ASSOCIATION BETWEEN MENTAL HEALTH AND MINDFULNESS IN EATING AMONG UNDERGRADUATE MEDICAL STUDENTS IN UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS, KUBANG KERIAN, KELANTAN

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SCHOOL OF HEALTH SCIENCES

UNIVERSITI SAINS MALAYSIA

2021

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by

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Dissertation submitted in partial fulfilment

of the requirements for the degree

of Bachelor of Health Sciences (Honours) (Dietetics)

JULY 2021

ACKNOWLEDGEMENT

First and foremost, I would like to deliver my utmost appreciation to my supervisor, Mrs. Juliana Binti Shamsudin. Without her assistance and participation, this dissertation could not have been possible to be completed. She is patient, willing to spend her precious time checking my work as well as provide me her precious advice and guidance throughout the preparation of this dissertation. She is always there to help me.

Moreover, I would like to express my thankfulness to Dr. Wan Faizah Wan Yusoff, my Course Coordinator of GTD 410 Research Project in Dietetics who provided good timeline for me to prepare for the dissertation as well as answered my queries patiently throughout the preparation of the dissertation. Besides, I would like to deliver special thanks to Dr. Wan Amir Nizam Wan Ahmad, lecturer of GTU 302 Biostatistics. He is patient in sharing his opinion and knowledge which is helpful for my result analysis and my future involvement in other studies. Furthermore, I would like to express my gratitude to Professor Dr Abdul Razak Sulaiman, Dean of School of Medical Science of Universiti Sains Malaysia, who allowed me to conduct my study among the undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan. I also appreciate all the representatives and respondents who are willing to take part in my study. Last but not least, I would like to deliver my sincere thankfulness to my family and friends who give me encouragement and support throughout my preparation for this dissertation.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
DASS	Depression, Anxiety and Stress Scale
DV	Dependent Variable
GBD	Global Burden of Diseases, Injuries and Risk Factors Study
IQR	Interquartile range
IV	Independent Variable
MEQ	Mindful Eating Questionnaire
NHMS	National Health and Morbidity Survey
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
UK	United Kingdom
US	United States
USM	Universiti Sains Malaysia
WHO	World Health Organization

HUBUNGKAIT ANTARA KESIHATAN MENTAL DENGAN MAKAN SECARA BERHEMAH DALAM KALANGAN PELAJAR SARJANA MUDA PERUBATAN DI UNIVERSITI SAINS MALAYSIA, KAMPUS KESIHATAN, KUBANG KERIAN, KELANTAN

ABSTRAK

Pendidikan dalam bidang perubatan dikenali kerana cabaran dan sifatnya yang memberi tekanan mungkin menyebabkan peningkatan risiko masalah kesihatan mental dalam kalangan pelajar perubatan. Makan secara berhemah prihatin terhadap kesedaran tabiat pemakanan dan ketiadaan tingkah laku ini dikaitkan dengan kegelisahan, emosi negatif serta makan secara keterlaluan. Tujuan kajian keratan rentas ini adalah untuk menilai kesihatan mental dan makan secara berhemah serta hubungkait di antaranya dalam kalangan pelajar sarjana muda perubatan di USM, Kampus Kesihatan. Responden direkrut melalui persampelan mudah dan seramai 158 menyertai kajian ini. Ciri-ciri sosio-demografi, kesihatan mental dan makan secara berhemah responden telah diperolehi. Borang soal selidik, iaitu *Depression, Anxiety and Stress Scale (DASS-21)* serta *Mindful Eating Questionnaire (MEQ)* digunakan dalam borang pengumpulan data. Antara 158 responden, 69.0% ialah perempuan dan 31.0% ialah lelaki. Berdasarkan DASS-21, prevalens kemurungan, kegelisahan dan tekanan dalam kalangan responden masing-masing ialah 38.6%, 51.3% dan 32.2% manakala skor min ringkasan MEQ ialah 2.82±0.26. Dalam kajian ini, hubungan songsang yang signifikan dan baik didapati antara skor kemurungan dan makan secara berhemah ($r=-0.33$, $p<0.001$), skor kegelisahan dan makan secara berhemah ($r=-0.34$, $p<0.001$) serta skor tekanan dan makan secara

berhemah ($r=-0.37$, $p<0.001$), dengan skor kemurungan, skor kegelisahan dan skor tekanan yang lebih tinggi berkaitan dengan makan secara berhemah yang lebih rendah. Kesimpulannya, kesihatan mental dan makan secara berhemah dalam kalangan pelajar sarjana muda perubatan perlu diberi perhatian kerana pengabaian boleh membawa kesan negatif seperti tingkah laku makan yang tidak teratur iaitu makan secara keterlaluan, makan beremosi dan status pemakanan yang tidak sihat seperti berat badan berlebihan.

ASSOCIATION BETWEEN MENTAL HEALTH AND MINDFULNESS IN EATING AMONG UNDERGRADUATE MEDICAL STUDENTS IN UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS, KUBANG KERIAN, KELANTAN

ABSTRACT

Medical education is well known for its challenging and stressful nature that may cause medical students to have a higher risk of mental health problems. On the other hand, mindful eating concerns awareness of dietary habits, while its absence is usually associated with anxiety, negative affect as well as binge eating. The purpose of this study is to evaluate mental health and mindfulness in eating as well as their association among undergraduate medical students in USM, Health Campus. The respondents were recruited through convenience sampling and 158 responses were included in the analysis. Socio-demographic characteristics, mental health and mindfulness in eating of respondents were obtained. Questionnaires namely Depression, Anxiety and Stress Scale (DASS-21) as well as Mindful Eating Questionnaire (MEQ) were used in the data collection form. Among 158 respondents, 69.0% were female whereas 31.0% were male. According to DASS-21, the prevalence of depression, anxiety and stress among respondents were 38.6%, 51.3% and 32.2% respectively whereas the mean MEQ summary score was 2.82±0.26 according to MEQ, which is considerable. Significant, fair inverse association were found between depression score and mindfulness in eating ($r=-0.33$, $p<0.001$), anxiety score and mindfulness in eating ($r=-0.34$, $p<0.001$) as well as stress score and mindfulness in eating ($r=-0.37$, $p<0.001$), with higher depression score, anxiety score and

stress score associated with lower mindfulness in eating. In conclusion, it is important to pay attention on mental health and mindfulness in eating among undergraduate medical students as they are associated and neglection might lead to problems such as disordered eating behaviour such as binge eating, emotional eating and unhealthy nutritional status such as overweight or obese.

CHAPTER 1 INTRODUCTION

1.1 Background of the study

According to World Health Organisation (WHO) (2018), mental health is a state of well-being in which an individual recognizes their own abilities, is able to cope with the normal stresses of life, is able to work productively as well as can make a contribution to the community. It includes emotional, psychological and social well-being (US Department of Health & Human Services, 2020).

Poor mental health can affect our abilities in thinking, emoting, interacting with each other, earn a living and enjoying life. Medical education is well known for its challenging and stressful nature. High level of stress and increased anxiety are seen in medical students (MacLean et al., 2015). Besides, there are about one-third of medical students globally suffer from depression or depressive symptoms (Puthran et al., 2016).

University students are a group of people who are typically experiencing a critical transition period from adolescence to adulthood, which time often considered as one of the stressful events in the life of a person (Quince et al., 2012). This, together with other challenges such as exam pressures and social changes, arguably puts university students at particular risk in terms of mental health (Awadalla et al., 2020).

Depression is a common mental disorder globally. There are more than 264 million people suffer from depression globally (WHO, 2020). It is predicted to be one of the leading causes of illness by the year 2030 (Mathers & Loncar, 2006). According to National Health and Morbidity Survey 2019, the prevalence of depression among adults

aged 18 years and above in Malaysia was 2.3% whereas the current depression prevalence in other countries range from 2.2% to 10.4%.

According to a systematic review, 7.7% to 65.5% of undergraduate medical students outside of the United States had anxiety (Hope & Henderson, 2014). The fear and anxiety that they suffer can bring significant problems in areas of their life such as school, work and social interactions (National Institute of Mental Health, 2018).

Furthermore, stress has negative physiological and psychological effects on individuals which could result in poor mental health, substance use, and the need to develop healthy coping strategies (MacLean et al., 2015). Poor mental health can bring negative impacts such as medical school dropout and suicidal ideation and burnout (Dyrbye et al., 2010).

On the other hand, mindful eating is conceptualized as being aware in the present moment when one is eating; paying close attention to the senses including physical and emotional sensations (Albers, 2008). Research has shown overall mindful eating was positively correlated with mental well-being which suggest that those with higher level of mental well-being are more mindful eater (Khan & Zadeh, 2014).

1.2 Problem Statement

Medical school is recognized as a stressful environment. Stress during education can cause mental distress and bring negative impacts on cognitive functioning and learning (Saipanish, 2003). A cross-sectional study conducted by Sherina et al (2004) in a local university in Malaysia found that the prevalence of psychological stress among medical students was high and psychological stress was also significantly associated with depression. The psychological stress that suffers by the medical students may lead to

burnout and poor academic performances. A cross-sectional study at a public university in Malaysia found 33% of the medical students had anxiety symptoms and 14% had significant anxiety whereas 11% of medical students had symptoms of depression and only 3.4% had significant symptoms of depression (Gan & Hue, 2019). This study also confirmed that the quality of life of medical students is affected by anxiety and depression.

Mindfulness encourages healthier eating by influencing attitudes toward different foods (Jordan et al., 2014). Research has shown overall mindful eating was positively correlated with mental well-being which suggest that those with higher level of mental well-being are more mindful eater (Khan & Zadeh, 2014). Besides, mindfulness in eating is inversely related to the mood disturbances observed in university students of health-related disciplines which the poorer the mental health of the students, the lower the level of mindfulness and the more disordered the eating behaviour (Giannopoulou et al., 2020) which is associated with significant reduction of health-related quality of life during young adulthood (Hart et al., 2020). Mental health and mindfulness in eating are the important topics while there was limited research regarding association between mental health and mindfulness in eating among undergraduate medical students in Malaysia. The examples of previous research are the research that to investigate the association between mindful eating, disordered eating and mood disturbances among university students in health-related disciplines conducted by Giannopoulou et al (2020) and to study mindful eating and its relationship to BMI and physical activity among university students conducted by Moor et al (2012). Therefore, a research is conducted to study the association between mental health in terms of depressive level, anxiety level and stress level with mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

1.3 Conceptual framework

Mental health (depression, anxiety and stress) is an independent variable (IV) whereas mindfulness in eating is the dependent variable (DV). Poor mental health can lead to poor academic performance as well as poor quality of life and health-related quality of life. Besides, mental health is negatively associated with mindful eating whereas lower mindfulness in eating is associated with higher BMI which may lead to malnutrition in terms of overweight and obesity. According to Framson et al (2017), mindful eating can play an important role in long-term weight maintenance. Apart from that, poor mental health can increase the risk of emotional eating, overeating, unhealthy eating habits and difficulty in separating between hunger and other negative internal states.

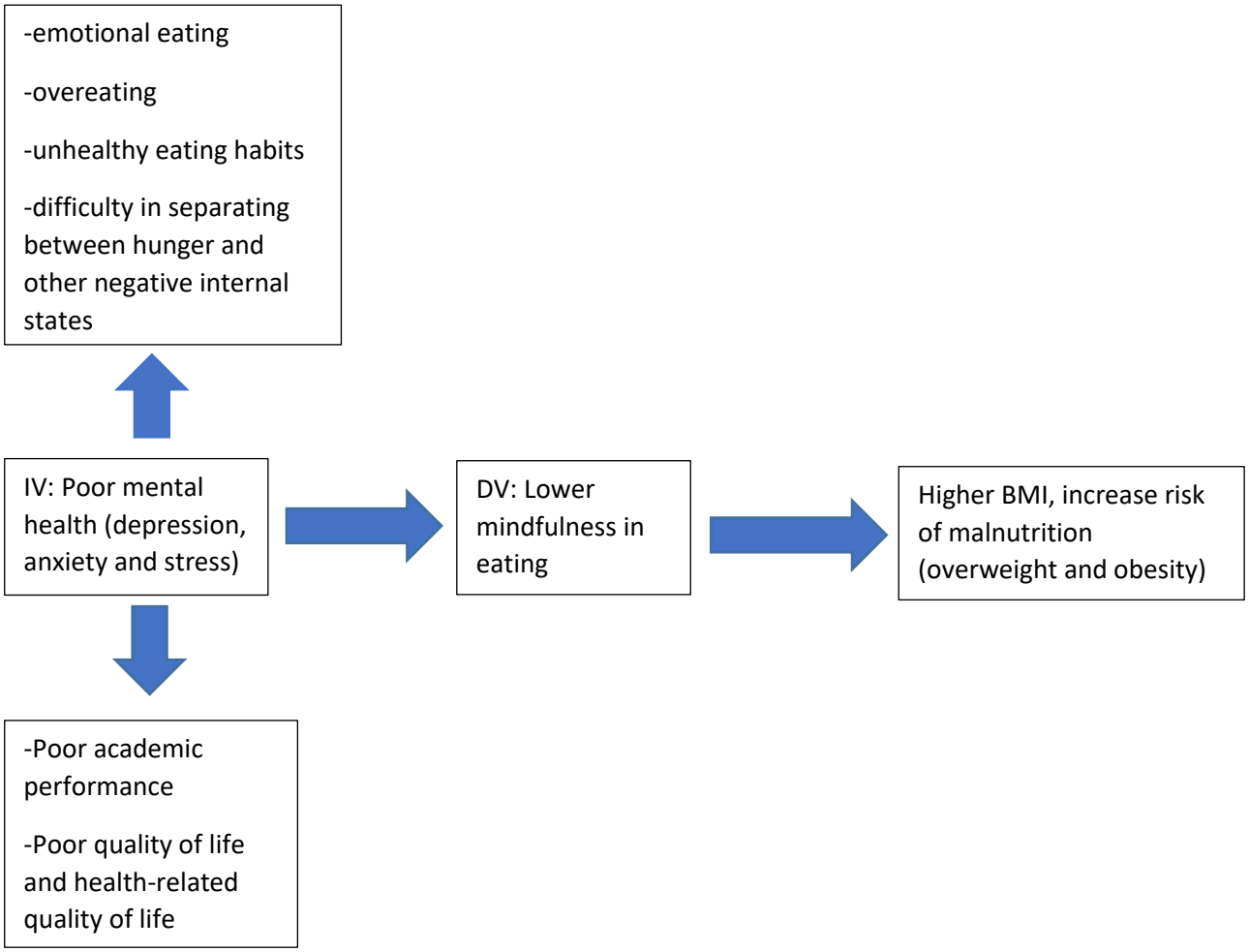

Figure 1.1: Conceptual framework

1.4 Research objectives

General objective

To determine the association between mental health and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Specific objectives

a. To determine the prevalence of socio-demographic characteristics (gender, age, year of study, ethnicity, household income and sponsorship during study) among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.
b. To determine the prevalence of mental health (depression, anxiety and stress) status among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.
c. To determine the prevalence of mindful eating behaviour among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.
d. To determine the association between mental health (depression, anxiety and stress) and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.
e. To determine the association between selected socio-demographic characteristics (gender, age, year of study, ethnicity, household income and sponsorship during study) and mental health (depression, anxiety and stress) among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

1.5 Research questions

1. What are socio-demographic characteristics (gender, age, year of study, ethnicity, household income and sponsorship during study) among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan?
2. What is the level of depression, anxiety and stress among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan?
3. How is the mindfulness eating behaviour among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan?
4. Is there any association between mental health (depression, anxiety and stress) and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan?
5. Is there any association between selected socio-demographic characteristics (gender, age, year of study, ethnicity, household income and sponsorship during study) with mental health (depression, anxiety and stress) among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan?

1.6 Research hypothesis

Null hypothesis 1 (H_{01}): There is no significant association between depression score and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Alternative hypothesis (H_{A1}): There is a significant association between depression score and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Null hypothesis 2 (H_{02}): There is no significant association between anxiety score and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Alternative hypothesis 2 (H_{A2}): There is a significant association between anxiety score and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Null hypothesis 3 (H_{03}): There is no significant association between stress score and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Alternative hypothesis 3 (H_{A3}): There is a significant association between stress score and mindfulness in eating among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Null hypothesis 4 (H_{04}): There is no significant association between selected socio-demographic characteristics (gender, age, year of study, ethnicity, household income and sponsorship during study) and mental health (level of depression, anxiety and stress) among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

Alternative hypothesis 4 (H_{A4}): There is a significant association between selected socio-demographic characteristics (gender, age, year of study, ethnicity, household income and sponsorship during study) and mental health (level of depression, anxiety and stress) among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

1.7 Significance of the study

The finding of this study will help to understand better about the mental health status of the undergraduate medical students in terms of their depressive level, anxiety level and stress level. The findings of this study therefore can raise awareness regarding mental health (depression, anxiety and stress) of medical students in the stressful and challenging environment. Some mental health counselling programme can be organised for the medical students as the precautions of worsening of mental health.

Apart from that, the findings of this study will help to contribute to the knowledge such as mental health (depression, anxiety and stress) among undergraduate medical students, their mindfulness in eating as well as the association between mental health (depression, anxiety and stress) and mindfulness in eating which can further affect their eating habit, health and nutritional status. These findings also help to provide suitable intervention in the future to improve mental health and mindfulness in eating among undergraduate medical students.

CHAPTER 2 LITERATURE REVIEW

2.1 Definition of mental health and the prevalence of mental health problem

Mental health refers to a state of well-being in which an individual realizes his or her own abilities, is able to overcome the normal stresses of life, can work productively and can make a contribution to his or her community (WHO, 2018). Mental health includes emotional, psychological and social well-being which can influence how we think, feel and act (U.S Department of Health & Human Services, 2020).

The National Health Morbidity Survey (NHMS) (2015) found that mental health problems had increased from 10.7% in the year 1996 to 29.2% in the year 2015 among adults aged 16 years old and above in Malaysia (Institute for Public Health, 1996; Institute for Public Health, 2015).

2.2 Definition and prevalence of depression

Depression is a common and serious medical illness that negatively affects how the individual feel, the way the individual think and how the individual act (American Psychiatric Association, 2020). Individuals who experiencing depression may pose feelings of hopelessness, dejection and even suicidal thoughts (de Zwart et al., 2018).

There was an estimated 264 million people of all ages are affected by depression globally (GBD 2017 Disease and Injury Incidence and Prevalence Collaborators, 2018). According to GBD 2017 Disease and Injury Incidence and Prevalence Collaborators (2018), the number of all-age years lived with disability (YLDs) attributed to depressive disorders increased by 33.4% and depressive disorders were one of the leading causes of

YLDs in the year 2017 for both sexes combined. In other countries, the current depression prevalence ranges from 2.2% to 10.4% (Kessler & Bromet, 2013). The National Health Morbidity Survey 2019 found that the prevalence of depression among adults aged 18 and above was 2.3% in Malaysia (Institute for Public Health, 2020) which is comparable with the prevalence of depression in Japan (2.2%) (Kessler & Bromet, 2013). There was a cross-sectional study conducted among medical students of a private medical university in Malaysia in the year 2015 found that the prevalence of depression was 60% (Fuad et al., 2015), which is considered quite high among medical students.

2.3 Definition and prevalence of anxiety

Anxiety refers to a basic human emotion including uncertainty and apprehension which typically appears when a person perceives an occurrence as a threat to self-esteem or ego (Harris & Coy, 2003). Anxiety can be a normal stress reaction. However, if anxiety get out of hand, it may become an anxiety disorder. Anxiety is a psychophysiology difficulty (Callahan, 2001) and there are different forms of anxiety including restlessness, a sense of fear, negative thinking, overly emotional responses and excessive worrying (Vitasari et al., 2010).

A cross-sectional study conducted among the adults in the community of Selangor, Malaysia reported the prevalence of anxiety was 8.2% (Kader Maideen et al., 2015). Moreover, a cross-sectional study was done on two batches of applicants to the medical course in the School of Medical Sciences, Universiti Sains Malaysia reported the prevalence of anxiety was 54.5% (Yusoff et al., 2013). Besides, there was a cross-sectional study conducted among medical students of a private medical university in Malaysia in the year 2015 that found the prevalence of anxiety was 76% (Fuad et al., 2015).

2.4 Definition and prevalence of stress

Stress refers to a stimulus, a response and a hypothetical state (Fleming et al., 1984). Stress can bring negative physiological and psychological effects on individuals which could result in poor mental health, substance use, and the need to develop healthy coping strategies (MacLean et al, 2015).

A cross-sectional study was done among medical students enrolled in the School of Medical Sciences, Universiti Sains Malaysia found the overall prevalence of stress among the medical students was 29.6% (Yusoff et al., 2010). Moreover, there was a cross-sectional study conducted among medical students of a private medical university in Malaysia in the year 2015 found that the prevalence of stress was 47% (Fuad et al., 2015), which is quite high.

2.5 Effect of depression, anxiety and stress among medical students

The mental health problems reported by medical students may be determined by academic factors such as poor academic performance (Moffat et al., 2004; Stewart et al., 1999), emotional experiences related to initial contact with patients (Pitkala & Mantyranta, 2004), curricular overload (Guthrie et al., 1998; Radcliffe & Lester, 2003), the stress associated with the transitional period to clinical training (Compton et al., 2008), Radcliffe & Lester, 2003) and sleep deprivation (Ball & Bax, 2002).

Quality of life refers to the perception of an individual regarding their position in life in the context of the value and culture systems in which they live and in relation to the individual's expectations, goals, standards and concerns (WHO, 2012). A cross-sectional study conducted involving medical students in their final two years of study at a public university in Malaysia confirmed that the quality of life of medical students is

affected by anxiety and depression (Gan & Hue, 2019). Health-related quality of life is defined as the psychological, social and physical domains of health, seen as distinct area which are affected by beliefs, experiences, perceptions and expectations of an individual (Testa & Simonson, 1986). The study that was conducted by Paro et al found that the students with depressive symptoms showed multi-dimensional impairment in health-related quality of life (Paro et al., 2010).

Mental distress is associated with poor academic performance (Stewart et al, 1999). The long-term increasing stress level among medical students can bring many deleterious effects on them including poor academic performance and poor quality of life (Paro et al., 2010). A study conducted by Awadalla et al reported the baseline findings support an association between higher levels of depressive symptoms and poorer academic performance among university students (Awadalla et al., 2020). In the same study, Awadalla et al found that the findings from baseline data supported a negative relationship between symptoms of anxiety and academic performance among university students (Awadalla et al., 2020).

It is widely accepted that humans' eating behaviour changes according to changes in their emotional arousal such as anger, joy, anxiety, sadness, depression and other moods (Cabetti et al., 2002; Patel & Schlundt, 2001; Wallis & Hetherington, 2004). Stressed emotional eaters tend to eat more sweet high-fat food and more energy-densed meals than non-emotional and unstressed eaters (Oliver et al., 2000; Zellner et al., 2006) which supported by a study that found stressed college women with an increased appetite chose significantly more types of sweet food and mixed dish such as fast food (Kandiah et al., 2006). Apart from that, research has shown stress incurs increased risk for a binge eating episode (Freeman & Grill, 2004).

A study had found there is significant inversed correlation between fresh fruit and depression symptoms whereas significant and positive correlation between fast food or ready-to-eat food consumption and depression (Liu et al., 2007). Furthermore, depressive symptoms and emotional eating were indirectly related through the difficulty identifying feelings that possibly indicating emotional eaters have difficulties in separating between other negative internal states and hunger (Ouwens et al., 2009). Apart from that, depressive symptoms are related to a less healthy diet. Two community surveys shown higher levels of affective or depressive symptoms were associated with lower likelihood to follow dietary recommendations (Sarlio-Lahteenkorva et al., 2004). The findings of the study conducted by Lazarevich et al shown individuals with depressive symptoms usually have dysfunctional coping strategies and tend to develop abnormal eating behaviours as well as periods of overeating to diminish negative mood states (Lazarevich et al., 2016). Moreover, depression and emotional eating have been associated with the intake of more calorie-dense food (Dallman et al., 2005; Konttinen et al., 2010, Mooreville et al., 2014; Van Strien et al., 2013), which may contribute to the unhealthy nutritional status.

On the other hand, anxiety can cause overeating and promote weight gain (Anderson et al., 2006; Zipper et al., 2001). Moreover, research has found anxiety is a stronger predictor of binge eating disorder status than depression (Schulz & Laessle, 2010).

2.6 Mindful eating

Mindful eating refers to a non-judgemental awareness of emotional and physical sensations associated with eating (Framson et al., 2009). It is conceptualized as being aware in present moment when the individual is eating; paying close attention to the

senses including emotional and physical sensations (Albers, 2008). Food cravings and the frequency of eating induced by external cues can be reduced by practicing mindfulness in the food environment. (Alberts et al., 2012; Allirot et al., 2017).

A study done among students at a medium-sized south-eastern university reported the mean mindful eating summary score was 2.89±0.32 (Moor et al., 2012) which is considerable and almost similar with the mean mindful eating summary score in the study conducted by Framson et al (2.92±0.37). Moreover, Giannopoulou et al (2020) reported the total mindful eating questionnaire score among the students from the University of Brighton, United Kingdom was 3.11±0.03, which is comparable to that observed in previous studies among adult populations (Katterman et al., 2014; Mantzios & Wilson, 2015).

2.7 Depression, Anxiety and Stress Scale (DASS-21)

The DASS-21 is used to measure depression, anxiety and stress levels (Crawford & Henry, 2003; Henry & Crawford, 2005, S.H. Lovibond & P.F. Lovibond, 1995; McDowell, 2006). It is a self-administered questionnaire. DASS appears to be an excellent instrument in measuring features of depression, hyperarousal and tension in clinical and non-clinical group (Antony et al., 1998).

2.8 Mindful Eating Questionnaire (MEQ)

Mindful Eating Questionnaire (MEQ) is a 28-item scale that was developed to measure the construct of mindful eating (Framson et al., 2009). MEQ consists of 5 subscales which are Emotional Response (eating in response to negative emotional states), Disinhibition (the inability to stop eating even when full), Awareness (being aware of and appreciating the effects of food on the senses), External Cues (eating in response to environment cues)

and Distraction (focus on other activities while eating) (Framson et al., 2009). MEQ was used in several studies to measure the construct of mindful eating among the university students such as the study conducted by Giannopoulou et al (2020) and Moor et al (2012).

2.9 Association between mental health and mindfulness in eating

Mindful eating was negatively related to anxiety and negative affect (Pintado-Cucarella & Rodriguez-Salgado, 2016). There are investigations reported that people with high levels of negative affect and anxiety posed less mindful eating (Davenport et al., 2012; Hearon et al., 2013; Levitan & Davis, 2010; Lindeman & Stark, 2001; Pintado-Cucarella & Rodriguez-Salgado, 2016).

2.10 Association between selected socio-demographic characteristics and mental health

According to Iqbal et al (2015), there was no gender difference of symptoms of depression, anxiety or stress among undergraduate medical students. Moreover, Shamsuddin (2013) reported that age of the Malaysian university students was associated with depression, anxiety and stress. Apart from that, Bayram and Bilgel (2008) found that there was significant association between years of study and depression, between year of study and anxiety as well as between year of study and stress, in which first and second year students found higher depression, anxiety and stress scores compared to those in higher years. Furthermore, Shamduddin et al (2013) found that there was no association between ethnicity and depression as well as ethnicity and anxiety. However, there was significant association between ethnicity and stress.

CHAPTER 3 METHODOLOGY

3.1 Study design

This study was designed as a cross-sectional study which involved the use of questionnaires. Cross-sectional study design enabled the information on both the exposure and outcome of interest to be collected from respondents simultaneously at one specific point of time. Furthermore, it was relatively inexpensive and allowed researcher to collect information in relatively short time due to do no require follow up of the respondents.

3.2 Study population

The subjects involved in this study were the undergraduate (Year 1 to Year 5) medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.

3.3 Study location

This study was conducted at Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan. This location was chosen because Universiti Sains Malaysia included undergraduate medical students which come from different backgrounds. It is a good place for conducting research as well as convenient and time saving for data collection.

3.4 Study participants

Inclusion criteria

This study would include individual who are

- Undergraduate (Year 1 to Year 5) medical students who study in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan.
- Malaysian.
- aged 18 and above.

Exclusion criteria

This study would not include individual who are

- Currently having underlying health concerns and chronic health diseases.

3.5 Study period

The study was conducted from February 2021 to April 2021.

3.6 Sample size

In this research, the formula for the sample size for the mean (Israel., 2013) that is used in the sample size calculation as below:

$$n = \left[Z\left(\frac{\sigma}{\Delta}\right)\right]^2 \text{ where}$$

n= sample size

Z= value representing the desired confidence level

σ= population standard deviation

Δ= precision (true value)

For this research, the confidence level was set to be 95%. The Z score value for 95% confidence interval was 1.96. The precision of 5% had been decided. The standard deviation of previous study that was used in the calculation of sample size of this research

was based on the mean mindful eating summary score was 2.89±0.32 among the students at a medium-sized south-eastern university (Moor *et al*, 2013).

$$n = \left[1.96\left(\frac{0.32}{0.05}\right)\right]^2$$

= 158 samples + 10% dropout added to the sample

=174 samples

To consider 10% drop-out rate (17.4 samples), therefore 174 samples were recruited for this study.

3.7 Sampling method

The samples were recruited by using convenience sampling method. Convenience sampling is a non-probability sampling method. All respondents were voluntarily recruited. Approved informed consent was obtained from the respondents before the recruitment in this study.

3.8 Study procedures

After the ethical approval from the Human Research Ethics Committee USM and Director of USM School of Medical Sciences were received, the process of data collection started.

First, each batch representatives were approached and briefly explained regarding the research. Then, the agreement to take part from the batch representatives was obtained, followed by a soft copy of poster together with message template regarding research subjects' recruitment with a link of Google Form were passed to them. Batch representatives helped to post and share the poster and messages to the group chat with their batch mates. The link leaded them to a Google Form that consisted of informed consent form and set of questionnaires. Those who met the inclusion criteria, absent of

exclusion criteria, interested and volunteered to take part in the research filled in the online informed consent form and questionnaire. Researcher asked the representatives to help to resend the same poster and message templates to their batch mates until the adequate responses were received. 158 responses collected were used in the data analysis. Participants were coded with number '001', '002', '003'… in this research. SPSS 26.0 was used to compute and analyse data. Data were presented as grouped data and kept in closed folder to ensure the identity of participants are not known as well as to ensure the privacy and confidentiality of participants being protected.

3.9 Research tools

3.9.1 Data collection form

The data collection form consisted of three sections (Part A, B and C). Part A was aimed to collect socio-demographic data of the respondents including gender, age, year of study, ethnicity, household income and sponsorship during study. Part B was the Depression, Anxiety and Stress Scale Questionnaire (DASS-21) to determine the depressive level, anxiety level and stress level of the respondents. Part C was Mindful Eating Questionnaire (MEQ) to determine the mindfulness in eating of the respondents.

Part A – Socio-demographic characteristics of the respondents

This part consisted of details of respondents' gender, age, year of study, ethnicity, household income and sponsorship during study.

Part B – Depression, Anxiety and Stress Scale (DASS-21)

The English version of Depression, Anxiety and Stress Scale (DASS-21) was used to measure the mental health. It was developed by Lovibond and Lovibond (1995). It is a

set of three self-report scales designed to measure the emotional states of depression, anxiety and stress. DASS-21 is reliable psychometric instrument that can be seen by its good Cronbach alpha value p=0.81, p=0.89 and p=0.78 for depression, anxiety and stress scale respectively which is useful as screening tool among university students (Coker et al., 2018). According to Coker et al (2018), it also consists of good internal consistency and adequate concurrent validity. DASS-21 consists of 21 items, which each of the three DASS-21 scales (depression, anxiety and stress) contain seven items. All the items are answered based on Likert scale with a scoring system: 0=did not apply to me at all, 1=applied to me to some degree or some of the time, 2=applied to me to a considerable degree or a good part of time and 3=applied to me very much or most of the time. The scores for the depression, anxiety and stress scale are calculated by total up the scores for the relevant items.

The scores of the depression scale, anxiety scale and stress scale in DASS-21 are needed to be multiplied by 2 respectively to obtain the final score. Table 3.1 demonstrates the recommended cut-off scores for conventional severity labels.

Table 3.1: Recommended cut-off scores for conventional severity labels of DASS-21

	Depression	**Anxiety**	**Stress**
Normal	0 – 9	0 – 7	0 – 14
Mild	10 – 13	8 – 9	15 – 18
Moderate	14 – 20	10 – 14	19 – 25
Severe	21 – 27	15 – 19	26 – 33
Extremely Severe	≥ 28	≥ 20	≥ 34

(Manual for the depression anxiety stress scales 2nd ed, 1995)

Part C – Mindful Eating Questionnaire (MEQ)

English version of MEQ was used in this study. MEQ was developed by Framson et al (2009). MEQ is a 28-item scale to measure the construct of mindful eating. There are 5 subscales in the MEQ which are awareness (7 items), distraction (3 items), disinhibition (8 items), emotional response (4 items) and external cues (6 items). Each item was scored from one to four, 1=never or rarely, 2=sometimes, 3=often and 4=usually or always. Higher scores indicate higher mindfulness in eating. Each subscale score was calculated as the mean of items, excluding those with the response of "not-applicable". The summary score was the mean of the five subscales (Framson et al, 2009). According to Framson et al (2009), this questionnaire was a valid measure with good construct validity and reliability in which Cronbach alpha value was 0.64. Besides, subscale scores in MEQ had good internal consistency reliability as well, in which the Cronbach alpha value of awareness (0.74), distraction (0.64), disinhibition (0.83), emotional response (0.71) and external cues (0.70) (Framson et al., 2009).

3.10 Statistical analysis

Statistical analysis and evaluations were computed by using Statistical Package for Social Sciences (SPSS) version 26.0. Statistical significance was set at p less than 0.05 (two tailed) at 95% confidence level. Normality of distribution was tested with the histogram and box plot. Descriptive statistics were used for the socio-demographic characteristics of subjects, respondents' depression, anxiety and stress level as well as mindfulness in eating. Categorial data were presented as frequency (n) and percentage (%). Numerical data were presented as mean and standard deviation (SD) when they were normally distributed while the data were presented as median and interquartile range (IQR) when they were not normally distributed.

The association between depressive level score and mindfulness in eating, anxiety level scores and mindfulness in eating as well as stress level score and mindfulness in eating were determined by using Spearman's Rank-Order correlation test since the data were non-parametric. The relationship between selected socio-demographic characteristics and mental health (depressive level, anxiety level and stress level) was tested by using Fisher's Exact since the expected count <5 is more than 20% of the cells.

3.11 Flow chart of study

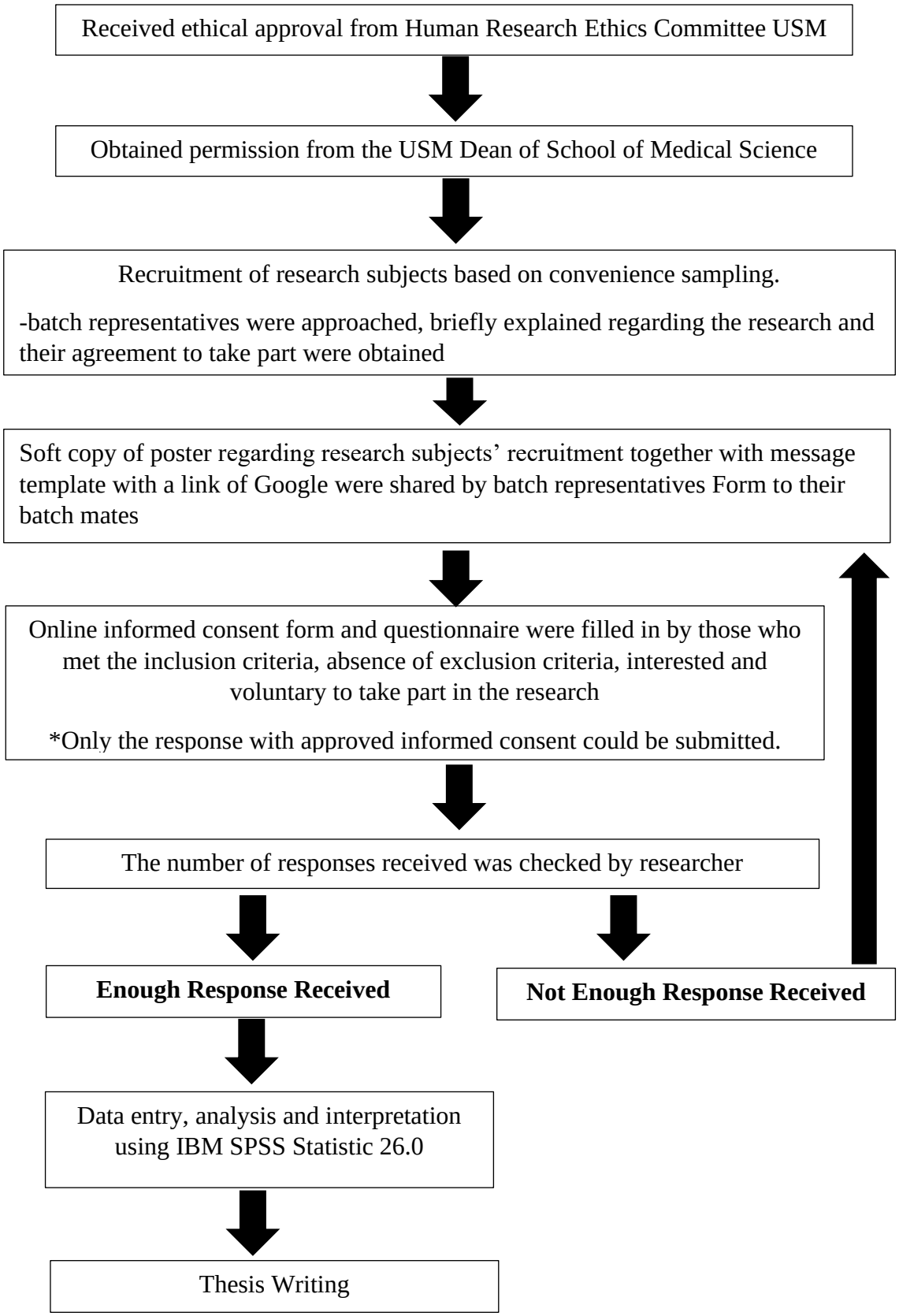

Figure 3.1: Flow chart of study

CHAPTER 4 RESULTS

4.1 Socio-demographic characteristic among undergraduate medical students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan

A total of 158 eligible undergraduate medical students took part in this study. Table 4.1 represents the socio-demographic characteristics of the undergraduate medical students (n=158). A total of 49 respondents were male (31.0%) and 109 respondents were female (69.0%). The mean age of the respondents was 22.11±1.56 years. Based on the present study findings, there were 96 respondents (60.8%) in the age group of 22 to 25 years, followed by 61 respondents (38.6%) in the age group of 18 to 21 years and 1 respondent (0.6%) in the age group of elder than 25 years. Among 158 respondents, 41 of them (25.9%) were in the year of study of Year 4, followed by 34 of them (21.5%) were in Year 2 as well as 28 of them (17.7%) were in the Year 1 and Year 5 respectively. There was the least number of respondents, 27 respondents (17.1%) in Year 3.

Majority of respondents were Malay in which there were 99 of them (62.7%), followed by 46 Chinese (29.1%), 10 India (6.3%) and 3 from other ethnicity (1.9%) which were Punjabi (n=1), Sino Kadazan (n=1) and Bugis (n=1). In terms of household income, present study findings shown there were 71 respondents (44.9%) from household income group of M40, followed by 66 respondents (41.8%) from B40, 18 respondents (11.4%) from T20 and the household income of 3 respondents (1.9%) were not sure or not stated. Besides, majority of respondents were receiving scholarship as their sponsorship during study in which there were 99 of them (62.7%), followed by 39 respondents (24.7%) and 19 respondents (12.0%) were receiving sponsorship from loan and parents respectively