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Poor Eating Habits & Predictors of Weight Gain During COVID-19 Quarantine Measures Among the Students in MMMC: A Cross Sectional Study

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Abstract

On December 12th 2019, a new coronavirus (SARS-Cov2) emerged in Wuhan, China, sparking a pandemic of acute respiratory syndrome in humans (COVID-19). The COVID-19 has caused massive impacts on human health apart from contacting the virus it has led to detrimental sudden lifestyle changes through social distancing and isolation at home and also with social and economic consequences. This study mainly highlights the changes in the eating habits and predictors of weight gain during COVID-19 quarantine measures among the undergraduate students of MMMC Malaysia. It is known that the eating habits of 58.1% of the participants have become healthy and in terms of weight changes category 52.7% of total respondents have reported weight gain during COVID-19. Our objective is to determine the prevalence of poor eating habits, to identify the predictors of weight gain and there by to find out the association of poor eating habits and weight gain and lastly to find out the correlation of poor eating habits with anxiety level among the undergraduate medical students of MMMC Malayisa during COVID-19 quarantine measures. This is a cross sectional study which was conducted from June 2020 to July 2020 among the undergraduate students of MMMC Malaysia. Data was collected using online questionnaires in google forms designed in English. Statistical tests such as ANOVA and unpaired T-test were used for the analysis. Level of significance was set at <0.05. In this study it was found that there was a significant association between gender and weight changes before and during COVID-19 quarantine measures where a higher mean score of weight changes was obtained in males compared to that of females (95%CI -3.42 – O.84, p-value 0.001). Another significant association was found between the eating habits and weight changes during and after COVID -19 quarantine measures where a high mean score was obtained among the participants whose eating habits had become unhealthy have experienced weight changes which is either losing or gaining weight (p-value 0.008) compared to those with healthier and unchanged eating habits. Not only that but also a significant association was found between physical activity and weight changes before and during COVID-19 quarantine measures where a high mean score was obtained among participants who had less movement or activity compared to those with high and unchanged physical activity (p-value 0.003). Based on our study we have come to know that there are impacts of this global pandemic on the eating habits, physical activity and also on the mental health during COVID-19 quarantine measures among undergraduate medical students of MMMC Malaysia.

Keywords

Eating Habits, Weight Changes, COVID-19, Medical Students, Cross Sectional

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1. Introduction

COVID-19, a highly pathogenic virus that is causing a global pandemic with a high mortality and morbidity rate among the people in the world.[1] Person to person transmission of COVID- 19 infection has led to the isolation of patients and quarantine measures. [2, 22] Quarantine and isolation measures are implemented to reduce the transmission of infection and to control the current outbreak. However these measures can induce several conditions including poor eating habits, weight gain depression, anxiety, anger and stress. Quarantine forces people to stay at home leading to reduction of physical activity and outdoor movement. [3, 23, 24]

Poor eating habits is a common health issue that causes a large impact on physical and mental health. [4, 8] It includes under or over-consuming, not having daily need of healthy foods, or consuming too many types of unhealthy food and drink. [5, 10, 12] Stress related eating is significantly associated with obesity and weight gain. [3, 14, 21] During quarantine, people tend to eat more food of high content of salt, sugar and trans-fat which will exacerbate the situation. [3] According to the world population review 2019, Malaysia has the highest prevalence of obesity (15.6%)among adults in south–east Asia. [7] In the olden days, weight gain was thought to be caused by over eating or lack of exercises. Further studies were done to explain obesity and thus intervention was focused on calorie counting and education was given to the public to balance their food intake and output which is physical activity. [6, 8, 9, 11]

As we know that COVID-19 had also brought a huge impact on the eating and drinking habits among the people all around the world, this means that people are more cautious about what they eat and drink. People prefer to improve their health in order to boost their immunity level during this pandemic, therefore decreasing the risk of acquiring the disease. The study shows that many people had increased their fruit and protein intake, at the same time reducing their sugar requirement. [15] However, by means of lifestyle changes, most people tend to spend more time at home. A study showed that there's high percentage of people increased their food intake in response to smell and sight, may be due to stress or more snacks at late night. [13, 16] In a Kuwait study, significant predictors of weight gain during the quarantine including the diet pattern, anxiety, consuming snacks excessively, decreased physical activity, water and coffee intake. [17] The outbreak of COVID-19 has significantly caused confusion, lifestyle changes, including commuting restrictions, worried and scared of the disease, closure of schools and businesses surely brought about devastating psychological impacts especially anxiety. [18, 25] Anxiety level has been investigated among the people and its effect can be seen discriminately in their eating manner. As an example, a more anxious women comparing to the less anxious one, tend to consume Western-type diet which is 2 times greater variance of normal food intake. [10, 19]

Poor eating habits and predictors of weight gain during COVID-19 quarantine measures is an issue that we concern most globally nowadays as it has drastically reduced the quality of healthy lifestyle. [17] Due to the inability to cope with the unexpected situation it has caused detrimenteal physical and mental health effects. Nevertheless, the advent of COVID-19 has influenced more on mental health, which led to psychological impacts especially anxiety. [8-18] Based on our understanding, this studies has not been conducted in other universities in Malaysia. Thus, hopefully the result of this research would channel the information to raise the public awareness about the physical, mental consequences and the education on measures that can adapted by individuals to reduce the ill effects of this pandemic towards our health and facing them successfully.

The objectives of our study are to access the prevalence of poor eating behaviours, to identify the predictors of weight gain, to determine the association between poor eating habits and weight gain, and lastly to find out the correlation of poor eating habits with anxiety level among the undergraduate medical students of Melaka Manipal Medical College (MMMC), Muar and Melaka campus, Malaysia during the COVID-19 quarantine measures.

2. Research Methodology

2.1. Study Design, Time, Population, Setting

The study conducted was a cross-sectional study, which includes the undergraduate medical students of a private medical college, Melaka Manipal Medical College (MMMC), Muar and Melaka campus, Malaysia. Muar campus is located in Johor state, while Melaka campus is located in Melaka state. The study was carried out from June 2020 to July 2020. This private medical college offers Bachelor of Medicine and Bachelor of Surgery (MBBS) Semester 6 and 7 in Muar campus, Johor, while it offers MBBS Semester 8, 9, 10, Bachelor of Dentistry (BDS) and Foundation in Science (FIS) in Melaka campus, Melaka. In contrast to this, our study includes all the undergraduate MBBS semester 6 to 10, BDS year 3, 4 and 5 and two batches of FIS in both Muar and Melaka campus.

2.2. Sample Size

Based on a previous study done in Kuwait [17], 24.3% of the participants had became unhealthy in their eating habit during COVID-19 outbreak. The sample size (n) for our study was calculated using Epi Info application version 7.2.

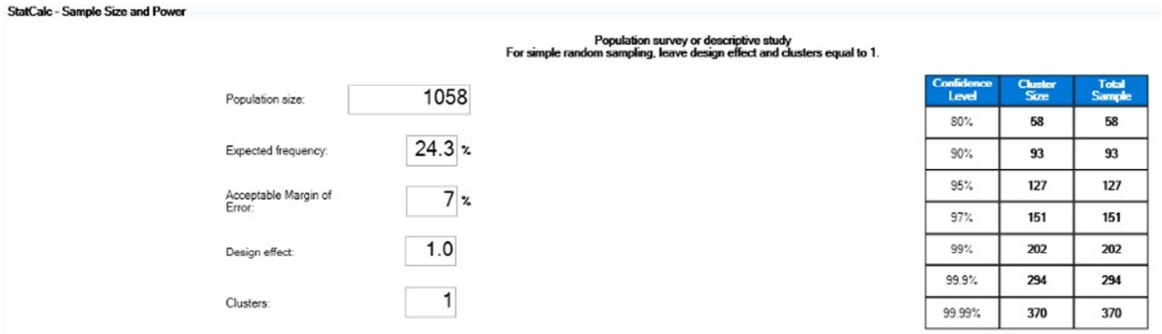

Figure 1. Sample size calculation.

The minimum sample size required in our study was 127

Upon further calculation of the sample size (n) using the formula application software Epi Info, we decided to allow non-response of 20% and the calculation is shown below:

$$\text{n (final)} = \frac{n(calculated)}{1-(non-response)} = \frac{127}{1-0.2} = 158.75$$

The final sample size after non-response rate obtained for this study was 159.

2.3. Sampling

The sampling method used was purposive sampling, which is a non-probability sampling method. The inclusion criteria included MBBS, BDS and FIS students from MMMC in Muar and Melaka campus, who had voluntarily agreed and completed the questionnaire given including the consent form. The exclusion criteria included those who failed to complete the questionnaire and those who did not give their consent since participation was voluntary.

2.4. Data Collection

The questionnaire comprised of 3 parts. The first part was demographic characteristics of participants, the second part included eating habits during COVID-19 and predictors of increased weight during the quarantine measures, followed by the third part which was General Anxiety Disorder-7 (GAD-7) assessment.

Independent variables of this study were age, gender, ethnicity, eating habits during COVID-19 quarantine measures, predictors of increased weight during COVID-19 quarantine measures and anxiety during COVID-19 quarantine measures. Dependent variables were height and weight changes before and during COVID-19 quarantine measures. The data collection method that we chose was questionnaire given to participants through Google form via Whatsapp.

In Part 1, the participants were asked about the sociodemographic information which included age, gender, ethnicity, nationality, batch, living status, number of family members and income level of family.

In Part 2, there were 24 questions to access the participants' eating habits and predictors of their increased weight during COVID-19 quarantine measures. Most of the questions in this part were in the form of multiple choices, for example, " Have your nutritional habits changed after COVID-19 quarantine measures" with choices of "yes, no or to an extent". The rest of the questions for this part were in the form of short answer text, for example, "What is your weight before and during COVID-19 quarantine measures", then the participants will have to answer the questions with short text only.

In Part 3, we used the official and ready-made questionnaire, General Anxiety Disorder-7 (GAD-7) assessment which is commonly used as a self -report anxiety questionnaire in the primary healthcare settings for the referral to any psychiatrist. [27] This was a seven items instrument that was used to access the severity of GAD. It was calculated by giving scores of 0, 1, 2, and 3 to the responses which included 0 for not at all, 1 for several days, 2 for more than half the days and 3 for nearly every day. According to the GAD-7, scoring less than 5 is classified as no or minimal anxiety, 5 to 9 as mild, 10 to 14 as moderate while scoring more than 15 as severe. The usage of GAD- 7 was due to its good reliability and validity of this questionnaire in this study.

2.5. Data Processing and Data Analysis

The data collected was compiled and processed using Microsoft Excel. Epi Info version 7.2 was used to statistically analyse the obtained data.

In our study, qualitative data such as gender, ethnicity, nationality, living status and questions about who is cooking at home were analysed and calculated as frequency and percentage. For quantitative data such as age, family income level and questions about number of snacks taken before and during COVID-19 were calculated and presented as mean (SD). The level of significance was set at p=0.05.

Following statistical test was used in our study:-

Table 1. Statistical tests used to find out the association between independent and dependent variables.

Independent variable	Dependent variable	Statistical test
Age	Weight changes before and during COVID-19 quarantine measures	ANOVA
Gender	Weight changes before and during COVID-19 quarantine measures	Unpaired T test
Ethnicity	Weight changes before and during COVID-19 quarantine measures	ANOVA
Eating habits during COVID-19 quarantine measures	Weight changes before and during COVID-19 quarantine measures	ANOVA
Sitting time during COVID-19 quarantine measures	Weight changes before and during COVID-19 quarantine measures	ANOVA
Sleeping duration during COVID-19 quarantine measures	Weight changes before and druing COVID-19 quarantine measures	Unpaired T test
Number of snacks during COVID-19 quarantine measures	Weight changes before and during COVID-19 quarantine measures	ANOVA
Daily movement / Physical activity	Weight changes before and during COVID-19 quarantine measures	ANOVA
Coffee intake	Weight changes before and during COVID-19 quarantine measures	ANOVA
Water intake	Weight changes before and during COVID-19 quarantine measures	Unpaired T test
Anxiety during COVID-19 quarantine measures	Weight changes before and during COVID-19 quarantine measures	ANOVA

2.6. Ethical Consideration

All participation were voluntarily done with an informed consent attached with important and relevant details of this study was forwarded to all participants. The data collected was only used for research purpose and any information given is strictly anonymous. The confidentiality was maintained during this research. The research was approved by the Research Ethics Committee, Faculty of Medicine, Melaka Manipal Medical College, Malaysia.

3. Results

Table 2. Sociodemographic profile of undergraduate MMMC students (n=148).

Variables	n (%)
Age	
17-19	24 (16.2)
20-22	65 (43.9)
23-25	57 (38.5)
Mean (SD)	21.8 (1.8)
Minimum-Maximum	17-25
Gender	
Male	44 (29.7)
Female	104 (70.3)
Ethnicity	
Malay	21 (14.2)
Chinese	46 (31.1)
Indian	56 (37.8)
Others	25 (16.9)
Program	
MBBS	99 (66.9)
BDS	24 (16.2)
FIS	25 (16.9)
Currently living with	
Parents / Guardian	138 (93.2)
Campus hostel / Staying alone outside campus	8 (5.4)
Friends outside campus	2 (1.35)
Number of family members	
1-3	16 (10.8)
4-6	121 (81.8)
7-9	11 (7.4)
Mean (SD)	4.75 (1.2)
Minimum-Maximum	1-8
Income level of family	
< RM4360	19 (12.8)
RM4360- RM9619	79 (53.4)
> RM9619	50 (33.8)

Table 2 shows a questionnaire consisting of 39 questions was distributed via google forms among the students of MMMC. A total of 169 responses were received by our side out of which only 148 responses were valid for analysis. Out of the valid responses the majority of the participants were in the age of 22-25 giving rise to a mean of 21.8 years of age in our sample size. Besides that most of our responses were noted to be from females (70.3%) leaving a total of 44 responses to be males (29.7%). In terms of ethnicity the highest response came from Indian community (37.8%) and the second highest was from Chinese community (31.1%) followed by the others (16.9%) and Malay community (14.2%) in our study. A large proportion of our participants were from the MBBS programme (66.9%) followed by FIS Programme (16.9%) and BDS programme (16.2%%). Most of the students were found to be living with parents or under a guardian (93.2%) while a very few students were found to be living in campus hostel or staying alone outside the campus (5.4%) and living with friends outside campus (1.35%). Out of the participants who live with parents, majority include 4-6 family members (81.8%) which gives a mean value of 4.75 (5) family members. When it comes to the income level of the family, most families have an income level ranging from RM 4360-RM 9619 (53.4%) while the least income level of families is below RM 4360 (12.8%).

Table 3. Eating habits of COVID-19 and predictors of increased weight.

Variables	n (%)
Who cooks for you at home	
Self	12 (8.1)
Family member	119 (80.4)
Cook/ helper	17 (11.5)
Have your nutritional habits changes after COVID-19	
Yes	61 (40.9)
No	52 (34.9)
To an extent	35 (23.6)
What happened to your eating habit during COVID-19 quarantine measures?	
Became healthier	86 (58.1)
Became unhealthy	28 (18.9)

Variables	n (%)
No changes	34 (23.0)
Are you now	
Eating more at night	25 (16.9)
Eating more at day, no changes	4 (2.7)
Eating more at day	41 (27.7)
Eating more at night, eating more at day	18 (12.2)
No changes	60 (40.5)
Daily movement / Physical activity	
Less	84 (56.8)
More	34 (23.0)
As it is	30 (20.3)
Sitting hours	
0 to less than 8	48 (32.4)
8 to 11	60 (40.5)
12 or more h/d	40 (27.0)
What time do you sleep?	
Before 12am	26 (17.6)
After 12am	122 (82.4)
Duration of sleep?	
Less than 8 hours	93 (62.8)
8 and more	55 (37.2)
Number of snacks?	
0	13 (8.8)
1	42 (28.4)
2	46 (31.1)
3	21 (14.2)
More than 3	26 (17.6)
Water intake?	
I drink enough water	119 (80.4)
I do not drink enough water	29 (19.6)
Coffee intake?	
No coffee	89 (60.1)
1-3 cups	53 (35.8)
More than 3 cups	6 (4.1)

Table 3 shows the eating habits during COVID-19 and the predictors of increased weight during the COVD-19 quarantine measures among the undergraduate students in MMMC. Out of the 148 participants, 80.4% of the participants stated that their family member cooks at home, while 11.5% have a cook or helper and 8.1% among them cook by themselves. As for the nutritional habit changes after COVID-19, 40.9% stated that there is a change in their nutritional habits, 34.9% of them did not have nutritional habit changes while 23.6% had changes to an extent. Among the participants, 58.1% became healthy in their eating habits, 23% had no changes while 18.9% became unhealthy. According to the results, 40.5% had no changes in eating more during the day or night, 27.7% of the participants had been eating more during the day, 16.9% had been eating more at night, 12.2% of them had been eating more at night and during the day while 2.7% had been eating more during the day and no changes at the same time. As for daily movement or physical activity, 56.8% had lesser, 235 had more while 20.3% stated that their daily movement or physical activity was as it is before the COVID-19 quarantine measures. Moving on to sitting hours, 40.5% had 8 to 11 hours of sitting time, 32.4% had 0 to less than 8 hours while 27% had sitting hours more than 12 hours a day. For sleeping time, 82.4% sleeps after 12 midnight while 17.6% sleeps before 12 midnight. Among them, 62.8% had less than 8 hours of sleep while 37.2% had more than 8 hours of sleep. The questions asked included the number of snacks consumed during the COVID-19 where 31.1% had 2 snacks per day, 28.4% had 1 snack, 17.6% had more than 3 snacks, 14.2% had 3 snacks while 8.8% had no snacks in a day. In terms of water intake, 80.4% stated that they drank enough water while 19.6% did not drink enough water whereas for coffee intake 60.1% of the participants had no coffee in a day, 35.8% had 1 to 3 cups while 4.1% had more than 3 cups of coffee in a day.

Table 4. Weight changes and Anxiety.

Variables	n (%)
Weight changes (During COVID19 – Before COVID19)	122 (82.4)
Mean (SD)	0.7 (3.8)
Minimum – Maximum	-10 - 20
Weight changes in category	
No changes	26 (17.6)
Weight loss	44 (29.7)
Weight gained	78 (52.7)
Anxiety (GAD-7 scale)	
No or minimal	80 (54.1)
Mild	44 (29.7)
Moderate	16 (10.8)
Severe	8 (5.4)
Mean (SD)	5.4 (4.7)
Minimum-Maximum	0-21

Table 4 shows the weight changes and anxiety level during COVID-19 quarantine measures. From the results given, There was a 122 (82.4%) out of total respondents have reported the significant weight changes (During COVID-19 – Before COVID -19) from a range of 10 to 20kg among the participants which gives rise to the mean value of 0.7 (3.8). In term of weight changes Category, total out of 78 (52.7%) of respondents have reported weight gained during COVID-19, followed by 44 (29.7%) were weight loss and the least were 26 (17.6%) with no weight changes. Furthermore, a higher proportions of our participants have not experienced any feeling of anxiety or minimal anxiety during COVID-19 which were 80 (54.1%), 44 (29.7%)Mild, 16 (10.8%) Moderate and followed by 8 (5.4%) Severe Anxiety level. Mean value of anxiety level during COVID-19 was 5.4 (4.7%)

in the range of 0-21.

Table 5. Association between gender, ethnicity, eating habits, sleeping and sitting time, number of snacks, daily movement or physical activity, coffee intake, water intake, anxiety during COVID-19 quarantine measures and the weight changes before and during COVID-19 quarantine measures.

Independent variables	Weight changes (during COVID-19 - before COVID19) Mean (SD)	Mean difference (95% CI)	P value
Gender			
Male	2.14 (4.75)	-2.13 (-3.42, -0.84)	0.001
Female	0.01 (2.84)		
Ethnicity			
Malay	-0.41 (3.90)	-	0.395
Chinese	0.60 (2.58)		
Indian	1.25 (4.48)		
Others	0.45 (3.11)		
Eating habits during COVID-19 quarantine measures			
Became healthier	-0.04 (3.92)	-	0.008
Became unhealthy	2.48 (3.33)		
No changes	0.92 (2.59)		
Sleeping duration during COVID-19 quarantine measures			
Less than 8 hours	0.83 (4.01)	0.46 (-0.82, 1.73)	0.482
8 or more	0.38 (2.97)		
Sitting time during COVID-19 quarantine measures			
0 to less than 8	1.85 (3.91)	-	0.026
8 to 11	-0.014 (3.92)		
12 or more h/d	0.23 (2.45)		
Daily movement/ Physical activity			
Less	1.61 (3.69)	-	0.003
More	-0.77 (3.40)		
As it is	-0.06 (3.19)		
Coffee intake			
No coffee	0.52 (3.66)	-	0.841
1-3 cups	0.87 (3.70)		
More than 3 cups	1.08 (3.58)		
Water intake			
I drink enough water	0.58 (3.72)	0.48 (-1.12, 2.08)	0.551
I do not drink enough water	1.06 (3.35)		
Anxiety during COVID-19 quarantine measures			
No or minimal	0.44 (3.31)	-	0.697
Mild	1.26 (4.25)		
Moderate	0.52 (2.90)		
Severe	0.22 (4.96)		

Table 5 shows the association between gender, ethnicity, eating habits, sleeping and sitting time, number of snacks, daily movement or physical activity, coffee intake, water intake, anxiety during COVID-19 quarantine measures towards the weight changes before and during COVID-19 quarantine measures. Males have a mean score of 2.14 (SD=4.75), which is higher than females which have a mean score of 0.01 (SD=2.84). The mean difference of these two are 2.13 with 95% CI ranging from -3.42 to 0.84. The calculated p value is 0.001 (less than 0.05), indicates that there is significant association between gender and the weight changes before and during COVID-19 quarantine measures. Malay have a mean score of -0.41 (SD=3.90), Chinese have a mean score of 0.60 (SD=2.58), Indian have a mean score of 1.25 (SD=4.48), and other races like Punjabi have a mean score of 0.45 (3.11). The calculated p value is 0.395 (more than 0.05), indicates that there is no significant association between ethnicity and the weight changes before and during COVID-19 quarantine measures. Participants whose their eating habits became healthier during COVID-19 have a mean score of -0.04 (SD=3.92), became unhealthy have a mean score of 2.48 (SD=3.33) and participants whose eating habits have no changes have a mean score of 0.92 (SD=2.59). The calculated p value is 0.008 (less than 0.05), indicates that there is significant association between eating habits and the weight changes before and during COVID-19 quarantine measures. Participants who slept less than 8 hours have a mean score of 0.83 (SD=4.01) and those who slept 8 or more hours have a mean score of 0.38 (SD=2.97). The mean difference of these two are 0.46 with 95% CI ranging from -0.82 to 1.73. The calculated p value is 0.482 (more than 0.05), indicates that there is no significant association between sleeping duration and the weight changes before and during COVID-19 quarantine measures. Participants who sits between 0 to less than 8 hours have a mean score of 1.85 (SD=3.91), between 8 to 11 hours have a mean score of -0.014 (SD=3.92), and those who sit 12 or more hours per day have a mean score of 0.23 (SD=2.45). The calculated p value is 0.026 (less than 0.05), indicates that there is significant association between sitting hours and weight changes before and during COVID-19

quarantine measures. Participants who have less daily movement and physical activity have a mean score of 1.61 (SD=3.69), more daily movement and physical activity have a mean score of -0.77 (SD=3.40), and those whose daily movement and physical activity are as it is have a mean score of -0.06 (SD=3.19). The calculated p value is 0.03 (less than 0.05), indicates that there is significant association between daily movement/physical activity and the weight changes before and during COVID-19 quarantine measures. Participants who do not drink coffee have a mean score of 0.52 (SD=3.66), drink 1-3 cups of coffee have a mean score of 0.87 (SD=3.70) and those who drink more than 3 cups of coffee have a mean score of 1.08 (SD=3.58). The calculated p value is 0.841 (more than 0.05), indicates that there is no significant association between the coffee intake and the weight changes before and during COVID-19 quarantine measures. Participants who drink enough water have a mean score of 0.58 (SD=3.72) and those who do not drink enough water have a mean score of 1.06 (SD=3.35). The mean difference of these two are 0.48 with 95% CI ranging from -1.12 to 2.08. The calculated p value is 0.551 (more than 0.05), indicates that there is no significant association between the water intake and the weight changes before and during COVID-19 quarantine measures. Participants who have no or minimal anxiey have a mean score of 0.44 (SD=3.31), mild anxiety have a mean score of 1.26 (SD=4.25), moderate anxiety have a mean score of 0.52 (SD=2.90) and those who have severe anxiety have a mean score of 0.22 (SD=4.96). The calculated p value is 0.697 (more than 0.05), indicates that there is no significant association between anxiety and weight changes before and during COVID-19 quarantine measures.

4. Discussion

The cross-sectional study was conducted to access the prevalence of poor eating behaviours, to identify the predictors of weight gain, to determine the association between poor eating habits and weight gain, and lastly to find out the correlation of poor eating habits with anxiety level among the undergraduate medical students of Melaka Manipal Medical College (MMMC), Muar and Melaka campus, Malaysia during the COVID-19 quarantine measures. Through this study, we found that there was a mean of 2.48 among the participants whose eating habits became unhealthy. There are 86 (58.1%) participants whose eating habits became healthier during COVID-19 quarantine measures, while 28 (18.9%) participants had an unhealthy eating habits and the rest 34 (23%) participants did not change their eating habits. In the previous study done among the Kuwait residents during this COVID-19 pandemic showed high prevalence of unhealthy eating habit which had contributed to their weight gain among the Kuwaits. In their study, there was 24.3% of participants whose eating habits became unhealthy during this pandemic. [17] In a web-survey cross-sectional study conducted on 24th April 2020 among the Italian population which ranges from 12 to 86 years had shown 35.8% of their study population declared to consume less healthy food. They also detected the positive perception of weight gain and its inversely related to increase of junk food consumption. [23] In another study done by a college in USA, it stated that roughly 59% had eaten more often with friends and family during self-quarantine. [16]

Based on our results, the mean score for weight changes during the COVID-19 quarantine measures is 0.7. There are 78 (52.7%) participants who had weight gain during the COVID-19 quarantine measures while 44 (29.7%) participants had weight loss during the same, whereas 26 (17.6%) participants had no changes in their weight during the quarantine. In a cross-sectional study conducted by Zeigler Zachary et al via Facebook to 1200 participants in USA, it stated that 22% of the sample experienced weight gain of 5 to 10 pounds in response to various types of stimuli. [16] A cross-sectional study conducted in Shenzhen, China showed that 32% of the patients admitted to the hospital are overweight during COVID-19 pandemic. According to the study also stated that those overweight patients had 1.84 folds of having severe COVID-19 symptoms comparing to the normal weight patients. [28] Interestingly, a study that was done by Andrew G. Rundle et al in USA regarding the risk of weight gain during COVID-19 related school closing, the study showed that the pandemic exacerbates the risk factors for weight gain during the school recess. The study also showed that there is higher weight in adulthood associated with the experience of obesity can be seen. [29] Based on a news by Carolyn Crist from Coronavirus Research Centre among the WebMD readers, it was said that about 47% of women gained weight due to the lockdown while around 22% of men said they gained weight as a result of movement restriction at home. [30]

We found out that there was a significant association between gender and weight changes before and during COVID-19 quarantine measures. Based on our study, male had a mean score of 2.14 for the weight changes while female only had mean score of 0.01 for the weight changes. This indicates that comparing to female, male have more significant weight changes before and during COVID-19 quarantine measures. In the other hand, there was also significant association between the eating habits during COVID-19 quarantine measures and the weight changes before and during COVID-19 quarantine measures. In our study, a mean score of 2.48 seen among the participants whose eating habits became unhealthy had experienced weight changes, either losing or

gaining weight. Only a mean score of -0.04 among the participants whose eating habits became healthier had experienced weight changes, while 0.92 mean score among the participants whose eating habits remain unchanged had experienced weight changes. There was also a significant association between the daily movement or physical activity and the weight changes before and during COVID-19 quarantine measures. From our study, a mean score of 1.61 is seen among the participants who had less movement or activity while mean score of -0.77 is seen among the participants who had more movement or activity. For the participants whose daily movement or physical activity are as it is, the mean score is -0.06. Interesting part in the web-survey conducted by Laura Di Renzo et al among the Italian population, their study showed that even in lockdown period, the frequency of sports and training had increased to an extent. Participants who previously exercised only once in a while have turning into more frequent exercising at home. The results showed an increase from 6 to 16% seen in those who trained for five or more days in a week. Also, around 38.3% of the respondents increased their physical activity by means of body weight training. [23]

This study showed that there was no significant association between ethnicity, sleeping duration, coffee, water intake, anxiety during COVID-19 quarantine measures and weight changes before and during COVID-19 quarantine measures. In the previous Kuwait study, 63.8% of the participants had stated that they only felt anxious sometimes during COVID-19 quarantine measures. [17]

Unfortunately, we faced few limitations during our study. Since our study is a cross-sectional study, we could only obtain the data of participants' weight by google form, instead of getting the proper weight using a standardized scale. Thus, its reliability is reduced. Since our questionnaire is self-reported, thus it may lead to the actual misreporting of the data. Lastly, our study was only conducted among the undergraduate students in Muar and Melaka campus, Malaysia, which excludes the pre-clinical students in India campus, therefore, our study is not representative of the whole population in MMMC.

In order to stay healthy during COVID-19 quarantine measures, we strongly advise the participants to follow the World Health Organization (WHO) recommendations which says that adults ranging from 18 to 64 years should do at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity or equivalent combination of moderate and vigorous-intensity physical activity per week. Participants are also recommended to consume more fruits and vegetables, decrease sugar intake, increase protein consumption, reduce trans-fat containing food like snacks and have a healthy well-balanced diet. Accordingly, future researchers should consider a prospective study design and usage of a proper way to measure the participants' weight in their study.

5. Conclusion

Regarding to the current situations of COVID-19 pandemic, it is highly significant bring both deleterious and potentially favorable effect of a global disaster especially the changes of community lifestyle as well as mental health. Nowadays, with so many people falling ill from the COVID-19 pandemic, unhealthy diets and weight gained are contributing to pre-existing conditions that put us more at risk. In this study, we have provided the data on how the COVID-19 lockdown affect the eating habits and predictors of weight gained. Our study showed 28 participants (18.9%) with a mean score of 2.48 had unhealthy eating habits which leads to weight changes before and during COVID-19 quarantine measures. As we expected, the perception of weight gained was observed as high as 52.7%, whereas, the daily physical activity was reduced which has been reported 56.8% in our majority respondents. Without any doubts, there was a significant association between the daily physical and the weight changes before and during COVID-19 quarantine measures.

COVID-19 puts diet at risk through disrupted health and nutrition services, job and income losses, disruption in local food supply chains, and as a direct result of infectious among poor and vulnerable people. Thus, hopefully by this study, it would raise the public awareness about the physical, mental consequences and education on measures that can adapted by individuals to reduce the ill effects of this pandemic towards health.

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Appendix

Poor eating habits & predictors of weight gain during COVID-19 quarantine measures among the students in MMMC: A Cross Sectional Study

Principal Investigator's names:

Kang Yi An, Wong Ke Ying Patricia, Lenni Sari, Thiruni Sathsarini Gunasekara

MBBS students, Batch 41, Melaka Manipal Medical College

This is a questionnaire to determine the burden of poor eating habits particularly binge eating habits, fluctuations in weight and height and its predictors during the movement control order (MCO) among the students in MMMC. Data will be collected by using the google form survey and this will take around 5-10 minutes. We intend to know the status of weight gain before and during pandemic in our participants, and also the predictors of weight gain during COVID-19. The information collected will be used only for research purpose, any information you provide is anonymous.

Consent

I agree to participate in this research conducted by Kang Yi An and his team. I understand that the proposed research has been reviewed and approved by our institution. I further understand that my participation is voluntary and I am free to withdraw at any time, without giving any reason.

Signature: -blank-

Date: -blank-

Thank you so much for your participation

Part 1: Sociodemographic information

Age (years)

-blank-

Gender

a) Male

b) Female

Ethnicity

a) Malay

b) Chinese

c) Indian

d) Others _____

Nationality

a) Malaysian

b) International students

Batch

a) MBBS 37

b) MBBS 38

c) MBBS 39

d) MBBS 40

e) MBBS 41

f) BDS 7

g) BDS 8

h) BDS 9

i) FIS 19

j) FIS 20

Currently living with

a) Parents/ Guardian

b) Campus hostel/ Staying alone outside campus

c) Friends outside campus

Number of family members

-blank-

Income level of family

a) <RM4,360 (approx. <190,470 LKR)

b) >RM4,360-RM9,619 (approx. >19,470 LKR- 420,222 LKR)

c) >RM9619 (approx. >420,222 LKR)

Part 2: Eating habits during COVID-19 and Predictors of increased weight

Who cooks for you at home?

a) Self

b) Family member

c) Cook/helper

Have your nutritional habits changes after COVID-19?

a) Yes

b) No

c) To an extent

What happened to your eating habit?

a) became healthier

b) became unhealthy

c) NO change

Are you now:

a) eating more at night

b) eating more at day

c) no change

Daily movement/Physical activity

a) Less

b) More

c) As it is

How many hours you are sitting during COVID-19 time?

-blank-

Before COVID-19: at what time do you sleep?

-blank-

Before COVID-19: at what time do you wake up?

-blank-

During COVID-19: what time do you sleep?

-blank-

During COVID-19: what time do you wake up?

-blank-

Before COVID-19: Your main meals were: (choose all apply)

a) Breakfast

b) Lunch

c) Dinner

Before COVID-19: Number of Snacks you have was:

a) 0

b) 1

c) 2

d) 3

e) More than 3

Before COVID-19: Type of Snacks were (choose all apply)

a) Desserts

b) Chips

c) Chocolate

d) Ice creams

e) Others:_____

Before COVID-19: Water

a) I do not drink enough water

b) I drink enough water

Before COVID-19: Coffee

a) No Coffee

b) 1-3 cups

c) more than 3 cups

During COVID-19: Your main meals were: (choose all apply)

a) Breakfast

b) Lunch

c) Dinner

During COVID-19: Number of Snacks you have was:

a) 0

b) 1

c) 2

d) 3

e) More than 3

During COVID-19: Type of Snacks were (choose all apply)

a) Desserts

b) Chips

c) Chocolate

d) Ice creams

e) Others:_____

During COVID-19: Water

a) I do not drink enough

b) I drink enough

During COVID-19: Coffee

a) None

b) 1-3 Cups

c) More than 3

What was your weight (kg) before COVID-19?

-blank-

What is your height in meters (m)?

-blank-

What is your weight (kg) during COVID-19?

-blank-

What do expect will happen to your weight after COVID-19?

a) Stabilise

b) Decrease

c) Increase

Part 3: Generalized Anxiety Disorder scale

Over the last 2 weeks, how often have you been bothered by the following problems?

Feeling nervous, anxious or on edge

a) Not at all

b) Several days

c) More than half the days

d) Nearly every day

Not being able to stop or control worrying

a) Not at all

b) Several days

c) More than half the days

d) Nearly every day

Worrying too much about different things

a) Not at all

b) Several days

c) More than half the days

d) Nearly every day

Trouble relaxing

a) Not at all

b) Several days

c) More than half the days

d) Nearly every day

Being so restless that it is hard to sit still

a) Not at all

b) Several days

c) More than half the days

d) Nearly every day

Becoming easily annoyed or irritable

a) Not at all

b) Several days

c) More than half the days

d) Nearly every day

Feeling afraid as if something awful might happen

a) Not at all

b) Several days

c) More than half the days

d) Nearly every day

Thank you so much for your participation

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