-19 as shown in **Table 1**. There were 12 questions asked to measure the level of knowledge on the COVID-19 **(Table 2)**. 99.6% (n= 247) of the respondents believed that people who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place and the observation period is 14 days. 99.2% (n= 246) among them also aware that isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus. However, 31.9% (n= 79) were confused that stuffy nose or runny nose, and sneezing are less common in persons infected with the COVID-19 virus as compared to common cold. Generally, majority of the medical students has good knowledge on the presentation, transmission and control measures for COVID-19.

Assessment of Attitudes

Students were asked two questions in assessment of attitudes **(Table 3)**. Most of the students agreed that COVID-19 will finally be successfully controlled (77.8%, n= 193). Nonetheless, they are also confident that Malaysia can win the battle against the COVID-19 virus (94.4%, n= 234).

Table 1: Characteristics of respondents (N= 248)

Variables	Frequency (%)	Mean (SD)
Age (years)		
19 - 20	47 (19.0)	22.0 (1.4)
21 – 22	101 (40.7)	
23 – 24	100 (40.3)	
Gender		
Male	73 (29.4)	
Female	175 (70.6)	
Ethnic		
Malay	46 (18.5)	
Chinese	38 (15.3)	
Indian	38 (15.3)	
Bumiputera	116 (46.8)	
Others	10 (4.0)	
Religion		
Muslim	114 (46.0)	
Christian	58 (23.4)	
Buddhist	37 (14.9)	
Hindu	37 (14.9)	
Others	2 (0.8)	
Year of study		
Pre-clinical (Year 1-2)	85 (34.3)	
Clinical (Year 3-5)	163 (65.7)	
Hometown residence		
West Malaysia	112 (45.2)	
East Malaysia	136 (54.8)	
Family income		
B40 (< RM4849)	94 (37.9)	
M40 (RM4850-RM10,959)	129 (52.0)	
T20 (> RM10,960)	25 (10.1)	
Knowledge on COVID-19 (score)		
Good	211 (85.1)	10.59 (0.99)
Poor	37 (14.9)	
Attitude on COVID-19		
Positive	191 (77.0)	
Negative	57 (23.0)	
Practice on COVID-19		
Good	163 (65.7)	
Poor	85 (34.3)	

Table 2: KAP assessments on COVID-19 ('+' Indicates Correct or Positive Answers)

S.No.	Type of Questions	Answers		
	Questions on Knowledge	True	False	I don't know
1.	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.	213 (85.9%)+	34 (13.7%)	1 (0.04%)
2.	Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with the COVID-19 virus.	130 (52.4%)+	79 (31.9%)	39 (15.7%)
3.	There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	241 (97.2%)+	1 (0.04%)	6 (2.4%)
4.	Not all persons with COVID-19 will develop to severe cases. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severe cases.	233 (94.0%)+	10 (4.0%)	5 (2.0%)
5.	Eating or contacting wild animals would result in the infection by the COVID-19 virus.	63 (25.4%)	141 (56.9%)+	44 (17.7%)
6.	Persons with COVID-19 cannot infect the virus to others when a fever is not present.	12 (4.8%)	228 (91.9%)+	8 (3.2%)
7.	The COVID-19 virus spreads via respiratory droplets of infected individuals.	243 (98.0%)+	3 (1.2%)	2 (0.8%)
8.	Ordinary residents can wear general medical masks to prevent the infection by the COVID-19 virus.	220 (88.7%)+	16 (6.5%)	12 (4.8%)
9.	It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus.	6 (2.4%)	242 (97.6%)+	0
10.	To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportations.	243 (98.0%)+	4 (1.6%)	1 (0.4%)
11.	Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.	246 (99.2%)+	2 (0.8%)	0
12.	People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days.	247 (99.6%)+	1 (0.4%)	0

Table 3: KAP assessments on COVID-19 ('+' Indicates Correct or Positive Answers)

S.No.	Type of Questions	Answers		
	Questions on Attitude	**Yes/Agree**	**No/Disagree**	**I don't know**
1.	Do you agree that COVID-19 will finally be successfully controlled?	193 (77.8%)+	28 (11.3%)	27 (10.9%)
2.	Do you have confidence that Malaysia can win the battle against the COVID-19 virus?	234 (94.4%)+	14 (5.6%)	-

Table 4: KAP assessments on COVID-19 ('+' Indicates Correct or Positive Answers)

S.No.	Type of Questions	Answers		
	Questions on Practice	**Yes**	**No/Disagree**	**I don't know**
1.	In recent days, have you gone to any crowded place?	85 (34.3%)	163 (65.7%)+	-
2.	In recent days, have you worn a mask when leaving home?	246 (99.2%)+	2 (0.8%)	-

Assessment of Practices

Practices toward COVID-19 were also measured using two questions **(Table 4)**. Majority of the participants reported wearing a face mask when going out in public (99.2%, n= 246). Whereas only 65.7% (n=163) of the students reported that they were avoiding crowded places recently. There were more than a third of respondents still taking risk in the crowd.

2. Univariate analysis

Simple logistic regression was used in univariate analysis to determine the association between variables under study. The younger age group has better knowledge on COVID-19 compared to the older age group (mean difference: 0.35, p= 0.146). Female gender has slightly better knowledge compared to the male counterpart, 86.3% and 82.2% respectively (OR: 1.36, p= 0.411). However, both findings show statistically not significant. Similarly, there were no association between ethnic, religion, hometown residence, year of study and family income towards good level of knowledge on COVID-19 **(Table 5, 6 & 7)**. Meanwhile, the male gender has more positive attitude towards COVID-19 as compared to the female counterpart, 82.2% and 74.9% respectively (OR 0.65, p= 0.213). However this finding is also statistically not significant. The rest of the variables also show no significant association towards positive attitude on COVID-19. The older age group has poorer practice towards COVID-19 compared to the younger age group (mean difference: 0.33, p= 0.069). However this finding is also not statistically significant. Unfortunately, all other variables also show similar findings of no significant associations towards good practice on COVID-19. Hence, multivariate analysis was not preceded.

Table 5: Factors associated with good knowledge towards COVID-19

Variables	Knowledge		Crude OR (95% CI)	*p*-value
	Good (n= 211) No.(%)	Poor (n= 37) No. (%)		
Age	21.9 (1.3)[a]	22.3 (1.5)[a]	0.35 (-0.12, 0.83)[b]	0.146
Gender				
Male	60 (82.2)	13 (17.8)		
Female[c]	151 (86.3)	24 (13.7)	1.36 (0.65, 2.85)	0.411
Ethnic				
Bumiputera	142 (86.1)	23 (13.9)		
Non-Bumiputera[c]	69 (83.1)	14 (16.9)	0.80 (0.39, 1.65)	0.542
Religion				
Muslim	97 (85.1)	17 (14.9)		
Non-Muslim[c]	114 (85.1)	20 (14.9)	0.99 (0.50, 2.01)	0.998
Hometown residence				
West Malaysia	90 (82.6)	19 (17.4)		
East Malaysia[c]	121 (87.1)	18 (12.9)	1.42 (0.71, 2.86)	0.327
Year of study				
Pre-clinical	73 (85.9)	12 (14.1)		
Clinical[c]	138 (84.7)	25 (15.3)	0.91 (0.43, 1.91)	0.798
Family income				
B40	83 (88.3)	11 (11.7)		
M40/T20[c]	128 (83.1)	26 (16.9)	0.65 (0.31, 1.39)	0.269

[a]Mean (SD); [b]Mean difference (95% CI); [c]Reference group; OR: Odds Ratio; CI: Confidence Interval; B40: Below 40; M40: Middle 40; T20: Top 20; *Significant at p <0.05.

Table 6: Factors associated with positive attitudes towards COVID-19

Variables	Attitude		Crude OR (95% CI)	*p*-value
	Positive (n=191) No.(%)	Negative (n=57) No.(%)		
Age	22.0 (1.4)[a]	22.0 (1.4)[a]	0.03 (-0.37, 0.44)[b]	0.877
Gender				
Male	60 (82.2)	13 (17.8)	0.65 (0.32, 1.29)	0.213
Female[c]	131 (74.9)	44 (25.1)		
Ethnic				
Bumiputera	127 (77.0)	38 (23.0)	1.01 (0.54, 1.89)	0.980
Non-Bumiputera[c]	64 (77.1)	19 (22.9)		

(Continued…)

Variables	Attitude		Crude OR (95% CI)	*p*-value
	Positive (n=191) No.(%)	Positive (n=191) No.(%)		
Religion				
Muslim	92 (80.7)	22 (19.3)	0.68 (0.37, 1.24)	0.205
Non-Muslim[c]	99 (73.9)	35 (26.1)		
Hometown residence				
West Malaysia	81 (74.3)	28 (25.7)	1.31 (0.72, 2.37)	0.371
East Malaysia[c]	110 (79.1)	29 (20.9)		
Year of study				
Pre-clinical	66 (77.6)	19 (22.4)	0.95 (0.51, 1.77)	0.865
Clinical[c]	125 (76.7)	38 (23.3)		
Family income				
B40	70 (74.5)	24 (25.5)	1.26 (0.69, 2.30)	0.475
M40/T20[c]	121 (78.6)	33 (21.4)		

[a]Mean (SD); [b]Mean difference (95% CI); [c]Reference group; OR: Odds Ratio; CI: Confidence Interval; B40: Below 40; M40: Middle 40; T20: Top 20; *Significant at p <0.05.

Table 7: Factors associated with good practices towards COVID-19

Variables	Practice		Crude OR (95% CI)	*p*-value
	Good (n= 163) No. (%)	Poor (n= 85) No. (%)		
Age	21.9 (1.3)[a]	22.2 (1.4)[a]	0.33 (-0.03, 0.68)[b]	0.069
Gender				
Male	51 (69.9)	22 (30.1)	0.77 (0.43, 1.38)	0.376
Female[c]	112 (64.0)	63 (36.0)		
Ethnic				
Bumiputera	105 (63.6)	60 (36.4)	1.33 (0.75, 2.34)	0.329
Non-Bumiputera[c]	58 (69.8)	25 (30.1)		
Religion				
Muslim	74 (64.9)	40 (35.1)	1.07 (0.63, 1.81)	0.803
Non-Muslim[c]	89 (66.4)	45 (33.6)		
Hometown residence				
West Malaysia	72 (66.1)	37 (33.9)	0.97 (0.57, 1.65)	0.923
East Malaysia[c]	91 (65.5)	48 (34.5)		
Year of study				
Pre-clinical	59 (69.4)	26 (30.6)	0.78 (0.44, 1.36)	0.378
Clinical[c]	104 (63.8)	59 (36.2)		
Family income				
B40	61 (64.9)	33 (35.1)	1.06 (0.62, 1.82)	0.829
M40/T20[c]	102 (66.2)	52 (33.8)		

[a]Mean (SD); [b]Mean difference (95% CI); [c]Reference group; OR: Odds Ratio; CI: Confidence Interval; B40: Below 40; M40: Middle 40; T20: Top 20; *Significant at p <0.05.

Discussion

A lack of adequate knowledge is probably the driving force for the public panic and spreading of diseases in an uncontrolled situation, particularly at the early stages of the outbreak; highlighting the fact that proper information is crucial because misunderstandings make the situation worst (Azlan, A.A. *et al.,* 2020). According to the results obtained, 85.1% of the medical students have good level of knowledge. This result is comparable with the studies done in India and Iran (Maheshwari, S. *et al.,* 2020 & Taghrir, M.H. *et al.,* 2020). Being a medical student, they are technically equipped with the fundamental knowledge of COVID-19 pathogenesis, transmission and control measures as compared to other students. The study done among the general population in Malaysia revealed a knowledge rate of 80.5% which was lower compared to our study (Azlan, A.A. *et al.,* 2020). This proves that the medical students are more knowledgeable compared to the general population. However, the usage of different set of questionnaires probably gives the variant results. Nonetheless, this result is slightly lower as compared to among the public in China which recorded knowledge rate of 90% (Zhong, B.L. *et al.,* 2020). The reason being would be due to the heightened awareness among China's residents as they were the initial population being affected by the COVID-19.

This study found that majority of the participant had great positive attitudes towards COVID-19. Most of them agree that COVID-19 will finally be successfully controlled in near future, provided the mitigation measures are well implemented and fully practiced by the public. This finding is in line with the study done among the community in China and hospital staff in Italy (Zhong, B.L. *et al.,* 2020 & Moro, M. *et al.,* 2020). The knowledge directly affects the attitude, and these may have a greater impact in flattening the curve (Puspitasari, I.M. *et al.,* 2020).

In this study, most participants reported taking precautions by practicing mask-wearing and avoiding crowded places in order to fight COVID-19. This is similar with the findings of studies done in Iran and Indonesia among the university students (Taghrir, M.H. *et al.,* 2020 & Saefi, M. *et al.,* 2020). This indicates a general willingness for students to make behavioural changes in facing COVID-19 pandemic. Most students are aware with the current situation and practicing good fundamental preventive measures to cut the chain of disease transmission. However, there are quite a few participants that willing to take the risk in the crowded places. Better explanation for this is the requirement for the students to go outside for necessities which makes it almost difficult to avoid crowded places all the time. Moreover, despite having a good basic knowledge about COVID-19, reluctancy and ignorance of the student still become one of the critical issues (Saefi, M. *et al.,* 2020). Despite that, majority of the students have adapted the current new norm of mask-wearing whenever going outside. Ministry of Health of Malaysia had urged the public to wear masks, as it is a powerful tool that can help control the spread of infection. They act as a barrier to keep virus-containing particles from escaping an infected individual and landing on another person which can further be improved with the aid of a face shield.

On a side note, countries where the pandemic is hitting hard should implement strategies to keep their medical students updated about emerging public health and medical emergencies. Students should be equipped with medical knowledge, proper attitude, and good precautionary measures. Given the current global situation, more frequent utilization of social media by medical schools to spread knowledge become a necessity and plans should be placed to implement such dissemination in early stages of medical and public health

emergencies. Students should also be properly guided to proper sources of information during these times. This study may provide an effective approach to deliver the proper information and relieve the public panic and timely publication of trustworthy research.

This study has several limitations. Firstly, the participants are all medically equipped with the basic knowledge which ultimately governs the results into a positive way. Secondly, the sampling of participants was through a non-probability method which results in the inability to generalize the findings to other population. Thirdly, the nature of the study design did not permit the cause-effect relationship. Fourthly, the use of an online dissemination of questionnaire limits the opportunity of participant to get help and ask if they do not understand and later affects the quality of the answers. Finally, no questions about vaccination were asked in the questionnaire, which depletes the important points on prevention practice among the students.

Conclusion

In summary, medical students in UMS have good level of knowledge about COVID-19 and the students showed positive attitudes and have good practices which are at par with other students or populations throughout the world. Further study needs to be implemented among the groups of non-medical student of the same institution to compare their KAP on COVID-19.

Conflicts of Interest

The authors have nothing to declare.

Ethical Approval

Ethical approval to conduct the study was obtained from the Faculty Medicine and Health Science, UMS. Consent form was distributed along with the questionnaires provided with concise information regarding the purpose of the study, right to refuse and also how confidentiality will be handled. Participants were well informed that the information they had share will not be disclosed to the third party and will only be used for study purpose only.

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RESEARCH ARTICLE Open Access

Dengue Outbreak Management - Field Experience in Managing Dengue Involving an Urban Residential Area in Kota Kinabalu, Sabah Malaysia

Narindeerjeet Kaur[1], Mohd Azimullah Abdullah Zakaria[2], Syed Sharizman Syed Abdul Rahim[1,*], Mohd Yusof Ibrahim[1]

Abstract

Introduction: Dengue fever is endemic in Malaysia. It is a major public health challenge that has caused significant morbidity and mortality. A dengue outbreak is contributed by entomological factors, epidemiological and environmental factors. Outbreak response is crucial to reduce cases and death. This study is a descriptive dengue outbreak report in an urban residential area in Kota Kinabalu, Sabah Malaysia.

Methods: This is a report of a dengue outbreak that started in middle of November 2019 and ended early December 2019. A dengue outbreak in Malaysia is defined when more than one dengue cases is reported in the same locality within 14 days from the date of notification of the first case. Cases were analysed descriptively looking at epidemiology and vector control database.

Results: This outbreak involved 6 cases. The source reduction activities by elimination of breeding sites were conducted 3 times covering an area of 200 meter radius. A total of 110 premises were checked with coverage of 86%. The number of containers inspected was 923, with 454 outside the premises and 469 inside the premises with no positive results for dengue larvae. Insecticide space spraying via thermal fogging was conducted with added ultra-low volume (ULV) spraying done within the 400 meter radius with coverage of 100%.

Conclusion: Effective preventive measures have to be paired with responsible communities, as both play very vital roles in the control of dengue.

Keywords: Dengue fever, Urban Residential Area, Kota Kinabalu, Vector control database, Breeding sites

*Correspondence Email: syedsharizman@gmail.com

[1]*Department of Community and Family Medicine, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia*

[2]*Kota Kinabalu District Health Office, Sabah State Health Department, Ministry of Health Malaysia, Jalan Mat Salleh, 88590 Kota Kinabalu, Sabah*

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Introduction

Dengue fever is thought to be the most common arbovirus infection with 390 million infection annually worldwide (Bhatt, S. *et al.,* 2013). Malaysia is a dengue endemic country with the first case detected back in 1902 (Suppiah, J. *et al.,* 2018). Dengue occurs throughout the year in Malaysia, as we experience equatorial temperatures. Higher number of cases tends to occur following the monsoon seasons in Malaysia (Ahmad, R. *et al.,* 2018). Many studies conducted in Malaysia indicated an association between dengue, vector indices, rainfall and temperature and a lag period ranging from days to weeks (Hii, Y.L. *et al.,* 2016 & Shafik, M.A.M. *et al.,* 2020).

Today almost 90% of the population have a life time risk of developing dengue (Chew, C.H. *et al.,* 2016). It has also been forecasted that the number of cases will increase six times higher in 2040 compared to 10 years ago (Adam, B.M. *et al.,* 2017). In 2017 and 2018, Malaysia reported 83,849 and 80,615 cases respectively (Suppiah, J. *et al.,* 2018).

In Sabah, dengue cases are significantly lower than in Peninsular Malaysia (Murphy, A. *et al.,* 2020). However, this is rapidly changing. In 2016, Sabah reported the highest number of cases at 3,668 cases and following that there was brief in decrease in cases to 2560 in 2017. These numbers did not remain low but increased to 3,423 cases in 2018 (Kaur, N. *et al.,* 2020). Unfortunately, with these increasing dengue cases, the dengue mortality has increased as well.

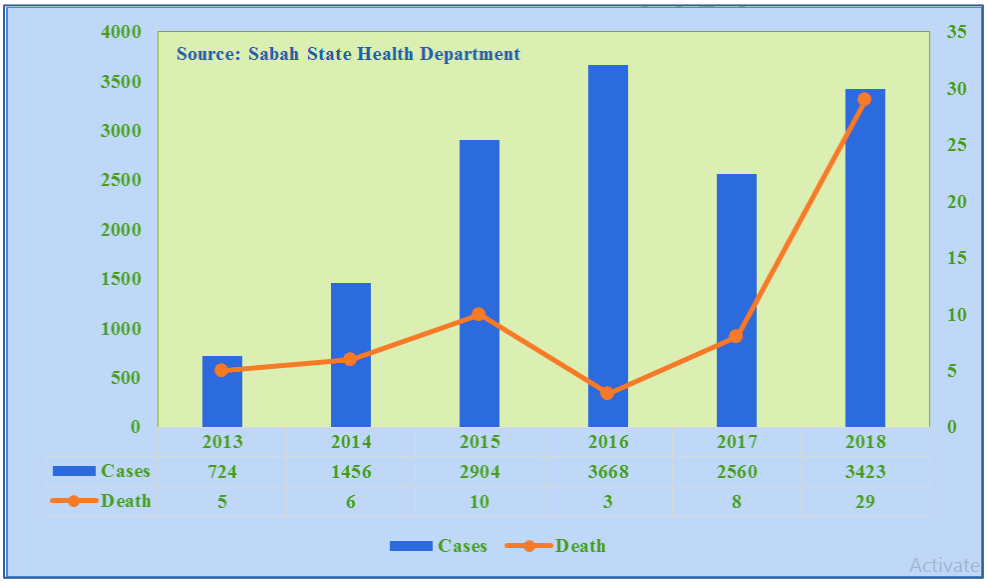

Figure 1: Number of Dengue Cases & Deaths in Sabah during 2013-2018

From 2016 to 2017, no dengue cases were reported from this locality however 1 case was reported back in 2018 and 4 cases in 2019. Due to that, this locality was classified as a priority 1 locality. A priority 1 locality is a place that has had a previous dengue case or outbreak. Disease control activity was conducted in the locality on the 18th November 2019, within 24 hours after the outbreak was declared. Inspection was done involving 46 houses out of the total 128 premises that were within the 200 meter radius of the index case. During the removal of breeding site (source reduction), no positive dengue larvae were detected from the potential containers. The entomological index during the control activities were Aedes Index (AI) 0%, Breteau Index (BI) 0 and Container Index (CI) 0%.

An outbreak is defined as excess number of cases beyond response capabilities (Brady, O.J. *et al.,* 2015) or in other words the occurrence of a disease higher than expected in a particular area during a specific duration (Husam, I.S. *et al.,* 2017). A dengue outbreak is contributed by the entomological factors, epidemiological as well as environmental factors such as rainfall, temperature and humidity. A dengue outbreak response is crucial to reduce case fatalities and number of cases. An outbreak is only detectable via a sound systematic surveillance system (Harrington, J. *et al.*, 2013 & Azhar, Z.I. *et al.*, 2016). At the moment the best way to control dengue is by controlling the vector and by reducing human vector contact (Hamdan, N. *et al.,* 2019).

These control measures can be broadly divided into physical control, chemical control and biological control. Under physical control, there is GIS mapping of dengue foci where dengue positive cases are located, and preventive strategies are concentrated in those areas. A study conducted in Thailand also highlighted the importance of home identification for dengue cases based on dengue transmission patterns (Gandhi, G. *et al.,* 2017). The next is effective surveillance that aid in collecting spatiotemporal distribution of cases which again is used for concentration of prevention strategies (Salje, H. *et al.,* 2017). Determination of oviposition sites is another strategy to eliminate the mosquito population (Scarpino, S.V. *et al.,* 2017), community based control programme that function to educate communities regarding the dengue prevention as well as the knowledge regarding dengue.

The next is chemical control, which are chemical compounds that act as insecticides to control the vector. Although this method has been widely used, it unfortunately has some negative effects to the environment (Wong, J. *et al.,* 2011). Under biological control, several strategies are in use such as Wolbachia carrying mosquitoes, where this bacterium is introduced into the vector and eventually colonize the vector population. This bacteria has the ability to supress the vector population by dysregulating its sexual cycle (Araújo, H.R.C. *et al.,* 2015). Another biological method is by using sterile insect technique (STI) where the male vectors are sterilized in a target population. Besides that, the use of larvivores fish and crustaceans such as the guppy fish in open water bodies to control the vector larvae population in an eco-friendly and cost effective way (Wilke, A.B.B. *et al.,* 2015). For prevention methods, RM 295 million is spent annually in Malaysia for vector control (Warbanski, M.L. *et al.,* 2017) which accounts for 1.2% of the RM 24 million total healthcare funding (Packierisamy, P.R. *et al.,* 2017). The objective of this study is describing the outbreak in an urban residential area and outlining its management on the field.

Methods

This was a descriptive study involving a series of reported cases involved in an outbreak that occurred in a local residential area in Kota Kinabalu involving 6 cases. A dengue outbreak was declared on the 17th November 2019 at an urban residential area after dengue cases from the heath facilities were notified to the District Heath Office. The dengue cases were diagnosed at the heath facilities based on the clinical symptoms as well as a positive NS-1 combo test kit that identifies NS-1, IgM and IgG. Active case detection was also conducted to identify other cases. The outbreak locality is situated in the sub-district of Luyang, in the district of Kota Kinabalu. This locality is an urban living area with arranged housing. There are 86 houses located in this locality with a total population of 340 people. The majority ethnic group of the people living there are Chinese followed by Dusun and Kadazan.

Dengue fever case is defined as any individual that presents with fever and two more symptoms such as headache, body ache, joint pain, retro-orbital pain, rashes, vomiting, diarrhoea or bleeding tendencies, along with a positive blood test [NS-1 (Non-structural protein 1) or ELISA (enzyme-linked immunosorbent assay)] (Murphy, A. *et al.,* 2020). A dengue outbreak is defined when more than one dengue cases is reported in the same locality within 14 days from the date of notification of the first case (Husam, I.S. *et al.*, 2017). An outbreak is considered over when no new case reported from the locality after 14 days of the last notified case. Interview of the cases were done based on the PBV(D)202 forms which is standard used in the Ministry of Health Malaysia (MOHM, 2020). All cases that comply with the criteria of case definition will be registered into the eDengue database system within 24 hours of notification based on the standard operating procedure (MOHM, 2021).

In accordance with the standard operation procedure, dengue control is done 24 hours when the case has been registered into the eDengue system. Dengue control consists of source reduction by inspection and elimination breeding sites and space spraying. Inspection of breeding site includes demolishing breeding site 200 meter from the house of the reported case, heath education, obtaining the entomological indexes such as the Aedes Index (AI), Breteau Index (BI), and Container Index (CI) (Lutomiah, J. *et al.,* 2016). AI is the percentage of houses infested with larvae. BI is the number of positive containers per 100 houses and CI the percentage of water-holding containers infested with active immatures (Nordin, O. *et al.*, 2017 & Focks, D.A., 2004). Ovitrap allows better assessment of entomological densities as compared to the standard larvae search methods. Having said that, some studies found weak correlation between ovitrap index and dengue cases (Azhar, Z.I. *et al.,* 2016).

Destruction of Disease Bearing Insect Act 1975 (Act 154) is used for the enforcement activities towards premises that are positive breeding site of Aedes larvae. Other initiatives such as larvaciding using temephos and/or Bacillus thuringiensis israelensis (Bti) and the use of outdoor residual spraying with pyrethroids are recommended (Ong, S.Q., 2016).

Results

All cases notified had an epidemiological link and were from the same locality with similar incubation periods.

Table 1: The information of the reported cases detected from the dengue outbreak

S.No.	Age (years)	Gender	Race	Results	Onset	Date of Notification	Date Registered	Serotype
1*	30	Male	Chinese	NS1	16.11.19	17.11.19	18.11.19	DENV 3
2*	39	Male	Chinese	NS1	12.11.19	17.11.19	19.11.19	ND #
3*	66	Female	Chinese	NS1	13.11.19	17.11.19	19.11.19	DENV 3
4	43	Male	Chinese	NS1	16.11.19	17.11.19	18.11.19	-
5	35	Male	Chinese	NS1	17.11.19	18.11.19	19.11.19	-
6	61	Female	Chinese	NS1 & IgM	15.11.19	19.11.19	21.11.19	-

*Same family (Household); # Not detected; - Serotype was not done

The index case was a 30-year-old Chinese male working as an accountant from home in Malaysia. The onset of his symptoms on 16th November 2019 is fever, headache with joint and body ache. From the investigation, it was found that the case was mostly at home for the past week leading to his symptoms and only went to the local street market briefly. He sought treatment at nearest public specialist hospital on the 17th November 2019 and was confirmed to have dengue with rapid test kit antigen NS-1 positive result.

The second case was a 39-year-old Malaysian Chinese male working as a salesman in Inanam which is about 7km away from his home. This case is the older brother of the index case. The onset of his symptoms was on the 12th November 2019 and presented with fever followed by headaches, joint and muscular pain, and diarrhoea. From the investigation, the case was regularly working in Inanam from 8am to 5pm and did not travel anywhere else prior to the onset of symptoms. Upon developing fever, the case consumes paracetamol, and delayed seeking treatment in the hospital. The case later sought treatment from the nearby public hospital on the 17th November 2019 the same day as his brother and was confirmed to have dengue with rapid test kit antigen NS-1 positive result.

The third case was a 66-year-old Malaysian Chinese lady who is the mother of the 1st and 2nd case. She is retired and lives in the same house as her sons. The onset of her symptoms was on the 13th November 2019 and presented with fever, headache, with joint and muscular pain. Weeks prior to her symptoms, she claims was at home and did not travel anywhere and she sought treatment only on the 17th November 2019 along with her sons and was diagnosed as dengue with a rapid test kit antigen NS-1 positive result.

The fourth case was a 43-year-old Dusun male who works as a security guard. The onset of his symptoms was on 16th November 2019 and presented with symptoms of fever, headache, body ache and retro orbital pain. From the investigation, the case claimed that he has only been traveling to work. His working hour is from 8am to 8pm for the day shift and 8pm to 8 am for the night shift. Upon developing symptoms, the case took paracetamol and sought treatment the next day on the 17th November 2019 at the nearby public hospital and was also diagnosed with dengue with a rapid test kit antigen NS-1 positive result.

The fifth case was a 35-year-old Indonesian Chinese male who worked as a manager at a petrol station in Menggatal, Kota Kinabalu. The onset of his symptoms was on the 17th November 2019 and presented with fever, retro orbital pain, headache with body and joint pain. He mentioned to be working every day from 9am to 6pm. The case also has flexible working hours and would return home at odd times off the day. He would also stop by a coffee shop in Kota Kinabalu city centre daily before returning home in the evenings. The case sought treatment at a private hospital on the 18th November 2019 and was diagnosed as dengue with a rapid test kit antigen NS-1 positive result.

The sixth and final case was a 61-year-old Malaysian Chinese lady who is retired. The onset of her symptoms was on the 15th November 2019 and presented with symptoms of fever, headache, and joint with body aches.

Throughout the weeks leading to the onset of symptoms she claims to be at home and did not travel out. She sought treatment on the same day (15th November 2019) at a private clinic and was diagnosed as viral fever. She returned to the clinic on the 18th November 2019 and was diagnosed with dengue with a positive antigen NS-1 test as well as IgM antibody.

The source reduction activities by elimination of breeding sites were conducted 3 times covering an area of 200 meter radius on the 18, 23rd and 25th of November 2019. A total of 110 premises were checked with a coverage percentage of 86%. The number of containers checked was 923, with 454 outside the premises and 469 inside the premises with no positive results for dengue larvae. The AI, BI and CI were all 0%. Containers that were potential breeding sites were destroyed and larvicide was done.

A total of 30 ovitraps were placed on the 19th November 2019 around the locality and of which 2 were positive (6.7%). Space spraying *via* thermal fogging was conducted 3 times (18th, 23rd and 25th of November 2019). Besides that, 2 cycles of ultra-low volume (ULV) spraying done on the 18th November 2019 and 29th November 2019 within the 400 meter radius with coverage of 100%.

Discussion

For dengue outbreak, the control measures were conducted within 24 hours of the case registration. Source reduction by elimination of breading sites managed to cover 86% of the premises for this outbreak locality. The space spraying was not satisfactory as it only managed to cover 24%, 25% and 54% of the premises. Space spraying has a known problem of difficulty in getting good coverage usually because of residents not cooperating or absent from home (Usuga, A.F. *et al.,* 2019).

The AI, BI and CI indexes were nil, but the ovitrap findings found some areas of breeding. These indices are used during dengue outbreak to measure the entomological contributions. However, this may need some revisions as they are very subjective in terms of the individual conducting the surveillance as well as the current weather conditions. Heavy rain would have washed off larvae just prior to inspection. Some studies shave also indicated that these indices apparently have a weak association with DENV transmission, and are limiting in ability to identify vector presence or absence (Lutomiah, J. *et al.,* 2016).

In terms of the serotype of the virus, the case no.1 and 3 were infected with DENV 3. Case 2 serotype was not detected as the case only presented to the heath facility on day 6 of illness. Due to the delay, the viral load may have already decreased. Interestingly the NS-1 was still positive, but the serotype was not detected. As for the 4th case, serotype results were not available. For the other 2 cases, they sought treatment at private clinics and the serum samples were not sent to for serotyping.

Epidemiologically based on the investigation all the cases fulfilled the dengue case definitions and were registered within 24 hours in the eDengue system, and the cases sought treatment. However, it should be stressed and advised during health promotion talks to seek treatment early especially if they live in dengue prone areas. The outbreak management was in par with the standard operating procedure.

Rapid detection of outbreak is a priority for disease surveillance (Jeffree, M.S. *et al.,* 2020). Besides that, control methods involve integration of GIS application which can assist the health authorities to implement surveillance, control and prevention of dengue outbreak (Azhar, Z.I. *et al.,* 2016).

Conclusion

The source of infection was from the surrounding area of the cases' home as the new cases were within 200 meter radius. The preventive measures for vector control place a heavy burden economically. Therefore, for the optimization of prevention measures, the community has to play a very important role. There must be more rigorous health promotion to educate and focus on behaviour modification. Strong emphasis must be given on the importance of cleanliness of their own homes especially the surrounding outside area as it is a breeding ground for Aedes mosquitoes. Early presentation to heath facilities is very crucial as it helps us detect an outbreak earlier and thus able to manage it more efficient and prevent further spread. Effective preventive measures have to be supported by responsible communities, only then can we truly control dengue.

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Ethical Approval

Ethical clearance was obtained from the National Medical Research Register (NMRR-18-2869-41360). The confidentiality of each case is maintained as no identifiable individual information was recorded or published.

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Conflicts of Interest

The authors declare that there are no competing interests in this study.

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RESEARCH ARTICLE Open Access

Occupational Stressors and Job Satisfaction among Royal Malaysian Navy at Teluk Sepangar Sabah: Comparison between Submariners and Surface Ship Personnel

Mohd Shahnaz Bin Shamsuddin[1], Fredie Robinson[2,*], Safirah Jaan Jaafar[2,3], Syed Shajee Hussain[2], Than Myint[4]

Abstract

Introduction: In the military, different aspects of job satisfaction are taken into account as compared to the civilian workforce. Some of the job satisfaction is related to as the working environment, nature of work and task, military operations and organizational traditions (e.g. obedience, policies and military disciplines). All these job stressors have an influence on the job satisfaction. Therefore, the military cannot be regarded as a normal and traditional work setting. The objectives of this study were to determine the differences of occupational stressors among submariners and surface ship personnel, the job satisfaction itself and to find a relationship between job satisfaction and occupational stressors among those two groups of occupation.

Methods: In this cross-sectional comparative study, self-administered NIOSH (USA) Generic Job Stress Questionnaire was used as a tool to measure occupational stressors and job satisfaction among 50 submariners and 48 surface ship personnel.

Results: The response rate was 98%. The result showed that there are statistically significant difference in the means in terms of job stressors among submariners and surface ship crews except for the conflict at work (P=0.03) and job requirement (P=0.01). Simple linear regression analysis shows that only mental demands had significant relationship with job satisfaction (P<0.001). Other job stressors such as the physical environment which were very different between these two occupations did not show any significant association on the occupational stress and job satisfaction when compared.

Conclusion: Further study would hope to examine the mental demand aspect as this can improve the overall job satisfaction level among these two groups of occupation.

Keywords: Occupational stress, Job satisfaction, Royal Malaysian Navy, Submariners, Surface Ship Personnel

*Correspondence Email: freddie@ums.edu.my

[1]*Family Care Clinic Sepanggar, Polytechnic Commercial Centre, Jalan Politeknik, Sepanggar, 88460 Kota Kinabalu, Sabah, Malaysia*

[2]*Community and Family Medicine Department, Faculty of Medical and Health Sciences, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia*

[3]*Department of Community Health, Faculty of Medicine, Universiti Kebangsaan Malaysia Medical Center, 56000 Cheras, Wilayah Persekutuan Kuala Lumpur, Malaysia*

[4]*Faculty of Health Sciences, STI Myanmar University, 302001 Yangon, Myanmar*

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Introduction

Work and the workplace environment emphasize many issues related to industrial and organizational psychology. In an occupational scene, naval work force undergoes a mixture of physiologic and mental stressors (Sargent, C., *et al.,* 2017). A career in the military usually involves and required both mental and physical training. This is in order for the enlisted to be continuously ready to serve the country. The expectations in the military for human performance and mental and physical ability are high and the training provided is very often adequate and somewhat challenging. However, the need to understand human nature and human potentiality and limitations cannot be ignored nor under emphasized (Fairbrother, K. *et al.,* 2003).

Military personnel also undergo conflicts while at duty, difficulty in trying to hold up their motivation levels, retention of good mental health, avoiding burnout, occupational stressors and job satisfaction similar with workers in other employment sectors. Research conducted on the military have documented that military personnel often are perceived to have a low job satisfaction (Blair, J.D. *et al.,* 1983; Alpass, F. *et al.,* 1997 & , Sanchez, R.P. *et al.,* 2004) and experienced high occupational stress (Pflanz, S. *et al.,* 2002 & Chou, H.W. *et al.,* 2016) compared to their civilian counterparts. Occupational stress among Navy personnel shown in studies to involve the role of ambiguity, obligation for somebody, powerlessness, under participation (Pawar, A.A. *et al.,* 2007), and work dimension factors which include the lack of clarity of the work role, and disruption of individual life values and daily routines (Fairbrother, K. *et al.,* 2003).

Submarine environment is defined by the characteristics of isolation, stealth, confinement, and risk. With the constraints of restricted environment, resources and limited numbers of submarine crew, causing to cope for extra responsibilities and duties. In the navy, origin of stress could include shortage of workers, lengthy occupational hours, interrupted leisure time in exchange for unplanned duty schedules, deployments, risk of military punishment, trouble with superior *etc.* (Pflanz, S.E. *et al.,* 2006). As such, submariners appeared to have more stressors compared to surface ship personnel in the navy. On the job on Navy ships is also related to with elevated PSQI (Pittsburgh Sleep Quality Index) scores, which meant a relatively higher frequency of poor sleep, and resulted lower psychomotor watchfulness execution at workplace (Matsangas, P. *et al.,* 2020).

There are not many studies on population that working in a remote, isolated confined space such as the submarines in the Royal Malaysian Navy and what are the factors associated with their job satisfaction. The objectives were to study the physical, mental and social stressors related to occupation and job satisfaction among surface ship personnel and submariners of Royal Malaysian Navy at Sepangar Navy Base, Kota Kinabalu, Sabah.

Methodology

This study was conducted among Royal Malaysian Navy personnel working as submariner and surface ship crew at Sepangar Navy Base, Kota Kinabalu, Sabah in March 2017. Respondents answered the self-administered NIOSH (USA) Generic Job Stress Questionnaire and the results were calculated according to the scoring key provided by NIOSH. This was a cross-sectional comparative study between two groups of occupations *viz.*, the submariners and the surface ship personnel. They have entirely different working surroundings which exposed them to different job stressors and may influence their job satisfaction.

The study was done in a cross sectional manner as both groups are involved in active operational duty and were deployable within 24hours for operational duty. Selections of respondents were done through convenience sampling method among Royal Malaysian Navy personnel working in Sepanggar Navy Base among submariners and surface ship crew members who were not on leave when the study visits were conducted. Sample size was 100 subjects using the formula of comparing two means at 80% power and α= 0.05 informed consent was obtained prior to the distribution of questionnaire.

In this study, all correspondents were required to answer the NIOSH Generic Job Stress Questionnaire. The scores were then calculated using the key scoring provided. Some scores needed to be reversed coded before being calculated. This model, developed by NIOSH (USA), builds upon frameworks proposed by Caplan, Cobb, French, Harrison, and Pinneau (1975), Cooper and Marshall (1976), and House (1974).

All data gathered from the questionnaire were entered into excel database and later analysed using SPSS (Statistical Package for Social Sciences) version 22.0. The dependant variable was job satisfaction while the independent variables were conflict at work, employment opportunity, job requirements, mental demand, physical environment, and work hazard, workload and work responsibility. Family support acted as a buffer in this study.

Results

Ninety eight Royal Malaysian Navy (RMN) personnel who consisted of 50 submariners and 48 surface ship personnel managed to answer the questionnaires. The response rate was 98%. The age of 98 Navy personnel ranges from 23 years old to 42 years old. The distribution of age among respondents was normally distributed. The mean for the age was 30.86 with standard deviation of 3.73. Majority of the respondents were male (90 personnel or 91.8%) whereas the rest were female respondents (8 personnel or 8.2%).

In terms of type of occupation, 50 personnel were working as a submariner out of 98 respondents (51%) and 48 personnel were working on surface ship (49%). Majority of the navy personnel were married; 74 (75.5%). Number of children in the family ranged 0-5. Majority of the subjects had one child in the family. The means for the NIOSH generic Job Stress questionnaires and the results of analysis of variance are shown in Table 1. Other variables such as employment opportunity, mental demand, physical environment, work hazard, work load and work responsibility does not differed significantly between submariners and surface ship crew. Family support acted as a buffer in this study as to find an association between job stressors and job satisfaction (**Table 1**).

In the simple linear regression analysis on job stressors associated with job satisfaction, only one job stressors showed significant linear relationship($P<0.05$) with job satisfaction that is mental demand($P<0.001$). The rest of the job stressors did not showed significant relationship with job satisfaction (**Table 2**).

The fitted line plot showed the same regression results graphically (**Figure 1**). There was significant linear relationship between mental demand and job satisfaction ($P<0.001$).It was observed that those who scores 1 point higher in the mental demand questionnaire have the job satisfaction score of 4.1 unit less.

Table 1: Comparison of NIOSH (USA) Generic Job Stress Questionnaires Score According to Type of Work

Variable	Submariner mean (SD) @ n=50	Surface Ship Crew mean (SD) @ n=48	Mean Difference (95%CI)	*t* stat. (df)	*P*-value
Job Satisfaction	9.26 (2.45)	9.17 (2.20)	0.09 (-0.84, -1.03)	0.19 (96)	0.66
Conflict at work	26.14 (6.02)	25.25 (4.37)	0.89 (-1.23, 3.01)	0.84 (96)	0.03
Employment opportunity	8.58 (2.55)	9.85 (2.50)	-1.27 (-2.29, 0.26)	-2.50 (96)	0.68
Job requirements	11.48 (2.85)	12.00 (1.85)	-0.52 (-1.49, 0.45)	-1.07 (96)	0.01
Mental demand	13.64 (20)	13.25 (2.26)	0.39 (-0.46, 1.24)	0.91 (96)	0.33
Physical environment	13.16 (1.72)	13.38 (1.21)	-0.26 (-0.81, 0.38)	-0.71 (96)	0.10
Work hazard	10.54 (2.29)	10.58 (2.64)	-0.04 (-1.18, 1.09)	-0.08 (96)	0.53
Workload	21.92 (2.44)	21.46 (3.29)	0.46 (-0.70, 1.62)	0.79 (96)	0.10
Work Responsibility	11.12 (2.44)	12.69 (4.25)	-1.57 (-3.09, -0.04)	-2.04 (96)	0.14
Family support	8.90 (3.11)	9.10 (3.72)	-0.20 (-1.58, 1.17)	-0.30 (96)	0.25

Table 2: Simple Linear Regression Analysis on Job Stressors Related to Job Satisfaction

Job stressors	*b* (95% CI β)	*t* statistic	P-value	r^2
Conflict at work	-0.03 (-0.12, 0.06)	-0.68	0.50	0.246
Employment opportunity	-0.04 (-0.02, 0.15)	-0.39	0.70	0.002
Job requirements	0.07 (-0.12, 0.26)	0.72	0.48	0.005
Mental demand	0.41 (0.21, 0.61)	3.98	<0.001	0.14
Physical environment	0.04 (-0.28, 0.35)	0.25	0.81	0.001
Work hazard	0.04 (-0.13, 0.21)	0.45	0.65	0.002
Work load	0.02 (-0.14, 0.19)	0.28	0.78	0.001
Work responsibility	0.10 (-0.20, 0.22)	1.65	0.10	0.028

Note: n= 98; $Y = \alpha + \beta x$; Dependent Variable= constant+(b*Independent variable); Job Satisfaction= 3.70–(0.41*mental demand)

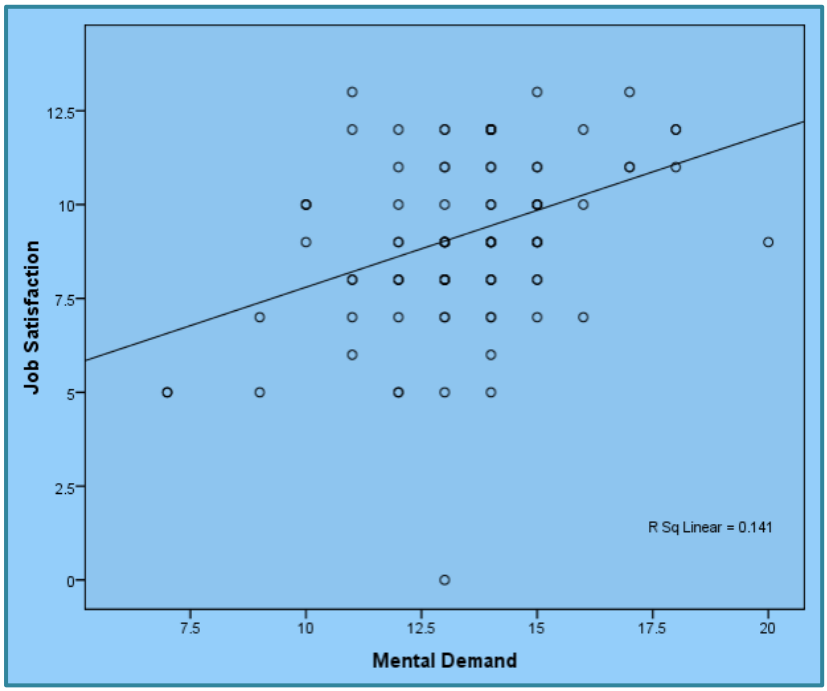

Figure 1: Fitted Line Plot Showing Linear Regression between Job Satisfaction and Mental Demand

Discussion

The minimum age for the respondents is 23 and maximum was 42 with the mean age of 30.86(SD=3.73). The age distribution was not quite different from the age distribution among navy personnel in other countries; in UK navy the age ranges from 16 years old to 36 years old while in the United States the age ranges from 17-34 year old. Although all the submariners were male (100%), but there are a few female personnel working on board the surface ship (n= 8.0, 8.2% from total respondents). It's a common practise nowadays among international Navy to enrol female as submariners especially in United States, UK and Australia although their numbers are very small. Certain occupations like those in the military emphasize the empowerment of men. As seen in the past research conducted among the military, more than 80% of these studies have used the male as respondents (Fairbrother, K. *et al.,* 2003). It seems that the males are still seen as predominant and makes up to the highest degree of the military workforce.

There were eight different job stressors that were compared between the submariners and the surface ship crews in this study. Those job stressors were conflict at work, employment opportunity, job requirements, mental demand, physical environment, work hazard, work load and work responsibility. Only two job stressors showed significant difference in the mean between the submariners and the surface ship crew. Those two job stressors were conflict at work (p= 0.03) and job requirements (p= 0.01). Job requirement in operating these two different types of vessels were very clear because they operate in a different manner from each other. Job requirements mean among surface ship crew was much higher (12.00) compared to submariners (11.48). Surface ship crew are usually required to execute more than a single task at a time, whereas in the submarines, each member has a specific job scope to execute.

In terms of conflict at work, the mean is much higher among the submariners (26.14) compared to the surface ship crew (25.25). Limited resources such as time, money, supplies are all important resources. Rival for any of these resources would unavoidably lead to interpersonal and interdepartmental conflict. Surprisingly, the physical environment factor did not have significant difference among those 2 types of job even though they are working on two different surroundings; one was open and the other completely enclosed underwater.

A similar study in Korea which compared the two jobs of submariners and surface ship personnel but using a different outcome as in JAWS (Job-Related Affective Well-Being Scale) score also showed no significant difference even though the work environment is non-comparable (Jo. D. *et al.,* 2021).

The buffer factor in this study that was the social support from family shows significant differences ($P<0.001$) when associated with job satisfaction. So, it is safe to say that the buffer factor in this study is actually mighty because it affected the job satisfaction level. Results from this study also revealed that the majority of respondents have a moderate level of job satisfaction. These findings deviate with past literature that have stated that military personnel experienced low levels of job contentment (Blair, J.D. *et al.,* 1983; Alpass, F. *et al.,* 1997 & Sanchez, R.P. *et al.,* 2004) although the British military perceived neutral job satisfaction.

Based on the simple linear regression analysis on job stressors related to job satisfaction as shown in Table 2, only one variable among the NIOSH Generic Job Stress Questionnaires shows significant linear relationship with job satisfaction that is the mental demand ($P<0.001$).

Stress enhancing mindsets may be a good strategy in order to combat the potential stressors, especially in highly rigorous and stressful settings. A mindset's may potentially beneficial when dealing with interacting with people, culture, and specific environment. Organizations, administrators, or employees can influence mindsets to adapt in the workplace and in their personal lives (Smith, E.N. *et al.,* 2020).

Limitations of the study

Several limitations in this study needed to be highlighted. Firstly, this study was preliminary in nature and the data analyzed were considered as exploratory in nature. This study was also limited to only active duty navy personnel and cannot be generalized to naval volunteers because they experience different issues related to the nature of work than those in active duty[5]. Therefore, caution must be taken in order not to generalize these findings to the whole Navy population. Lastly, since this study was based on a cross-sectional comparative study design, caution on the causality should be taken into account when drawing any conclusion.

Conclusion

There was a significant linear relationship between mental demand and job satisfaction based on the prediction model that has been developed from this study. The higher the mental demand, the lower the job satisfaction. Various types of jobs in the Navy may have different carrying out method and different risk that comes with it. These findings might not predict the true outcome of the actual study to be conducted but the data would still be useful when developing a research hypothesis for future study.

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RESEARCH ARTICLE Open Access

Bacterial Causes of Urinary Tract Infection among Diabetic and Non-Diabetic Patients in Al-Kut City, Iraq

Taqi Mohammed Jwad Taher[1], Firas Turki Rashed Sarray[2], Ammar Shimal Shwekh[2], Tariq Kuraidi Mareedh[2], Hasanain Faisal Ghazi[3,*]

Abstract

Introduction: Urinary tract infection is a very prevalent disease among humans and it is highly presented among patients with diabetes mellitus. The main aim of the current study was to find out the commonest bacterial organisms causing urinary tract infection among a sample of diabetic and non-diabetic patients in Al-Kut city, Iraq.

Methods: A cross-sectional study was conducted among 100 conveniently sampled patients suffering from urinary tract infections and attending Al-Karama Teaching hospital laboratory for urine culture between October and December 2019 were included in the study. The patients were consented to answer a special questionnaire containing data like patients' age, gender, and disease status (diabetic or non-diabetic).

Results: From the 100 participated patients there were 29 (29%) with diabetes and the remaining 71(71%) from the sample were non-diabetics. The females represent the majority of the sample (67%) while males represented only (33%). The most common identified bacteria from this sample were *Staphylococcus aureus* (48%), *Escherichia coli* (24%), *Klebsiella pneumoniae* (17%), *Enterococcus species* (5%), and *Pseudomonas aeruginosa* (2%). The study result shows a significant association of being diabetic or not with age and gender of the patients (p-value<0.001, 0.038) respectively. While this association was non-significant when considering the type of bacteria between the two groups (P-value=0.056).. While this association was non-significant when considering the type of bacteria between the two groups (P-value=0.056).

Conclusion: The urinary tract infection is frequently presented among young non-diabetic females and near half of the urine cultures showed the *Staphylococcus aureus* bacteria as the commonest cause of infection among them.

Keywords: Diabetes Mellitus, Causative bacteria, Urinary Tract Infection, Iraq.

*Correspondence Email: dr.hasanainhabasha@gmail.com

[1]*Department of Family and Community Medicine, College of Medicine, Wasit University, Wasit, Iraq*

[2]*Al-Zahraa Teaching Hospital, Wasit Health Directorate, Wasit, Iraq*

[3]*College of Nursing, Al-Bayan University, Baghdad, Iraq*

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Introduction

The disease Diabetes mellitus (DM) is a syndrome of multiple symptoms occurs due to increased glucose level in the blood. This high level of blood glucose is called hyperglycemia which can lead to both acute and chronic complications. Metabolic decompensation can occur acutely with obvious symptoms that may end with hospital admission. While chronic complications of hyperglycemia can affect multisystem like kidneys, blood vessels, nerves, and eyes (Ralston, S. *et al.,* 2018).

Diabetes can cause numerous types of complications for the renal system which may later be developed into end-stage renal failure (USRDSCC, 2004 & ADA, 2012). The prevalence of kidney diseases related to diabetes was increasing during this period and about 45% of American diabetic patients suffer from renal diseases related to diabetes, which may be due to multiple attacks of renal injury either from infections, nephrotoxins, or even prescribed drugs and treatments (De Boer, I.H. *et al.,* 2011 & NKF, 2002). UTIs are five times more likely to occur in diabetics than non-diabetics.

In people with diabetes, UTIs are also more severe and have a poor prognosis. The increasing incidence and poor outcome of UTIs among diabetic patients can be due to low levels of interleukin-8 and interleukin-6 in diabetic patients' urine in addition to decrease the leukocyte cell count (Shah, M.A. *et al.,* 2020). Previous works of literature found that *E. coli* was the major causative bacteria for UTIs among diabetics followed by *Klebsiella pneumoniae*. In a study conducted in Jordan, it was found that *E. coli* was presented the higher percentages (44.8%) of UTI in both groups divided to (15.5%) in DM patients and (29.3%) in the non-DM patients (Shah, M.A. *et al.,* 2020, Al-Asoufi, A. *et al.,* 2017).

Diabetic patients are frequently suffering from acute kidney infections which may be contributed to immune system damage and weakness. In addition to incomplete bladder evacuation due to nerve injury and increasing glucose level in the urine that can play as a good environment for bacterial growth and colonization (Chin, H.P.V., 2006; Muller, L.M.A.J. *et al.,* 2005; Boyko, E.J. *et al.,* 2005 & Boyko, E.J. *et al.,* 1995).

So, Urinary Tract Infections (UTIs) are the most common bacterial infections among diabetic patients, and they must be suspected, identified, and treated by doctors (Ribera, M.C. *et al.,* 2006). If UTI persists and doesn't deal with correctly, it can lead to numerous harmful problems like renal papillary necrosis, renal abscess, and even bacteremia (Boyko, E.J. *et al.,* 2005; Boyko, E.J. *et al.,* 1995; Ribera, M.C. *et al.,* 2006; Geerlings, S.E. *et al.,*2000). Correct identification of antimicrobial susceptibility by urine culture and early management of UTI with proper antimicrobial drugs in patients with diabetes can help prevent further complications and avoid antimicrobial resistance to antibiotics (WHO & IDF, 2006 & Ajay, K.P., 2018.

Therefore, it is important to control frequent UTIs with accurate screening, treatment, and avoiding future linked problems. Though, it is of great significance to outline the specific types of microbes affecting patients with diabetes to keep in minded their features and sensitivity when facing it. This study was prepared and conducted to assess the type of microbiologically confirmed urinary infections among DM patients in comparison with non-diabetic patients visiting the AL-Krama Teaching Hospital in Wasit province/ AL-Kut city.

Materials and Methods

Study design and setting: The study is designed as a cross-sectional study. Duration of data collection was continuous for 2 months (October to December) 2019 at Al- Karama teaching hospital laboratories. AL-Karama teaching hospital is one of the largest hospitals in AL-Kut city/ Wasit province. Wasit province is located in the eastern part of Iraq with a total population of about 1,450,000.

Study sample: The study included 100 convenient patients with positive UTIs who visiting hospital laboratories from different areas of Wasit province during the determined period of the study.

Inclusion criteria: All patients suffering from UTI from different age groups with a positive laboratory test that confirming their UTI.

Exclusion criteria: Patients with severe pain preventing them from participation and those urgent to back home were excluded from the study.

Data collection: Relevant data were collected by a self-administered special questionnaire prepared by the researchers and consisted of demographic features like age, gender, and disease status (diabetic or non) in addition to data related to results of their urine cultures. Data were obtained from participants after their full consent and acceptance to participate in the study. The questionnaire was validated by two experts in community medicine and microbiology and it was pretested for 5 patients who were then excluded from the final analysis and results.

Urine collection and processing: The patients were provided with special sterile cups for collecting urine samples and were instructed to collect a midstream clean urine properly. After that, the samples were inoculated using a calibrated special inoculation needle. Only 10 µL of urine sample was used to be inoculated on three different types of media used in the laboratory (blood agar, Nutrient agar, and MacConkey agar plates) and incubated for 24–48 hours under 37°C temperature.

Recognition of the type of the isolated micro-organisms: First of all, all urine samples were counted for the available colonies. If it appears to be more than 104 CFU/mL, so it is judged as UTI positive, and consequent biochemical tests were completed using the automated system Micro scan. Different types of panels were used for both Gram-negative (NC34 and NC53) and Gram-positive bacteria (PC21) and advanced tests were done for species isolates (API E20, API strep, and API staph) in addition to quality control (QC strains) for (*Escherichia coli* ATCC 25922, *Klebsiella pneumoniae* ATCC 13883).

Statistical analysis*:* All collected data were entered into a computer and analysis was performed by SPSS program version 26. Categorical variables were presented in frequencies and percentages while the continuous variable (age) was presented by mean and standard deviation. For association chi-square test and fisher's exact test were used as appropriate. For contentious variables, an independent sample t-test was used considering P-value equal to or less than 0.05 as significant.

Ethical approval: Official approvals were obtained from the College of Medicine/ Wasit University and Wasit Health Directorate / AL-Karama Teaching Hospital manager office.

Results

The results of this study were depending on the analysis of 100 UTI confirmed patients to determine the different types of microorganisms causing UTI among DM compared to non-DM patients. The result showed the frequency distribution of socio-demographic features of the patients. The minimum age among participant patients was 3 years and the maximum was 80 years old with a mean age of 32.12±19.05, the females represented more than two-thirds (67%) of the patients. The majority of patients with UTI (71%) were non-diabetics and the most frequent bacteria causing the infection was *Staphylococcus aureus* (48%) followed by *Escherichia coli* (*E. coli*) (24%) as appeared in **Table 1**. Table 2 shows significant differences between DM and non-DM patients concerning age and gender (*p*-value <0.001 and 0.038) respectively. No significant association between the two groups regarding the causative bacteria for UTI (*p*-value= 0.056).

Table 1: Frequency distribution of participant characteristics according to age, gender, disease status, and causative bacteria for urinary tract infection

Age (years)		**Mean**	**Standard deviation**
		32.12	19.05
Variables		**Frequency**	**Percentage**
Gender	Female	67	67%
	Male	33	33%
Disease status	Diabetic	29	29%
	Non-diabetic	71	71%
Causative Bacteria	*E. coli*	24	24%
	Klebsiella pneumonaie	17	17%
	Pseudomonas aeruginosa	2	2%
	Staphylococcus aureus	48	48%
	Enterococcus spp.	5	5%
	Streptococcus spp.	4	4%

Table 2: Association between disease status with age categories, gender, and causative microorganisms

Variables		**Disease status**		**P-value**
		Diabetic	**Non- diabetic**	
Age (years)	Mean±Standard deviation	56.28±10.35	22.25±11.39	<0.001 (Independent t-test)
Gender	Male	14(48.3%)	19(26.8%)	0.038 (Chi-square test)
	Female	15(51.7%)	52(73.2%)	
Causative Bacteria	*Staphylococcus aureus*	11(37.9%)	37(52.1%)	0.056 (Fisher s exact test)
	E. coli	6(20.7%)	18(25.4%)	
	Klebsiella pneumonaie	10(34.5%)	7(9.9%)	
	Enterococcus spp.	1(3.4%)	4(5.6%)	
	Streptococcus spp.	0(0%)	4(5.6%)	
	Pseudomonas aeruginosa	1(3.4%)	1(1.4%)	

Discussion

The identification of the most common causative microorganisms causing UTIs among confirmed patients was of great interest for the physicians to manage properly especially among DM patients who complain from recurrent infections that may be developed to severe and significant health problems. The result obtained from the participant patients in the current study showing a significant association of being diabetic or not with the age and gender of the patient, while disease status was non-significantly associated with the causative UTI pathogens.

Regardless of the disease status, the most predominant bacteria isolated from UTI patients in this study were in the following order: *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Enterococcus species*, and lastly *Pseudomonas aeruginosa*. The *Staphylococcus aureus* is a high resistance bacterium so it presents commonly among patients with UTIs. The study in Zakho/ Iraq in 2018, showed a different observation where *E. coli* was the most commonly isolated bacterium (Jameel A.Y. *et al.,* 2019) just like what was found by Bonadio M et al. (2006) (Bonadio, M. *et al.,* 2006). *Staphylococcus aureus* is considered the second commonest bacterial cause of UTI, especially among females worldwide. Even though urinary tract infections can affect both males and females, females show higher percentages of infection than males which may be attributed to the difference in their and reproductive physiology (Kenny, L. *et al.,* 2017). The urethra in general is shorter in women than in men, so bacteria need very little time to reach the bladder and causing infection in addition to their location near the rectum (Tan, C.W. *et al.,* 2016). The same results were obtained from previous studies conducted in different places in the world [(Jameel A.Y. *et al.,* 2019; Bonadio, M. *et al.,* 2006 & Tan, C.W. *et al.,* 2016). This study found that the younger age group females who represented mostly women of reproductive age were the most vulnerable age group to be diagnosed with UTI which mainly due to sexual contact and pregnancy.

Previous studies had shown that elevated glucose levels in the blood were associated with the risk of UTI occurrence so leading to an increase in the prevalence of infection among DM patients compared with other non-diabetes. Even, in this study diabetic patients have represented the lower percentages among the study sample. This may be due to the diabetic patients may visit other specialist diabetic centers and private clinics or maybe the patient with DM may have asymptomatic bacteriuria and so the percentage rate of their incidence was less than non-diabetics. Diabetic patients suffer commonly from fungal UTI rather than bacterial especially among those who are hospitalized for a long period, catheterized, and frequently using the parenteral antibiotic (Joshi, N. *et al.,* 1999). This result was in contrast to other studies that found a higher risk of UTI among DM patients (Jameel A.Y. *et al.,* 2019, Aswani, S.M. *et al.,* 2014). The elevated plasma glucose level develops glucosuria that empowers the bacterial proliferation by the increase in cell number; suggesting neutrophil dysfunction (Goswami, R. *et al.,* 2001, Gul, N. *et al.,* 2004). Another mechanism might be related to the lower rate of kidney cytokine (IL-8 and IL-6) secretion that is responsible for the development of immunity against infection in the urinary tract (Chen, C.Y. *et al.,* 2012). This increasing prevalence of UTIs among DM patients can also be explained by increased adherence to bacteria due to decrease anti-adherence action of the urine and higher adherence ability of uroepithelial tissue (Funfstuck, R. *et al.,* 2012). Increase bacterial adherence to urinary cells in patients with DM caused by a decrease in the level of production of Tamm-Horsfall Protein (THP) by the kidney which is responsible for the prevention of bacterial connection to urinary cell tissues (Saber, M.H. *et al.,* 2010).

Limitations

It is difficult to generalize the finding due to the small sample size, convenient sampling method, and also the high possibility that the patients are all symptomatic (asymptomatic UTI patients are likely not included in the study). The small sample size collected from one center was the major limitation of this study which was because of security and health conditions in that period of the study.

Conclusion

The Staphylococcus Aureus was the commonest bacterial isolate among patients with UTI in both diabetic and non-diabetic patients. Age and gender were significantly associated with disease status among UTI patients, while there was no significant association between disease status and causative bacteria causing the infection. This study recommends further studies including a larger multicentral sample from different places.

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REPORT Open Access

A Report on a Visit to the School of Tropical Medicine and Global Health, Nagasaki University

Narinderjeet Kaur[1], Abraham Chin[1], Eric Tan[1], Nelbon Bin Giloi[1,*] Mohd Yusof Hj Ibrahim[1], Syed Shajee Hussain[1]

Abstract

Introduction: In August 2018, three Master of Public Health (MPH) students from the Faculty of Medicine and Health Sciences, University Malaysia Sabah visited the School of Tropical Medicine and Global Health (TMGH), Nagasaki University in Japan.

Methods: They were joined by a faculty lecturer from the Community and Family Medicine Department. The objective of the ten-day educational trip was to attend the short course on Spatial Eco-Epidemiology Technologies at Public Health at Nagasaki University, School of TMGH.

Results: The trip provided students with practical and theoretical experience of the latest technologies in the field of spatial eco-epidemiology. It also provided an opportunity to learn from the Japanese culture and gave them a well-rounded foundation upon which to build their knowledge for future careers in public health.

Conclusion: This fantastic opportunity would not have been possible without the generous support and funding provided by UMS Student Mobility Programme.

Keywords: Visit report, Mobility programme, Study tour

*Correspondence Email: nelbon.giloi@ums.edu.my

[1]*Department of Community & Family Medicine, Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah, 88400, Kota Kinabalu, Sabah, Malaysia*

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Introduction

Mobility programmes provide opportunity for students to enhance their experience and knowledge through travels and visits abroad whilst undertaking their courses at a given institution (International Strategy of Nagasaki University). In 2017 the Universiti Malaysia Sabah (UMS) and the Nagasaki University (NU) signed an Academic Cooperation

agreement, fostering implementation of collaborative research projects, implementation of lectures and symposia, exchange of academic information and materials, exchange of faculty members, researchers, administrative staff, and student mobility and exchange programmes. Consequently, several reciprocal visits by faculty members and researchers from both universities have already been done.

Methodology

The first group of three Master of Public Health (MPH) students from the Faculty of Medicine and Health Sciences (FMHS), University Malaysia Sabah (UMS) visited the School of TMGH, NU in August 2018. They were attended by a lecturer from the faculty's Community & Family Medicine Department (CFM). This paper briefly describes the experiences obtained by the students, how educational the visit was, and the factors that helped the experience to be more than an "educational tourism" and the "take home" learnings for the students.

Mobility Visit to Nagasaki

The round flight tickets for the programme were funded by the faculty whereas the students were selected by the CFM Department based on their outstanding achievement during their MPH study. The timing and arrangement of this visit was planned to ensure the group's timely arrival for the short summer course and Japanese culture experience in a ten-day short duration (**Table 1**).

Table 1: Travel Itinerary

Date	Detail
17th August 2018	Departed from Kota Kinabalu, Sabah and arrived in Nagasaki, Japan
18-19th August 2018	Tour the Nagasaki city
20-24th August 2018	Spatial Eco-Epidemiology course
25-26th August 2018	Day off in Nagasaki
27th August 2018	Depart Nagasaki and Arrive at Incheon, South Korea (Transit)
28th August 2018	Arrive in Kota Kinabalu, Sabah

School of TMGH, NU

NU's proud history goes back to November 12th, 1857 from the establishment of Igaku Denshusho, the oldest medical school in Japan by a Dutch naval surgeon named Dr. Pompe. Currently the university is comprised of eight faculties (Education, Economics, Medicine, Dentistry, Pharmaceutical Sciences, Engineering, Environmental Studies and Fisheries) along with affiliated hospitals and its School of Tropical Medicine (Nagasaki University, 2021). With the rapid globalization of economy, industry, mass migrations, infectious diseases, mental health issues and lifestyle related illnesses particularly affected by the changes in the environment, it requires new ways and methods to address that transcend countries and regions. All these public health issues are labelled under the term "Global Health" which formed the philosophy and purpose behind the establishment of the School of Tropical Medicine and Global Health (TMGH) in NU (Introducing TMGH, 2021), making the study visit very relevant for the aspiring future Public Health professionals students.

Table 2: A Five-day Spatial Eco-Epidemiology Technologies in Global Health Course Outline

Days	Course Outline
DAY 1 (20th August 2018)	• Introduction to TMGH and course outline • Mosquito trap for dengue and malaria surveillance, structure and how to make your own. • The lecture included different types of traps such as light traps and odour traps, mainly made up of common everyday items. • Drone technology for observation and intervention • The technology on small remotely controlled aircrafts with more sensory capabilities and the application to aerial 3D/4D photogrammetry to be used to create various maps were discussed. • Impact evaluation methods for interventional study • This lecture talked about how to build a quasi-experimental design in the real world setting. Students were asked to build a project plan keeping in mind what was important. The size of the project needs to be studied and quantified in order to clarify the specifics of our project plan, justify its feasibility and make the project managers accountable to donors. To qualify the effect size of the project we need to how to conduct an impact evaluation. The students explored how to make the most of the limited time and resources as professionals in the fields.
DAY 2 (21th August 2018)	• Software and data preparation • Students were able to download the QGIS as well as the R software QGIS and R software. • Geographical data visualization: Choropleth mapping • Handling of geographical data: Georeferencing, digitizing, sampling, network analysis
DAY 3 (22nd August 2018)	• Basic data analysis with R software • Data visualization and classification using R - Part 1 • Data visualization using gg plot2. • Data visualization and classification using R – Part 2 • Epidemiology, environment, geographical data interrogation and visualization using dplyr, reshape2 and gg plot2. • Data visualization and classification using R – Part 3 • Case study of spatial eco-epidemiology.
DAY 4 (23rd August 2018)	• Anthropological demography • WIRE: women and infant registration platform • Exercise
DAY 5 (24th August 2018)	• Exercise • Presentations by each MPH Student on their research topic • Wrap-up

A Five-Day Spatial Eco-Epidemiological Technologies in Global Health Course

During this visit the students undergone "A Short Summer Course of Spatial Eco-Epidemiology Technologies in Global Health" by School of Tropical Medicine & Global Health, NU (**Table 2**), organized specifically for this educational visit. It was an actively engaging five-day course of epidemiological analysis tool in relation to the natural environment and the spatial structures, measuring spatial structures of epidemiological data. It effectively analyses complex data using QGIS (Geographical information system) and the tool to analyse is the R software.

Results

A Brief Comparison

Spatial Eco-Epidemiological Technologies in Global Health Course is an excellent value addition course in terms of updating the ever growing integration between the different fields of Public Health. At NU, they are always innovative in terms of connecting contemporary ICT and health practices. At UMS there is still a gap in this approach. At UMS we need to diversify our approach and require more integration between different faculties so that similar courses can be developed for local students in local setting. It will be a great opportunity to collaborate with NU and keep abreast the challenges of ever changing global health arena.

Japanese Cultural and History Experience

During the stay, students were able to explore the rich Japanese culture and important histories of Nagasaki. The work ethics, clean environment, well preserved historical sites amidst bustling modern city surroundings, efficient public transport system and many more provided new experiences to everyone. These were eye-openers on what it is to live in such a developed country that still upholds its culture close to the heart. It must be mentioned that the homestay arranged by the NU School of TMGH at an actual Japanese traditional house next to the university provided a rare and unique experience to the group.

Conclusion

The trip provided students with practical and theoretical experience of the latest technologies in the field of spatial eco-epidemiology **(Figure 1)**. The trip provided an opportunity to learn from the Japanese culture and gave students a well-rounded foundation upon which to build their knowledge for future careers in public health. It is highly recommended to have such kind of study tours in the future, especially in the current era of epidemics, where it is very essential to learn from each other for the better outcome of the public health interventions. Such visit can also be a good capacity building measure for non-academic members to update themselves with contemporary practices of organizational management.

Acknowledgements

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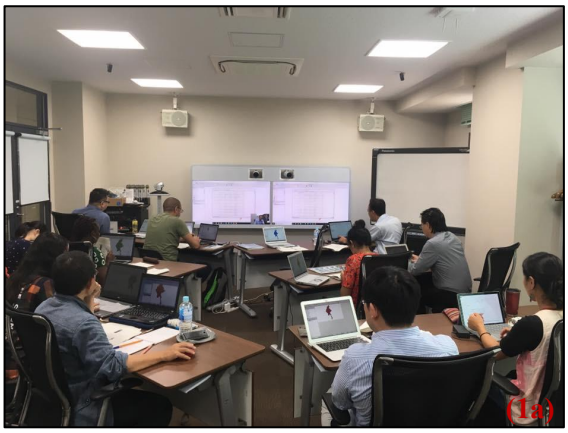

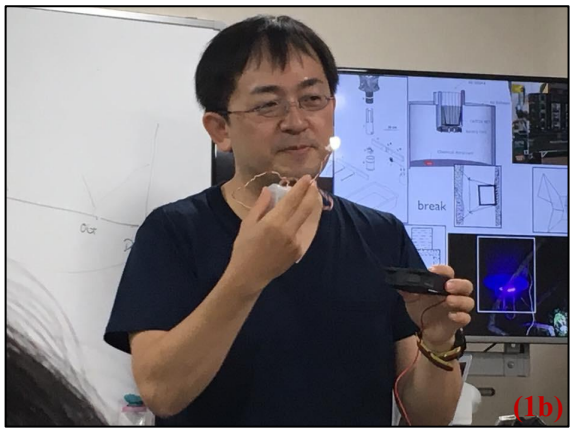

1a & 1b: *The Spatial Epidemiology Course together with International MPH; Students from NU and Dr. Masuda Explaining about his Self-Created Mosquito Trap*

1c & 1d: *Presentation of Appreciation Gift at the End of the Course and a Unique Experience Staying in a Traditional Home*

1e & 1f: *Learning about Japan Disaster Preparation and Enjoying Summer Festival with Locals*

Figure 1: Master of Public Health students, Faculty of Medicine & Health Sciences, University Malaysia Sabah, Malaysia visited the School of Tropical Medicine and Global Health, Nagasaki University, Japan

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ACKNOWLEDGEMENTS

Acknowledgements to the funders, supporting organizations to be mentioned in the manuscripts.

REFERENCES

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The Faculty of Medicine and Health Sciences (FMHS), or Fakulti Perubatan dan Sains Kesihatan (FPSK) in Bahasa Malaysia, was established in 2003 with the primary aim to increase the number of medical doctors, nurses and other health professionals, especially in Sabah, to meet the increasing demand for such personnel in Malaysia. The main objective of the faculty is to produce committed and concerned medical and health professionals who are sensitive to the health needs of the communities, with emphasis to their total wellbeing within their cultural and traditional orientation.

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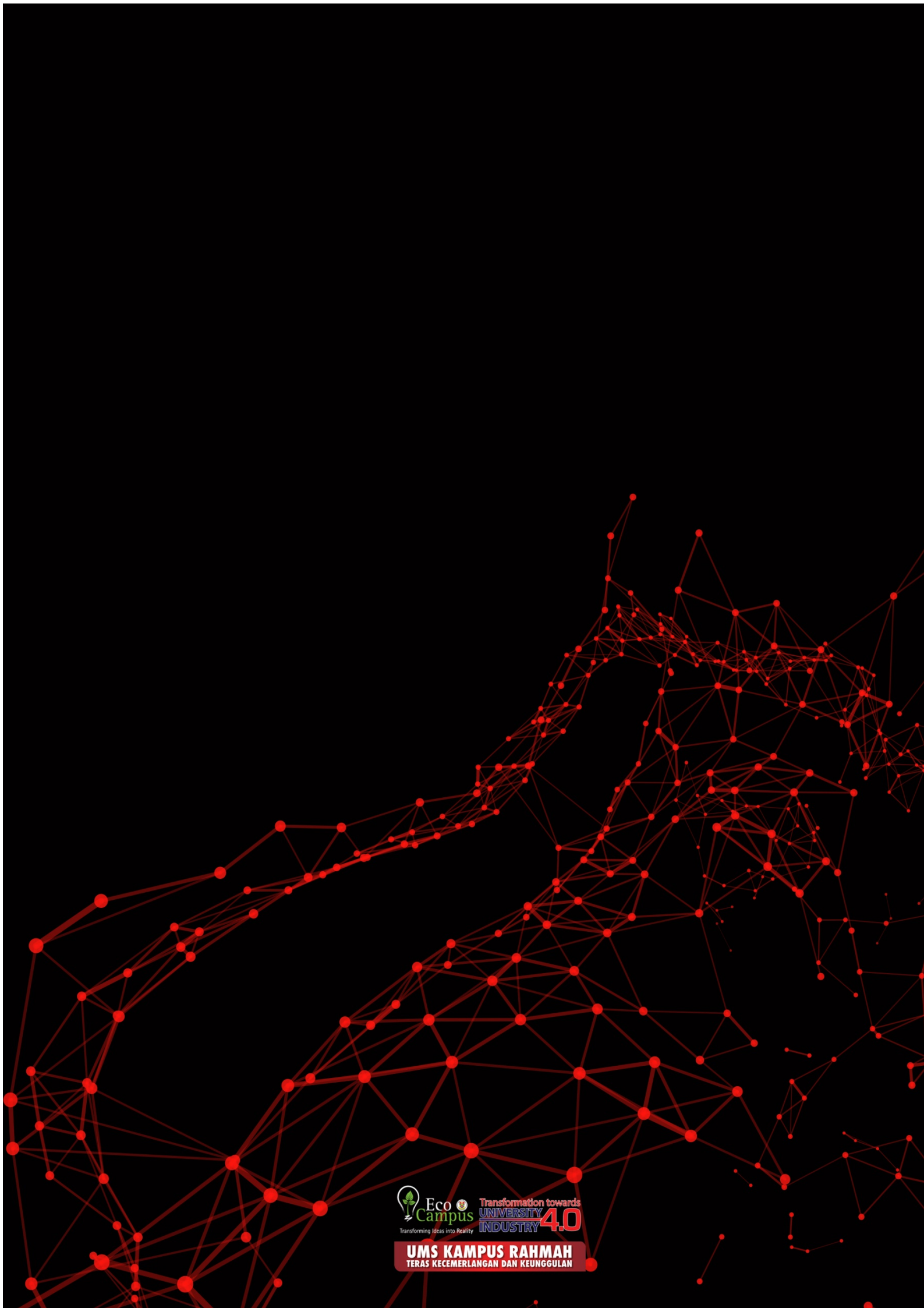
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