ORIGINAL ARTICLE

Changes in the pattern of eating habit and physical activity during the pandemic of COVID-19 in Malaysia: data from COMET-G international multi-country study

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ABSTRACT

Lockdown during the COVID-19 pandemic had led to lifestyle changes among Malaysians. These changes were due to people being confined to work and study at home and stress due to the risk of COVID-19 transmission. Our study aimed to observe changes in the patterns of eating habits and physical activity during the pandemic of COVID-19 in Malaysia and look for the associations with sociodemographic factors, people living together, living conditions and mental health status. This study was an online cross-sectional survey among 963 participants who completed self-administrated questionnaires on socio-demography, Likert scales on eating habits and physical activity and the Center for Epidemiologic Studies Depression Scale for mental health status. The data were analyzed using descriptive statistics, one-way ANOVA, Pearson correlations and independent t tests. Marital status has a significant association with the frequency and intensity of physical workouts during this pandemic and lockdown, changes in eating amount, and changes in body weight ($p<0.001$). Employment had a significant association with all components of eating habits and physical activities except the level of physical activity affected by the pandemic ($p<0.001$). Those with normal mental health status found exercise to be helpful in preventing anxiety, practicing healthy eating, and having more changes in body weight, compared to those who were depressed ($p<0.001$). There was a significant difference in how the vulnerable group practiced healthy eating compared to the non-vulnerable group ($p<0.001$). The vulnerable group had significant changes in eating amount and body weight ($p<0.001$). In conclusion, the COVID-19 pandemic has brought changes in eating habits and body weight which were also influenced by sociodemographic factors and mental health status.

Key words:
COVID-19; eating; exercise; physical activities; weight; mental health; pandemic; diet

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INTRODUCTION

The spread of COVID-19, which after that led to the pandemic, has hugely impacted the economy, political crisis, and public health worldwide. [1] The vital measurement taken during the critical stage of the COVID-19 pandemic was lockdown, which led to the isolation of billions of people worldwide. After that, people were confounded to stay home and work from home. [2]

The active transmission of information about COVID-19 and its risks during the pandemic has undeniably caused a certain stress level among people. [3] Hence, various COVID-19-related lifestyle changes, such as reduction of physical activity [4] and increased emotional eating [5,6] were adopted to relieve the stress as well as the result of stress.

During the lockdown, there were positive and negative changes in people's eating habits worldwide. [7] The pandemic caused changes to people's mood and mental health, which influenced their food intake and choices to achieve better health or cope with stress and other emotional disorders such as depression and anxiety. [8] Studies done during the lockdown period looked at the type of food taken, frequency and amount, snacking habits and sweets intake, the pattern of alcohol consumption, adherence to a healthy diet and weight changes. [9,10] People chose to take healthier fresh produce, home-cooked food, or unhealthier processed or fast food. Different eating habits were found to be associated with the level of education, health concerns, weight control, level of stress and emotional regulation. [11]

Globally, physical activities decreased in the pattern during the COVID-19 pandemic due to home confinement.[12] This pattern continued during the Movement Control Order (MCO), an official term for lockdown in Malaysia. [13] All forms of physical activities, including vigorous intensity, moderate intensity, or walking, were less compared to the period before the lockdown. It was within the range of 22.7% to 35%, and daily sitting time increased from 5 to 8 hours per day through an international online survey.[14]

Our study aimed to observe the different patterns of eating habits and physical activity during the pandemic of COVID-19 in Malaysia and look for the associations with sociodemographic factors, people living together, living conditions and mental health status.

METHODS

Study design

This study is a cross-sectional survey that gathered data conveniently via online self-administrated questionnaires. It is a part of the COVID-19 mental health international for the general population (COMET-G) study, a global joint project of 40 countries worldwide initiated by the Aristotle University of Thessaloniki and the Mental Health Sector of the Scientific Research Institute of the Pan-Hellenic Medical Association, Greece. We analysed local data to describe the changes in the pattern of eating habits and physical activity during the pandemic of COVID-19 in Malaysia.

Data collection

In Malaysia, the survey was disseminated to the public using Google Forms through social media, like Facebook and Twitter. The selection criteria were participants aged 18 years and above, able to read Malay or English, and have access to the internet to receive the online form. All potential participants were provided with an explanation of the study's risks and benefits on the online questionnaire's introductory page. Participants who agreed to participate were invited to answer the questionnaires. Implied consent was gathered when the participant proceeded to the next page, where the actual survey began. The local institutional research

ethics committee approved this study; REC/06/2020 (MR/109).

Measurement tools

The entire protocol of COMET-G can be found elsewhere.[15] In this study, we analysed local data on sociodemographic data (including age, marital status, educational status, employment and residential area); the number of people and children living together and the health status of the participants and family (the presence of vulnerable people living together, chronic medical disease, perceived health condition, mental health status). Vulnerable people are defined as elderly or children, or disabled individuals.

For mental health status, the presence of distress and depression were assessed with the Center for Epidemiologic Studies Depression Scale (CES-D) [16]. The English version of the survey was prepared by the lead collaborating centre. In contrast, the Malay Version was prepared after translation and discussion between local researchers regarding the Malay Version of the questionnaires.[17] This study followed the categorisation of depression by the main COMET study in which the participants were considered as having major depression when they fulfilled both criteria; the total CES-D score was above the cut-off score of 23/24, and the algorithm score was above 9.03.[15] Other participants were considered to have no depression; either normal or had distress/dysphoria (in case only one criterion was fulfilled).

Participants were asked about the patterns of eating habits and physical activity during the lockdown. Using the Likert scores, the participants were asked about the level of exercise helping them to prevent anxiety (score: 0 to 4); the importance of exercise during the pandemic (score: 0 to 4); frequency and intensity of physical workouts during this pandemic and lockdown (score: 0 to 4); level of physical activity affected by the pandemic (score: -2 to 2); changes in eating amount (score: -2 to 2); practising healthy eating (score: -1 to 1) and changes in body weight (score: -2 to 2) .

Statistical analyses

There are three main hypotheses in this study; i) HO1. There are no significant differences between sociodemographic background (age, marital status, educational status, employment and residential area) and patterns of eating habits and physical activity; ii) HO2. There are no significant correlations between the number of people and children living together, and patterns of eating habits and physical activity; and iii) HO3. There are no significant differences between health statuses (the presence of vulnerable people living together, chronic medical disease, perceived health condition, mental health status) and eating habits and physical activity patterns.

Descriptive statistics were calculated and presented as frequency, percentages and mean. One-way ANOVA (F) was used to determine the differences in the patterns of eating habits and physical activity in relation to sociodemographic variables. The Pearson correlations (r) were used to analyse the correlations between the pattern of eating habits and physical activity and the number of people, children, and perceived health conditions. Lastly, independent t-tests were used to determine the differences between the pattern of eating habits and physical activity in relation to the status of living together with vulnerable people and the presence of chronic medical diseases. Statistical analyses were performed by using IBM SPSS version 26.

RESULTS

Table 1. Background Sociodemography of the Participants, People Living Together and Health Status of the Family

Sociodemographic background		**Frequency (n=963)**	**Percentage (%)**
Age (years old)	≤ 21	27	2.8
	22-45	662	68.8
	46-65	239	24.8
	≥ 66	35	3.6
Marital Status	Single	232	24.1
	Married	618	64.2
	Cohabitant	48	5.0
	Divorced	51	5.3
	Widower	12	1.2
	Other	2	0.2
Educational Level	Primary/Elementary	35	3.6
	High School	176	18.3
	Bachelor's Degree	446	46.3
	Master's Degree	247	25.7
	Doctorate or PhD	59	6.1
Employment	Civil servant	357	37.1
	Private	192	20.0
	Self-employed	127	13.2
	Students	129	13.4
	Housekeeper	34	3.5
	Retired	64	6.6
	Networking by choice	9	0.9
	Unemployed	16	1.7
	Others	35	3.6
Residential area	City	517	53.7
	Town	265	27.5
	Village	156	16.2
	Others	25	2.6
People living together			
No of Children	0	298	30.9
	1	128	13.3
	2	239	24.8
	3	147	15.3
	4	151	15.7
No of people living together	1	47	4.9
	2	140	14.5
	3	265	27.5
	4	231	24.0
	5	280	29.1
Living with vulnerable people	No	652	67.7
	Yes	311	32.3

Sociodemographic background		Frequency (n=963)	Percentage (%)
Health conditions			
Chronic Disease	No	783	81.3
	Yes	180	18.7
Perceived Health Status score	0	14	1.0
	1	121	13.0
	2	530	55.0
	3	94	9.8
	4	204	21.2
Current Mental Health	Normal	516	54.0
	Distress	125	13.0
	Depression	322	33.0

Table 1 shows the sociodemographic background of participants, people living together, and the health status of the family. There was a total of 963 participants, 662 participants (68%) of them were aged 22 to 45, while 239 participants (24.8%) were from the 46-65 age group. Of most participants, 618 (64.3%) were married, followed by 232 (24.1%) being single. Almost half of the participants, 446 (46.3%), had bachelor's degrees, a third of them were civil servants, 357 (37.1%), and half of them stayed in the city 517 (53.7%). Regarding people living together, about 298 (30.91%) participants have no children, followed by 239 (24.8%) participants having two children. Many of the participants, 652 (67.7%), were not living with vulnerable people. Of most participants, 783 (81.3%) have no chronic disease, and more than half of the participants, 530 (55%), perceived their health was at a moderate level. However, more than a third of the participants, 322 (33.4%), had depressive symptoms.

Table 2. Eating Habit and Physical Activity in relation to Background Sociodemography of the Participants during the lockdown due to the COVID-19 pandemic

Eating Habit and Physical Activity	Sociodemographic Background of the Participants									
	Age		Marital Status		Educational Status		Employment		Residential Area	
	F	P	F	P	F	P	F	P	F	P
Level of exercise helps preventing anxiety	0.730	0.534	1.347	0.251	0.647	0.629	3.670	<0.001	4.247	0.015
Importance of exercise during pandemic	2.232	0.083	1.672	0.154	6.335	<0.001	5.814	<0.001	2.635	0.072
Frequency and intensity of physical workout during this pandemic and lockdown	0.619	0.603	4.568	0.001	0.908	0.459	2.576	0.009	5.420	0.005
Level of physical activity affected by the pandemic	0.264	0.851	0.913	0.456	1.172	0.322	1.476	0.162	0.969	0.380
Changes in eating amount	1.116	0.342	3.619	0.006	1.810	0.125	4.132	<0.001	1.961	0.141
Practising healthy eating	2.268	0.079	1.775	0.132	2.321	0.055	2.482	0.011	5.675	0.004

Eating Habit and Physical Activity	Sociodemographic Background of the Participants									
	Age		Marital Status		Educational Status		Employment		Residential Area	
	F	P	F	P	F	P	F	P	F	P
Changes in body weight	7.124	<0.001	3.868	0.004	1.368	0.243	7.285	<0.001	1.602	0.202

Notes: F= One-way ANOVA test; P= P-value taken with two tails significant value of P<0.05

Table 2 shows associations between eating habits, physical activity, and the sociodemographic backgrounds of the participants. Age was found to have a significant association with changes in body weight. In contrast, marital status was significantly associated with the frequency and intensity of physical workouts during this pandemic and lockdown, changes in eating amount, and changes in body weight. Education status was significantly associated with the importance of exercise during the pandemic. Employment was found to have a significant association with all components of eating habits and physical activities except the level of physical activity affected by the pandemic. Finally, the residential area was found to have a significant association with the level of exercise that helps prevent anxiety, the frequency and intensity of physical workouts during this pandemic and lockdown and practising healthy eating.

Table 3. Eating Habit and Physical Activity in relation to Number of People or Children Living Together during the lockdown due to the COVID-19 pandemic

Eating Habit and Physical Activity	Number of People		Number of Children	
	r	p	r	p
Level of exercise helps preventing anxiety	0.123	<0.001	-0.009	0.788
Importance of exercise during pandemic	0.160	<0.001	-0.067	0.037
Frequency and intensity of physical workout during this pandemic and lockdown	0.020	0.538	-0.005	0.879
Level of physical activity affected by the pandemic	-0.012	0.703	0.015	0.634
Changes in eating amount	0.048	0.139	0.021	0.511
Practising healthy eating	-0.062	0.054	-0.016	0.625
Changes in body weight	0.149	<0.001	-0.025	0.445

Notes: r= Pearson Correlation Test; P= P-value taken with two tails significant value of P<0.05

Table 3 showed a significant correlation between the number of people living together during lockdown with the level of exercise helping in preventing anxiety, the importance of exercising during the pandemic and changes in body weight. The number of children in the same house correlated significantly with the importance of exercise during the pandemic.

Table 4. Eating Habit and Physical Activity in relation to Mental Health Status

Eating habits and Physical Activity during the lockdown due to the COVID-19 pandemic	Mental Health Status			df	F	P
	Normal (Mean ± SD)	Distress (Mean ± SD)	Depression (Mean ± SD)			
Level of exercise helps preventing anxiety	2.23±1.24	1.81±1.13	1.63±0.98	2	28.940	<0.001
Importance of exercise during pandemic	2.60±1.21	2.00±1.20	1.85±0.96	2	47.407	<0.001
Frequency and intensity of physical workout during this pandemic and lockdown	1.77±1.35	1.61±1.15	1.66±0.97	2	1.378	0.252
Level of physical activity affected by the pandemic	-0.10±0.80	-0.11±0.53	-0.05±0.37	2	0.698	0.498
Changes in eating amount	-0.57±0.79	-0.52±0.75	-0.63±0.66	2	1.115	0.328
Practising healthy eating	0.33±0.67	0.08±0.62	-0.00±0.47	2	32.894	<0.001
Changes in body weight	-0.11±1.19	-0.34±1.13	-0.63±0.92	2	21.648	<0.001

Notes: SD=Standard Deviation; df=degree of freedom; F= One-way ANOVA test; P= P-value taken with two tails significant value of P<0.05

There was a significant difference in mental health status among normal mental health status regarding exercise. Those with normal mental health status found exercise to help prevent anxiety, practised healthy eating, and showed more changes in body weight compared to those who were depressed. Those with depression, as measured by CESD, paid less importance to exercise during the pandemic.

Table 5. Eating Habit and Physical Activity in relation to Health Status of the Participants and Family during the lockdown due to the COVID-19 pandemic

Eating Habit and Physical Activity	Health Status of the Participants and Family					
	Living with Vulnerable people		Having Chronic Disease		Perceived Health Condition	
	t	P	t	P	r	P
Level of exercise helps preventing anxiety	0.406	0.685	1.007	0.314	0.130	<0.001
Importance of exercise during pandemic	-2.661	0.008	1.238	0.216	0.155	<0.001
Frequency and intensity of physical workout during this pandemic and lockdown	1.948	0.052	-0.172	0.864	0.018	0.576
Level of physical activity affected by the pandemic	2.103	0.036	0.236	0.814	0.022	0.497
Changes in eating amount	-2.530	0.012	-0.875	0.382	0.167	<0.001
Practising health eating	3.468	0.001	0.750	0.454	0.139	<0.001
Changes in body weight	-4.362	<0.001	0.669	0.504	0.148	<0.001

Notes: r= Pearson Correlation Test; t= Independent T Test; P= P-value taken with two tails significant value of P<0.05

There was a significant difference in participants living with the vulnerable group compared to those not living with the vulnerable group in terms of giving importance to exercise during the pandemic and the level of physical activity affected during the pandemic. There was a significant difference in how participants living with the vulnerable group practised healthy eating compared to those not living vulnerable group. Moreover, they had significant changes in eating amount and body weight. No significant difference was found between participants with or without chronic diseases in terms of their eating habits and physical health status. Furthermore, there were significant differences for those who perceived better health conditions in terms of exercise, reducing their anxiety, giving importance to exercise during the pandemic, had significant changes in eating amount, practising healthy eating and significant changes in body weight.

DISCUSSION

Our study observed different eating habits and physical activity patterns during the COVID-19 pandemic in Malaysia. The main findings from the present study in terms of eating habits were: (i) there was a significant association between changes in body weight with age, marital status, employment, number of people living together, normal mental health status and living with vulnerable people; (ii) there was a significant association between changes in eating amount with marital status, employment and living with vulnerable people; and (iii) there was a significant association between practising healthy eating with employment, residential area, normal mental health status and living with vulnerable people.

There were changes in body weight and eating amount in our study population, like in other studies during the COVID-19 pandemic. [14,18–20] Our study showed that changes in body weight and eating habits were significantly associated with age. A study by Di Renzo et al. found that younger people took more night snacks and declared increased appetite.[10] However, a systematic review reported that age was not correlated with specific eating behaviours.[11] We also found that changes in body weight and eating habits were significantly associated with employment. Other studies found that changed work habits (suspension or smart working), in comparison to unchanged ones, were associated with changes in appetite either negatively or positively[10]. In contrast, another study found that people who work at home consumed more self-made food than processed food.[21]

Our study population was mainly younger, had access to an online survey, was mostly educated, stayed in cities or towns and was healthy with no chronic illness. Therefore, these people's food choices were either home-cooked meals or outside food through takeaways and food deliveries which were still operating during the lockdown period as essential services. Having outside foods may contribute to changes in body weight and eating amount to be either increased or decreased, as our study did not determine the changes. Another limitation was that our study did not explore more details, such as the type of foods taken, meal numbers, and timing of eating and snacking.

Our study also found that despite having normal mental health status, there were still significant changes in body weight. Previous studies showed that increased stress and anxiety during lockdown would influence dietary habits, increase the amount of unhealthy food like sweets, increase snacking and eventually increase body weight. [14,22-23] Changes in body weight despite normal mental health could be due to an increasingly sedentary lifestyle, reduced physical activities, and increased access to food at home during the lockdown.

We also found that participants living with vulnerable people like children and the elderly were associated with practising healthy eating. Other studies showed healthy eating could be in the form of increased fruit and vegetable intake, [24-25] reduced comfort foods intake [26], and home-cooked meals. [10] This finding may be due to promoting healthy eating to improve immunity against COVID-19 infection, especially among vulnerable groups like the elderly, children, and disabled individuals.

The main findings from the present study in terms of physical activities and exercises were: (i) there were significant differences in employment status with regard to the level of exercise that helps in preventing anxiety, the importance of exercise during the pandemic and the frequency and intensity of physical workouts during the pandemic and lockdown; (ii) there were significant differences in residential areas with a level of exercise that helps in preventing anxiety and the frequency and intensity of physical workouts during the pandemic and lockdown; (iii) there were significant differences in educational status in terms of perceiving the importance of exercise during a pandemic; and (iv) there were significant differences in marital status with the frequency and intensity of physical workouts during the pandemic and lockdown.

In a systematic review, physical activities were seen to be decreased among healthy adults, children, and adolescents across all reviewed populations. The same pattern was also observed among adults and children with medical conditions. On the other spectrum, sedentary behaviours increased during the Covid-19 lockdown.[27]

Regarding the differences observed in the present study, it is essential to note the pre-lockdown physical activity levels of the individual. It was found that individuals who were more active before the lockdown were more likely to show more significant decreases in their physical activity levels.[28-29] This may explain the disparity in terms of the investigated variables.

Besides that, it could also be due to the lack of accessibility to outdoor physical activities, gymnasiums, and other physical training centres during the lockdown. Lacking accessibility indirectly causes a barrier for people to engage in physical activities and exercises. Having poor motivation for fitness exercise, especially during the initial phase of lockdown due to engagement on social media, could explain our findings. [2] A study by Eng Yao et al. among Malaysians, found "lack of energy", "lack of willpower" and "lack of resource" were the most common perceived barriers to physical activities .[30]

The significant differences in the residential area, education, employment and marital status may have been attributed to the changes and the frequency and intensity of the physical workouts. Mitra et.al. further elaborated on the importance of neighbourhoods, particularly during the COVID-19 pandemic.[31] Outdoor spaces where use is allowed enable children and adolescents to engage in physical activity more. On the other hand, limited access to these built environments could decline outdoor activities. This can also be applied conceptually to adults in terms of neighbourhood environment, echoed in a study by Ali et al. [32] Children staying in houses compared to apartments was correlated with increased outdoor activities. [31]

However, the home workout was gradually observed across the lockdown period because of overcoming the dependence on gym and fitness equipment as the pandemic prolonged. [2] In line with this, according to Chin et al. there is a portion of people who reported losing weight during the lockdown and 41% of

them reported to perform more physical activities.[13]

In our present study, there were significant differences between mental health status (normal, distress and depression) with the level of exercise helping to prevent anxiety and the importance of exercise during the pandemic. Similarly, Puccinelli et al. found that men without any mood disorders were noted to be very active. At the same time, those with a more significant presence of depressive and anxiety symptoms were associated with low physical activity levels.[4]

The importance of exercise during the pandemic was also observed among the vulnerable people in the present study. This supports the concept that physical inactivity is a risk factor for significant disease morbidity and global mortality[33], which can be transcended to older adults and chronically ill patients who are in fact at a delicate risk of COVID-19 induced mortality.[14]

In general, the COVID-19 pandemic has brought changes in eating habits and body weight which were also influenced by sociodemographic factors. In comparison, physical activities and exercises are primarily affected due to the lockdown phase of COVID-19. These practices affected mental health status in preventing mental health disturbances. This research study was limited by the cross-sectional study design, which does not give a direct cause-and-effect outcome.

RECOMMENDATIONS

It is recommended for future studies to have a prospective design to investigate the cause and effect of eating habits and physical activities. Furthermore, a randomised sampling would be beneficial to make the findings more generalisable. Policies on improving these activities are important measures in preventing vascular risk factors in the population, despite the pandemic.

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CONFLICT OF INTEREST

The authors declared no personal or financial conflict of interest which may influence this study.

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