Correlation Between Eating Habits and Exam Stress Among Medical Students in Malaysia: A Cross-sectional Study

J. B. Sathmi S. De Silva[1], Fathima Safna Tuan Fareed[1], Mah Yin Chang[1], Keishini a/p T. Alagarajah[1], Sujata Khobragade[2], Htoo Htoo Kyaw Soe[2], Soe Moe[2], Mila Nu Nu Htay[2]

Corresponding Author Email: sathmidesilva@gmail.com

ABSTRACT

Stress is thought to influence human eating behaviour. Usually, it has a negative impact on human health. Medical students could feel stress during their studies contributed by the nature of their study. As a result, their appetite can be affected by skipping meals or eating fast food. The aim of this study was to assess the pattern of eating habits and its association with stress among medical students. This cross-sectional study was conducted among the undergraduate medical students in a private medical university college in Malaysia. Researchers used questionnaires consisting of questions on sociodemographic, stress and eating habits, which was distributed online. The data was statistically analysed using Epi Info version 7.2.4.0. Correlation test, unpaired T-test, one-way ANOVA, and general linear model were used to analyze the data. A total of 109 students participated in the study. The mean age was 22.2 years and 70.6% were female students. Findings revealed that 40% of students showed to be having poor eating habits, that was positively associated with the exam stress (r= 0.69,p value= 0.004). A significant positive association was established between gender and exam stress faced by the medical students that have participated in the study (p value= 0.01). This study demonstrated that exam stress and eating habits are critical issues for a medical student's life and their future. Therefore, undergraduate medical students need support and guidance on healthy eating habits and strategies to cope up with exam stress especially when they are preparing for important exams and also right after the exams.

[1] Faculty of Medicine, Manipal University College Malaysia, Jalan Batu Hampar, 75150 Bukit Baru, Melaka, Malaysia
[2] Department of Community Medicine, Faculty of Medicine, Manipal University College Malaysia, Jalan Batu Hampar, 75150 Bukit Baru, Melaka, Malaysia

INTRODUCTION

Stress is defined as any general response of the body that either overwhelms or threatens to overwhelm the body and its ability to maintain homeostasis [1]. In simpler terms, stress is a response in an individual to a state of "imbalance between high demands and poor supply", and academic stress is defined as "mental distress associated with academic demands that need to be fulfilled at that period of time" [2].

It is undoubtedly evident that the two factors: stress and medical students seemingly go hand-in-hand and are almost conjoined. There can be various sources of stressors such as immense pressure to succeed, competition with peers, moving away from home, academic overload, limited study time and cramped schedules [3]. The experience of stress is of such high frequency among medical students, given the nature of pressure they are expected to work in. A study carried out in 2013 revealed that Malaysian medical students showed stress as high as 56% which is alarming [4]. High levels of stress may have a negative effect on cognitive functioning and learning of students in medical school [5]. To ensure the eustress doesn't digress to distress, medical students use numerous coping mechanisms such as scheduled and prudent use of time, exercising, sports, gathering with loved ones, not comparing grades among peers, engaging in diverting activities, music, and religious activities [6]. In previous research it has been seen that food is not only used for nutrition and health benefits but also used as a coping mechanism to deal with stress and unpleasant situations [7].

Accordingly, students will have to deal with these demands such as examinations as well as fulfil parental expectations by achieving expected academic results. These demands usually may cause rising stress levels as well as tax and exceed their personal and social resources which all eventually lead to a medical student being stressed and this may cause a change in their dietary habit [8]. Studies have shown that stress can not only affect a person's health through direct physiological process but also by altering behaviors that affect health [1]. Change in eating habits is one such health behavioral response to stress observed in medical students.

Cost of food and availability of fast food are two of the factors which university students take into consideration when it comes to choosing what to eat [9,10]. They had very frequent snacking habits [11] as well as high consumption of fast food [12]. The intake of snack type food, pre-prepared, ready-to-eat food and sweet food such as chocolate, cakes and ice-cream, was found to increase among students experiencing stress [13-15]; while the intake of healthy food such as vegetables tended to decrease [13,16]. Although it is well established among medical students that healthy eating habits promote one's well-being and helps in boosting immunity, they seem to hardly practice what they preach. Studies show that around 48% of the student population are caffeine dependent and consume coffee daily. It is also seen that skipping breakfast has become a pattern among most Malaysian university students. As for fruit intake, studies reveal that 28.8% consume fruits daily [17]. A study carried out among university students in Australia revealed that women tend to suffer from stress more compared to men and that stress was associated with the selection of less healthy food [18].

It has been found that medical students tend to carry out much healthier eating habits when compared to non-medical students [19], although some studies state otherwise. A study which was carried out among both medical and non-medical students in Pakistan revealed that even though medical students had sufficient knowledge regarding good dietary habits, they failed to apply this knowledge into practice [20]. Another study done in Malaysian stated that there is a high prevalence of underweight among university students due to unhealthy eating habits and inadequate nutrient intake, thus, to achieve a healthy nutritional status, healthy eating habits must be promoted among the youth [10]. On the other hand, a study carried among medical students at a private medical university in Malaysia revealed that overweight and obesity are on the high which reinforces the need to encourage these students to be leading a healthy lifestyle [21]. Further, it was reported that stress is associated with both an imbalanced dietary pattern and emotional eating [22-24]. However, several studies showed conflicting results. Some studies showed that stress was associated with increased carbohydrates and fat resulting in obesity development, while others found stress is associated with poorer food choices such as decreased fruits and vegetables consumption [25-27].

Data on eating habits and exam stress among medical students in Malaysia are limited. The current study aims at assessing the patterns of eating habits and its association with examination stress among medical students in a private university in Malaysia.

METHODS

Study design and setting

This cross-sectional study was conducted among the undergraduate medical students (MBBS) in a private medical college, which is Manipal University College Malaysia, comprising Muar Campus and Melaka campus. In MBBS, there are a total of 10 semesters, in which semesters 4 and 5 are currently being conducted in India, while the remaining 8 are conducted in Malaysia. In our study, we only included the students currently studying in Malaysia. This study will be carried out in February 2022.

Sample size and sampling

The sample size for this study was calculated by using the CDC Epi Info sample size calculator. The estimated total population was 815 medical students from Manipal University College Malaysia. The minimum sample size required was 261 with an expected frequency of 50% due to unavailability of previously conducted studies, acceptable margin of error of 5%, power of 80%, and confidence level of 95%.

The respondents were recruited with "purposive" sampling method. The inclusion criteria of this study were medical students of Manipal University College Malaysia studying in semesters 1,2,3,6,7,8,9 and 10 of the MBBS degree programme.

Data Collection

This questionnaire was distributed online through Google Forms to eligible undergraduate students from semesters 1-3 and 6-10 of MBBS students in Manipal University College Malaysia (MUCM). Students were informed that it would take approximately 5 to 10 minutes to complete this questionnaire. The respondents' consent was taken before they proceed to answer the questionnaire. Students were ensured that all information provided will be strictly confidential and used purposefully for this research only.

The structured questionnaire used to collect the data consisted of three parts. The first part of the questionnaire contained demographic data which included age, gender, ethnicity, religion, and academic batch. The second part of the questionnaire included questions regarding examination stress. The reliability analysis of the examination stress question was conducted and Cronbach alpha was 0.896. The third part of the questionnaire contained questions regarding eating habits. These questions were taken and modified from a previously done study, which is "Work Stress & Eating Habits: A Health Risking the United States" by Raymond Matias & Takanori K Endo, M.S. [28]. Cronbach alpha of eating habit questions was 0.903.

Data analysis

The data collected from the distributed questionnaires was entered into Microsoft Excel and analysed using Epi Info version 7.2.4.0 and Statistical Package for the Social Sciences (SPSS) (version 12). The independent variables used in this study were age (years), ethnicity, gender, and the academic batch. The dependent variables used in this study were eating habits and examstress of medical students. A five-point Likert scale was used for the assessment of the eating habits and exam stress among the medical students (1- Never, 2- Seldom, 3- Sometimes, 4- Often, 5- Nearly all the time). Higher scores indicated higher levels of stress and poorer eating habits, whereas lower scores indicated lower levels of stress and better eating habits.

Ethical consideration

Ethical approval to conduct this study was granted by the Institutional Research Board (IRB) MUCM. Informed consent was obtained from the respondents.

RESULTS

Table 1 shows the sociodemographic characteristics of the respondents. A total of 109 students responded to this survey. Among them, 66 (60.6%) were 22 years or below, while the other 43 (39.4%) were 22 years and above. Among the respondents, 77 were females (70.6%) and 29 respondents were males (26.6%). With regards to nationality, 86 of the respondents were Malaysians (78.9%) where 51 (46.8%) were Indian, 28 (25.7%) were Chinese, 7 (6.4%) were Malay and the remaining 23 were international students (21.1%).

Semester wise, the leading number of responses, 47, was from Semester 6 (43.1%), 34 responses were from Semester 7 (31.2%), 19 responses were from Semester 2 (17.4%) and the remainder of 8 responses was distributed among Semester 8, 9 and 10 (Table 1).

Table 1. Sociodemographic characteristics of the respondents (n=109)

Variables	Frequency (%)
Age	
22 years and below	66 (60.6%)
23 years and above	43 (39.4%)
Mean (SD)	22.2 (1.3)
Minimum – Maximum	19-26
Gender	
Male	29 (26.6%)
Female	77 (70.6%)
Prefer not to say	3 (2.8%)
Ethnicity	
Malay	7 (6.4%)
Chinese	28 (25.7%)
Indian	51 (46.8%)
Other	23 (21.1%)
Current academic semester	
Semester 2	19 (17.4%)
Semester 6	47 (43.1%)
Semester 7	34 (31.2%)
Semester 8	5 (4.6%)
Semester 9	3 (2.8%)
Semester 10	1 (0.9%)

Table 2 shows the association between gender and exam stress faced by the medical students that have participated in the survey. The findings revealed that females generally have higher exam stress levels compared to males. The mean value calculated for females was 64.06 whereas for males it was 58.02 (p = 0.10) (Table 2).

Table 2. Association between gender and exam stress (n= 109)

Variables	Mean	SD	Minimum	Maximum	P*
Gender					
Female	64.06	10.04	36.00	86.00	
					0.010
Male	58.02	11.90	37.00	80.00	

*Unpaired T-test

Table 3 shows the association between gender of the medical students and their eating habits. The mean value for the females calculated was 44.01 whereas for the males it was 41.98, which shows that females have 2.13 more poor eating habits compared to males, however, the finding was not statistically significant (p = 0.385) (Table 3).

Table 3. Association between gender and eating habits (n= 109)

Variables	Mean	SD	Minimum	Maximum	P*
Gender					
Female	44.01	11.29	21.00	75.00	
					0.385
Male	41.88	11.06	25.00	75.00	

*Unpaired T-test

Table 4 highlights the association between the ethnicity of the medical students and their exam stress. The highest mean value obtained for exam stress among the ethnicities was 66.93, which was for Malays. However, there is no significant association between the ethnicity of the medical students and their exam stress (p = 0.564) (Table 4).

Table 4. Association between ethnicity and exam stress (n= 109)

Variables	Mean	SD	Minimum	Maximum	P*
Ethnicity					
Chinese	62.79	11.78	36.00	80.00	0.564
Indian	62.46	11.13	38.00	86.00	
Malay	66.93	9.78	54.00	80.00	
Other	60.22	10.99	36.00	78.00	

*One-way ANOVA

Table 5 reports the association between the ethnicity of the medical students and their eating habits. The highest mean value obtained for eating habits among the ethnicities was 47.14, which was for Malays, however, it was not significant (p = 0.775) (Table 5).

Table 5. Association between ethnicity and eating habits (n= 109)

Variables	Mean	SD	Minimum	Maximum	P*
Ethnicity					
Chinese	42.50	11.94	24.00	63.00	0.775
Indian	43.81	11.56	23.00	75.00	
Malay	47.14	10.96	33.00	69.00	
Other	42.63	10.15	21.00	60.00	

*One-way ANOVA

General linear model analysis was carried out to investigate the association between the characteristics of the respondents and exam stress. Gender was found to be significantly associated with the exam stress among the respondents (Table 6).

Table 6. General linear model analysis of demographics characteristics and exam stress (n= 109)

	Mean square	F	P*
Intercept	157.47	1.38	0.244
Age	167.12	1.46	0.230
Gender	545.64	4.77	0.031
Ethnicity	44.54	0.39	0.761
Semester	134.88	1.18	0.325

*General linear model analysis

General linear model analysis was carried out to investigate the association between the characteristics of the respondents and eating habits. Age was found to be significantly associated with the eating habits among the respondents (Table 7).

Table 7. General linear model analysis of demographics characteristics and eating habits (n= 109)

	Mean square	F	P*
Intercept	161.48	1.32	0.253
Age	1006.48	8.24	0.005
Gender	141.68	1.16	0.284
Ethnicity	77.43	0.634	0.595
Semester	150.39	1.23	0.301

*General linear model analysis

Pearson's correlation coefficient test was performed to find the association between exam stress level and eating habits. The result of correlation analysis was significant (p= 0.004). The correlation coefficient (r) is 0.69 with a positive direction and moderate association. Based on our questionnaire, a r value of 0.69 means that as exam stress level increases, the eating habits tend to become unhealthier and the preference shifts towards junk food.

A scatter plot with the mean exam stress level on the x-axis (independent variable) and the mean eating habits on the y-axis (dependent variable) shows a positive significant moderate correlation (Figure 1).
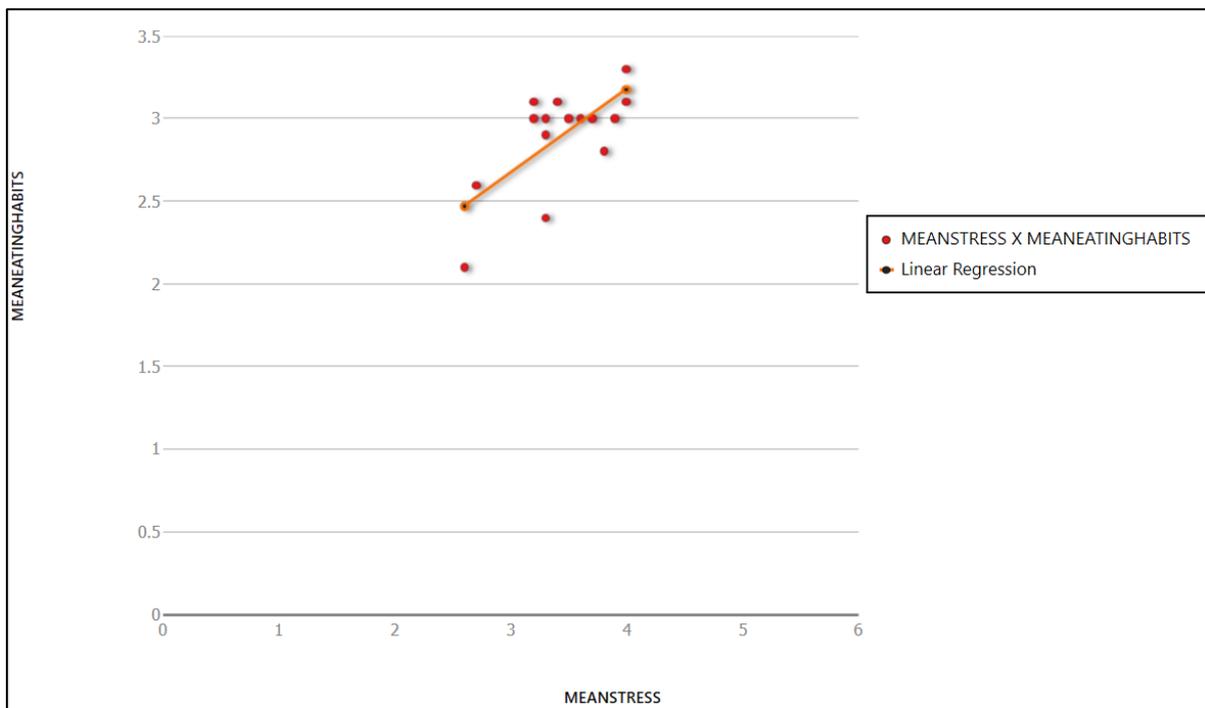

Figure 1. Scatter plot of association between exam stress and eating habits among undergraduate medical students (n= 109)

The individual item mean score and standard deviation of exam stress questions and eating habits among the respondents are reported in Appendix Table 1 and 2.

DISCUSSION

This cross-sectional study was conducted to investigate the association between exam stress level and eating habits among MBBS students in a private medical institution in Malaysia. Furthermore, we set out to determine the association between gender and exam stress level, gender and eating habits, ethnicity and exam stress level, and ethnicity and eating habits. Based on the initial literature review, our conceptual framework was that an increase in exam stress level could result in poor eating habits [1,3]. Our finding revealed the significant correlation that as exam stress level increases, the eating habits tend to become unhealthier, and the preference shifts towards junk food.

A gender difference in food selection patterns during stress may be the tendency of females in general to restrict their diet to ensure their weight is well maintained when not stressed as they are well in control of the situation. Our research portrays that female respondents have a higher tendency to consume an unhealthy diet while undergoing exam stress as compared to the male counterparts. In a study conducted by Zellner et al. (2006) it was reported that women who are stressed ate more unhealthy food in comparison to women who are not stressed while unstressed men on the other hand had significantly higher consumption of unhealthy food compared to healthy men [1]. A study found that although 80% of their female respondents reported that they typically consumed a healthy diet, only 34% of these women ate healthy food when they were stressed out. Moreover, a study carried out by Jasim Naeem Al- Asadi shows that students with high levels of stress have significantly unhealthy eating habits [3].

In this study, it was also found that females are more likely to have exam stress as compared to male medical students. This shows that female medical students in our study generally have higher levels of exam stress as compared to male medical students. Eating has been recognized to be an important variable to how individuals cope with stress and emotions. This happens when an individual either skips meals, eats in excessive amounts, or eats a significantly less amount as compared to what they would consume on a regular day. According to Wardle et al (2000) there are various kinds of psychological stress that can contribute to overeating or poor eating choices. This may be inclusive of stress at university, social stress as well as perceived stress which are all somewhat associated with increased consumption of a diet that is rich in unhealthy substances. In a cross-sectional analysis done with respondents which were students from Germany, Poland and Bulgaria none of the food consumption subscales of food frequency questionnaire were associated with perceived stress in male students whereas with female students there was an increase in consumption of unhealthy food as compared to a healthy diet which was associated with high levels of stress [1]. As observed in our study, female students participated in our survey were more likely to experience exam stress as compared to male students. Reflecting on the results obtained from our study, we also observed that female students are two times more likely to indulge in unhealthy eating habits as compared to male students that took part in our study in relation to exam stress. Stress is said to be the body's response to be able to maintain balance. Many previous research has studied that medical students as compared to students in other courses have significantly higher amounts of stress throughout their university lives. A study done in King Abdulaziz University in Jeddah, Saudi Arabia, revealed that numerous students eat more or prefer unhealthy meals when they experience negative emotions. Their stressful lifestyles as medical students may be a contributing factor towards negative emotions and these rates were supported by the eating habits which were exhibited in the study done. Previous studies also show that

behavioural effects of stress may influence the eating patterns where people live in stressful environments which consume more food as a method of coping stress [29].

Based on the assessment of the association between ethnicity of the medical students and their exam stress, the frequently encountered ethnic group was Indian which was paradoxical as the study was conducted in Malaysia where the most common race is Malay. Despite having more Indian students in our study, the highest exam stress levels were recorded among the Malays. However, the association between different ethnicities of the medical students and their exam stress levels were not significant. Our study reported similar findings as in the study by Hishan Sanil, in which it was said that there was no significant association between stress and ethnicity [30].

In the regression analysis, age was found to be significantly associated with the eating habits. Eating habits of medical students may change throughout medical school as it gets more challenging every passing year, as they lack time to cook a healthy meal. Thus, students in their senior years tend to order out and eat fast food more often compared to students who just enrolled in medical school. In addition to that, final year students have unpredictable work hours and heavy workload based on their posting which makes it almost impossible to have a fixed time for their meals every day.

There are some limitations in this study. In this study, the participation of the final year students was considerably less in comparison with the participation from the junior medical students. The reason for this may be due to the heavy workload the senior students were having compared to the junior medical students which could contribute to the self-selection bias. The dietary patterns responses were based on self-reported data which may have introduced information and recall bias. Moreover, the cross-sectional study design did not allow us to gauge any change in the exam stress levels and eating habits of medical students that might occur over a period.

Despite these limitations, the results are valuable in providing insights about perceived stress and eating habits among medical students in private medical institution in Malaysia.

CONCLUSION AND RECOMMENDATION

In conclusion, the findings revealed that there is a significant association between exam stress level and eating habits. As the exam stress levels increased, poorer eating habits was observed among the majority of the undergraduate medical students. Taking into consideration the fact that medical students are challenged with several exams time and again, it is important to build healthier eating habits with adequate nutrition independent of the exam stress level. It was also observed that female students are more likely to experience exam stress compared to their male counterparts. This cross-sectional study also helped us to identify that students age was significantly associated with the poorer eating habits. To have a healthy eating behaviour and prevent again stress-induced eating among undergraduate medical students, preventive strategies should integrate stress management and nutritional education programmes. Furthermore, education sessions should focus on senior students while paying attention to the female student population.

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APPENDIX

Appendix Table 1- Mean scores exam stress questions among the respondents (n =109)

Item	Mean	SD*
Q1- Do you tend to feel more uneasy and anxious during examination periods?	4.0	1.0
Q2- How often do you feel like you're lacking focus while studying?	3.7	0.9
Q3- How often do you feel confused about the topics you have to study?	3.3	0.8
Q4- How often are you aware that you could improve your academic score?	4.0	0.9
Q5- How often do you feel your workload is too overwhelming making it impossible to complete during the study break?	3.8	0.9
Q6- How often do you feel that you will not be able to satisfy the expectations of various people around you?	3.6	1.0
Q7- How often do you feel unqualified to be a medical student?	3.2	1.2
Q8- How often are you uncertain about your performance as a medical student?	3.4	1.0
Q9- How often do you find difficulties in obtaining the information necessary to carry outyour studies?	3.2	0.9
Q10- How often do you feel unaccepted by your peers?	2.6	1.1
Q11- How often do you feel judged by your peers due to your academic performance?	2.7	1.2

Q12- How often are you confused by what's expected of you by your lecturers during examinations?	3.3	1.0
Q13- How often do you think the academic workload correlates with your performance in exams?	3.5	1.0
Q14- How often do you feel your studies disrupts your family time?	3.3	1.1
Q15- How often do you overwork yourself during examination periods? (e.g.: study for excess hours)	3.9	1.1
Q16- Do you think exam stress can be a motivation for you to work harder?	3.4	1.0
Q17- How often do you feel like you're unprepared for a viva or examination that youwill be sitting for?	3.8	1.0
Q18- How often do you feel you do not have the confidence to pass the exams?	3.4	1.1

*SD: Standard deviation

Appendix Table 2- Mean scores of eating habits questionnaire amongrespondents (n= 109)

Items	Mean	SD*
Q1- How often do you eat fast food?	3.1	0.8
Q2- When making a choice on what to eat, how often do you turn to junk food?	3.0	0.8
Q3- I often find myself skipping a healthy dinner.	3.0	1.1
Q4- I often find myself skipping a healthy breakfast.	3.3	1.3
Q5- I often find myself skipping a healthy lunch.	2.8	1.2
Q6- I often binge when eating. (Eating in excess)	3.0	1.1
Q7- When eating, I'm more prone to foods higher in sweets (sugar) or sodium (salt) then average.	3.1	1.1
Q8- I find that when I start eating certain foods, I end up eating much more than planned.	3.1	1.2
Q9- I find myself continuing to consume certain foods even though I am no longer hungry.	3.0	1.2
Q10- I eat to the point where I feel physically ill or pain.	2.1	1.1
Q11- Not eating certain types of food or cutting down on certain types of food is something I worry about.	2.6	1.1
Q12- I spend a lot of time feeling sluggish or fatigued from overeating.	2.4	1.2
Q13- During situations of high stress, I often eat unhealthy foods (high in sugar/carbs, fat/oil, processed, etc.)	3.0	1.2
Q14- Eating helps me cope with stress.	2.9	1.3
Q15- I often fluctuate in weight.	3.0	1.3

*SD: Standard deviation