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Kertas Asli/*Original Articles*

Impact of COVID-19 Lockdown on Physical Activity and Mental Health among Undergraduate Students

(Impak Perintah Kawalan Pergerakan Akibat COVID-19 terhadap Aktiviti Fizikal dan Kesihatan Mental dalam Kalangan Pelajar Sarjana Muda)

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ABSTRACT

With the sudden change of environment and limited studies on the effects of COVID-19 lockdown among university students, this study therefore aims to examine the effects of COVID-19 lockdown on physical activity level and mental health among university students in Malaysia. This is a cross-sectional study involving university students studying in Klang Valley, Malaysia. Demographics information, living status during COVID-19, physical activity level and mental health status were obtained through online questionnaire via Microsoft forms. Paired T-test was used to compare the effect of physical activity level and mental health status during COVID-19 lockdown. Data on falls was available for 383 participants with 254 (66.3 %) women and 129 (33.7%) men. Overall, the metabolic equivalent task (MET) of vigorous, moderate, mild, and total MET has decreased during COVID-19 lockdown as compared to before COVID-19 lockdown. Approximately an increment of 6% of participants reported having depression and anxiety during COVID-19 lockdown. In conclusion, significant impact on physical activity level and mental health was found in our study. Our study findings could therefore assist educational institutions and policymakers in forming strategies to improve student's overall health, yet further longitudinal studies should be performed to examine the long-term effects of COVID-19 lockdown.

Keywords: Pandemic; students; sedentary; depression; anxiety

ABSTRAK

Dengan perubahan persekitaran yang mendadak dan kajian terhad mengenai kesan Perintah Kawalan Pergerakan (PKP) akibat COVID-19 dalam kalangan pelajar universiti, kajian ini bertujuan untuk mengkaji kesan Perintah Kawalan Pergerakan akibat COVID-19 terhadap tahap aktiviti fizikal dan kesihatan mental dalam kalangan pelajar universiti di Malaysia. Kajian ini melibatkan pelajar universiti di Lembah Klang, Malaysia. Maklumat demografi, status kehidupan semasa COVID-19, tahap aktiviti fizikal dan status kesihatan mental diperoleh melalui soal selidik dalam talian. Ujian T berpasangan digunakan untuk membandingkan kesan tahap aktiviti fizikal dan status kesihatan mental semasa PKP COVID-19. Data adalah tersedia untuk 383 peserta dengan 254 (66.3%) wanita dan 129 (33.7%) lelaki. Secara keseluruhan, metabolic equivalent task (MET) bagi MET yang tinggi, sederhana, ringan dan jumlah MET keseluruhan telah menurun semasa PKP akibat COVID-19 berbanding sebelum PKP. Terdapat peningkatan sebanyak 6% peserta dilaporkan mengalami kemurungan dan kebimbangan semasa PKP akibat COVID-19. Kesimpulannya, kesan yang ketara terhadap tahap aktiviti fizikal dan kesihatan mental didapati dalam kajian kami. Oleh itu, penemuan kajian kami boleh membantu institusi pendidikan dan penggubal dasar dalam membentuk strategi untuk meningkatkan kesihatan keseluruhan pelajar, namun kajian lanjut perlu dilakukan untuk mengkaji kesan jangka panjang PKP akibat COVID-19.

Kata Kunci: pandemik; pelajar; sedentari; kemurungan;kebimbangan

INTRODUCTION

The outbreak of Coronavirus Disease 2019 (COVID-19) started in December 2019 at Wuhan City of Hubei Province, China and was later declared as pandemic by the World Health Organization (WHO) in March 2020 (Cucinotta &Vanelli 2020). Due to its staggering rate of transmission worldwide and the severity of the disease, the Centre of Disease Control (CDC) recommended the implement of social distancing and home quarantines as a method to mitigate the spread of the disease (CDC 2021). As adhering to the recommendation by CDC, the Malaysian government has implemented a Movement Control Order (MCO) – national lockdown beginning on March 2020 (Tang 2020). The MCO imposes a ban on all types of mass gathering, closure of all government and private sector premises (expect essential services) and cessation of all schools and higher learning institutions in Malaysia (Tang 2020; Hashim et al. 2021; Aziz et al. 2020).

While the implementation of the MCO in Malaysia could help curb the spread of COVID-19, it has caused dramatic change in the population's lifestyle, forcing the population to stay indoors leading to numerous unhealthy behaviours such as sedentary lifestyle and reduced physical activities such as participation in sports, active recreation, and walking (Aziz et al. 2020; Kuan et al. 2021; Di Renzo et al. 2020). It has been proposed that these unhealthy behaviours would increase risk of mental health especially among students (Karingada &Sony 2021; Singh et al. 2020; Evans et al. 2021). It has been proposed that increased screen-based sedentary behaviours may induce feelings of addiction and loss of responsibility undertaking work-related responsibilities leading to increase feeling of stress and anxiety among students (Teychenne et al. 2019). While many studies have studied the effects of COVID-19 pandemic, most of the studies have focused on healthcare workers (Tan et al. 2020; Lai et al. 2020) , young children (Fong et al. 2021; Christner et al. 2021; Moore et al. 2020) and older adults (Amore et al. 2021; Martins Van Jaarsveld 2020) with limited evidence found on university students. With the closure of education institutions during the MCO, university students experience numerous of uncertainties delay of final exams, postponement of graduation, adopting online modes for classes or lectures and cancelling practical or hands on session (Banerjee et al. 2021) . Consequently, students will also undergo drastic changes in their study environment as they are required to adapt to "studying from home".

To our knowledge, previous studies were mainly focused on the effects of COVID-19 lockdown particularly after the lockdown (Simon et al. 2021; Ali et al. 2021). However, information during the COVID-19 lockdown was limited. With the sudden change of environment and limited studies on the effects of COVID-19 lockdown among university students, this study therefore aims to examine the effects of COVID-19 lockdown on physical activity level and mental health among university students in Malaysia.

METHODS

STUDY DESIGN AND PARTICIPANTS

This was a cross-sectional study conducted among undergraduate students in Klang Valley. A total of 383 undergraduate students aged 18 years and above were randomly recruited from ten different universities, both private and public universities in Klang Valley. Inclusion criteria of this study include: (1) an active registered student from selected universities., (2) resided in Malaysia for the past 12 months and (3) being able to read and understand English Language while participants with existing mental health conditions were excluded.

DATA COLLECTION

An online questionnaire – uploaded on Microsoft Forms was shared via email to the student's database of the selected university to participants who have met the inclusion criteria. The participants were given a participant information sheet and consent form prior to assessing the Microsoft Form link and participation is fully voluntary. The participant's personal data are kept anonymous. This study received approval by International Medical University Joint Commission IRB [BCh I/2021(08)].

MEASUREMENTS

Data was collected via an online questionnaire which contains of four sections to collect information on demographics, physical activity level and mental health. Participants were required to fill up the online survey twice (before and during COVID-19 lockdown).

DEMOGRAPHICS & COVID-19

Participant's demographic information such as age, gender, height, weight, family income was obtained. Information on close contact of COVID-19 and living status during COVID-19 lockdown was also collected.

PHYSICAL ACTIVITY

Physical activity in our study is defined as any bodily movement that requires expenditure of one's energy. It refers to any movement during leisure time, transport to go to and from places or as part of a person's work (World Health Organisation 2022). Physical activity level of participants was obtained via The International Physical Activity Questionnaire (IPAQ). The IPAQ is a standardized tool used to assess on one's physical activity level and inactivity and is measured in MET.min-1. wk-1. The reliability and validity of the IPAQ was tested in 12 countries or more (Medina, Barquera, & Janssen 2013). According to Dunton et al (2020), the IPAQ has shown an adequate reliability and validity over all types of age groups (Dunton et al. 2020). Information on the time spent on vigorous activities such as jogging, running, fast cycling, fast swimming or walking uphill, moderate activities such as brisk walking, dancing, or gardening and sedentary behaviour such as sitting was collected and calculated. The scores were subsequently categorized into high, moderate, and low physical activity level (Supplementary File 1).

MENTAL HEALTH

Mental health in our study is defined as a state of well-being in which the individual realizes his or her own ability in coping with normal stress of life to work productively (Galderisi et al. 2015). Information on participant's mental health status was obtained using the Depression Anxiety Stress Scale 21 (DASS-21) questionnaire. According to Coker et al (2018) , the DASS-21 reliability showed 0.81, 0.89 and 0.78 on the Cronbach's alpha values for depression, anxiety and stress respectively (Coker et al. 2018). A total of 21 questions were included to measure participant's emotional states of depression, anxiety and stress. The rating of each questions is added accordingly to every scale, based on the scoring key and multiplied by 2 for the final score for every scale (Supplementary File 2).

STATISTICAL ANALYSIS

Data analysis was conducted using SPSS 26.0 (IBM Corp, New York, USA). Descriptive analysis was used to describe participant's characteristics in either mean with standard deviation (SD) or frequency with percentages in parentheses for continuous and categorical data respectively. Statistical difference in physical activity level and mental health before and during COVID-19 lockdown was examined using paired T-test while the association between the difference in physical activity and mental health was examined with Pearson correlation test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

PARTICIPANT'S CHARACTERISTICS

Participants 'characteristics were displayed in Table 1. Data was available for 383 university students. There were 254 (66.3 %) women and 129 (33.7%) men with majority of them within the age range of 22 – 24 years old. Of the 383 participants, approximately 84% of participants were active students in private universities and 81% of them were living with family during COVID-19 lockdown.

Table 1 Participant Characteristics

Variable	Total (N=383)
Age, years n (%)	
18-21 year old	129 (33.7)
22-24 year old	250 (65.3)
≥ 25 year old	4 (1.0)
Female, n(%)	254(66.3)
Ethnicity, n(%)	
Chinese	294 (76.8)
Malay	38 (9.9)
Indian	38 (9.9)
Others	13 (3.4)
University, n (%)	
Public	60 (15.7)
Private	323 (84.3)

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Number of years studied n (%)	
Year 1	49 (12.8)
Year 2	107 (27.9)
Year 3	114 (29.8)
Year 4	20 (5.2)
Final Year	93 (24.3)
Nationality	
Malaysian	377 (98.4)
Non-Malaysian	6 (1.6)
BMI, n(%)	
Underweight (<18.5 kg/m2)	99 (25.8)
Normal (18.5-24.9 kg/m2)	235 (61.4)
Overweight (25-29 kg/m2)	34 (8.9)
Obese (>30 kg/m2)	12 (3.1)
Living situation during COVID-19 lockdown, n (%)	
Family	312 (81.5)
Friends/Housemates	45 (11.75)
Alone	26 (6.79)
Close Friend/Family with confirmed /suspected COVID-19, n (%)	110 (28.7)

BMI= Body Mass Index

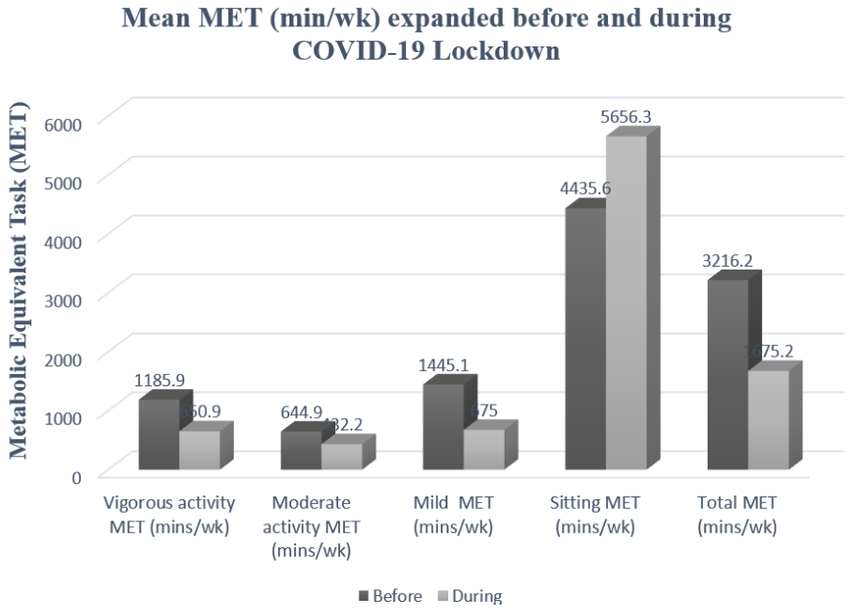

Figure 1 Mean MET scores before and during COVID-19 lockdown

PHYSICAL ACTIVITY LEVEL

The mean MET (mins/wk) of the participants before and during COVID-19 lockdown was presented in Figure 1. Overall, the MET of vigorous, moderate, mild, and total MET has decreased while the MET for sitting has increased during the COVID-19 lockdown compared to before COVID-19 lockdown.

Significant difference was also found in the mean difference in MET score for vigorous activities, moderate activities, mild activities, and sitting activities before and during COVID-19 lockdown (Table 2). When comparing by percentage, significant difference was found with 45% decrease in vigorous activity, 32% decrease in moderate physical activity, 53% decrease in walking, and a 47% decrease in the total MET during COVID-19 lockdown as compared to before COVID-19 lockdown.

MENTAL HEALTH

Table 3 describes the effect of the COVID-19 lockdown on the participants' mental health. The mean scores for depression, anxiety and stress were significantly higher during COVID-19 lockdown as compared to before COVID-19 lockdown. Approximately 30.4 % of participants reported having depression, 34.9 % anxiety and 21.7 % stress from mild to extremely severe before COVID-19 lockdown while during COVID-19 lockdown, approximately 36.1% of participants had depression, 40.9 % anxiety and 22.5% stress.

CORRELATION BETWEEN PHYSICAL ACTIVITY, SEDENTARY BEHAVIOUR AND MENTAL HEALTH

The correlation between physical activity, sedentary behaviour, and change in DASS-21 scores is presented in Table 4. Although there is a significant inverse correlation between the change in MET for physical activity with depression ($r = -0.117$, $p = 0.02$) and stress ($r = -0.104$, $p = 0.04$), the correlation is weak. In general, no significant correlations ($p > 0.05$) were observed between the sedentary behaviour and mental health.

Table 2 Physical activity level before and during COVID-19 lockdown in MET (mins/wk) and Kcal.

Physical activity	Mean difference in MET, mins/wk (95%Cl)	P-value	Mean difference in percentage for MET (%)	Mean difference in calories burnt, Kcal/wk (95% Cl)	P-value
Vigorous	- 534.93 (-706 to -363)	<0.01**	-45.11%	-606.61 (-803 to -409)	<0.01**
Moderate	-212.76 (-330 to -95)	<0.01**	-32.90%	-234.99 (-356 to -113)	<0.01**
Mild	-770.05 (-945 to -594)	<0.01**	-53.29%	-739.3 (-924 to -554)	<0.01**
Total	-1541 (-1845 to -1236) MET min/wk	<0.01**	-47.91%	-1581.41 (-1923 to - 1238) Kcal/wk	<0.01**
Total Sitting	1220.64 (1014 to 1426)	<0.01**	27.5%	1202.09 (986-1417)	<0.01**

*P-value<0.05; **P-value<0.01

Table 3 Mental Health Status Before and During Covid-19 Lockdown

Variable	Before Lockdown	During Lockdown	Difference in mean	P-Value
Depression				
DASS-21 Scores, mean (SD)	7.45(8.45)	12.67(11.68)	-5.22(8.56)	<0.01**
Status, n (%)				<0.01**
Normal	90.0(69.8)	162(63.8)		
Mild	9.0(7.0)	33(13.0)		
Moderate	18.0(14.0)	43(16.9)		
Severe	6.0(4.7)	8(3.1)		
Extremely Severe	6.0(4.7)	8(3.1)		
Anxiety				
DASS-21 Scores, mean (SD)	6.53 (6.83)	9.66 (9.44)	-3.13(6.40)	<0.01**
Status, n (%)				0.73
Normal (n, %)	84(65.1)	150(59.1)		
Mild (n, %)	9(7.0)	26(10.2)		

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Moderate (n, %)	21(16.3)	49(19.3)		
Severe (n, %)	8(6.2)	17(6.7)		
Extremely Severe (n, %)	7(5.4)	12(4.7)		
Stress DASS-21 Scores, mean (SD)	9.11			
(8.542)	13.31 (10.770)	-4.20(7.87)	<0.001	
Status, n (%)				0.06
Normal (n, %)	101(78.3)	197(77.6)		
Mild (n, %)	7(5.4)	30(11.8)		
Moderate (n, %)	11(8.5)	17(6.7)		
Severe (n, %)	9(7.0)	6(2.4)		
Extremely Severe (n, %)	1(0.8)	4(1.6)		

DISCUSSION

MAIN FINDINGS OF THIS STUDY

Our study found significant effect of COVID-19 lockdown on the physical activity level, musculoskeletal and mental health among university students. When comparing on participant's physical activity level, our study found significant reduction on physical activity level and increase in sitting time which is consistent with a recent systematic review of seven studies (Maher et al. 2021; Barkley et al. 2020; Romero-Blanco et al. 2020; Luciano et al. 2021; Gallè et al. 2020; Yang et al. 2020; Savage et al. 2020) in United States, Spain, Italy, China and United Kingdom (sitting) among undergraduate students (Rivera et al. 2021). Ammar et al. (2020) also found similar finding on the reduction of physical activity and increased sitting time among the study participants during home confinement (Ammar et al. 2020). It has been suggested that the reduced of physical activity and increased sedentary lifestyle could be due to the by closure of universities and the conversion of face-to-face class to online classes during the COVID-19 lockdown (Rivera et al. 2021; Romero-Blanco et al. 2020). Besides that, reduced participation in sports particularly youth activities and outdoor activities due to cancellation and postpone of sports activities could also contribute to the reduced physical activity level among students (Moore et al. 2020).

The MET scores reduction in our study for all levels of physical level including vigorous, moderate and mild were 45.1%, 32.9% and 53.3% respectively were higher compared to existing literature (Hermassi et al. 2021; Ammar et al. 2020; Barkley et al. 2020) Such differences could possibly be explained by the different measuring tools (Godin physical activity questionnaire) used to measure physical activity, which may affect the validity of the results (Barkley et al. 2020). On the other hand, a study conducted among physiotherapy students found a higher reduction in vigorous (57.3%) and moderate (63.5%) physical activity during the lockdown period as compared to our study findings (Srivastav et al. 2021). The different population involved in our study as compared to other previous published studies could suggest the conflicting findings. It has been suggested that physiotherapy students experienced higher reduction in physical activity as compared to other undergraduate students from various professional courses as they were more active before COVID-19 lockdown due to the nature of their profession (Srivastav et al. 2021; Sudha et al. 2018).

Our study finding which suggest significant increase in prevalence of depression, anxiety and stress among students is in line with several studies conducted in Greece (Sazakli et al. 2021), Saudi Arabia (Hakami et al. 2021; AlHadi & Alhuwaydi 2021), France (Wathelet et al. 2020) and Malaysia (Hassan Omar Ads 2020; Sundarasen et al. 2020). It has been suggested that majority of universities implemented online learning during the lockdown leading to increased stress among students as they need time to adjust to online learning and may appear to be helpless when the lecturers did not modify the learning outcomes that was meant for face to face learning (Sundarasen et al. 2020). Furthermore, the confinement at home which reduces the exposure to social networking with peers and increased detachment from friends and family may also lead to increase prevalence of mental health during lockdown period (Hakami et al. 2021; AlHadi & Alhuwaydi 2021). Although consistent findings were found with

previous literature, the prevalence of mental health in our study were lower as compared to those studies. These differences could possibly be explained by the time of study period and survey tools used by respective studies. For instance, study conducted by Hassan et al. (2020) was conducted after three months of the first lockdown while our study was conducted during the lockdown (Hassan Omar Ads 2020). Surprisingly, a study conducted by Bolatov et al. (2021) found a decrease in mental health among students following online learning during COVID-19 (Bolatov et al. 2021). It was proposed that the decreased in mental health could possibly be explained by the decrease of indirect costs by students such as travelling and accommodation costs in university and increased time spent with family. The conflicting results from the study may have resulted from the differences in study population were only medical students were included in the study while our study have included students from all courses.

Although our study has found significant inverse correlation between physical activity level with depression and stress, the correlation was weak as compared to other studies that have found stronger correlation (Puccinelli et al. 2021; Wright, Williams, & Veldhuijzen van Zanten 2021). It has been indicated that physical activity distracts one's negative mood and stress that is related to COVID-19 fear during lockdown (Wright et al. 2021). Also our study finding which have found no significant correlation between reduced physical activity level and anxiety is consistent with a finding conducted among 165 adolescents in United States (Wright et al. 2021). Although it remains unclear why physical activity level was not correlated with anxiety. Therefore, further research is warranted to understand the correlation between physical activity and anxiety during lockdown periods.

LIMITATIONS

Our study has a few limitations. Firstly, participants may have poor recall of their history of physical activity and sedentary behaviour before COVID-19 lockdown which may possibly lead to under or over reporting. As our study was conducted among undergraduate students in Klang Valley, the results may not be generalized to the rest of the undergraduate students in Malaysia. Hence future studies should be conducted to include undergraduate students in other states in Malaysia. Also, the type of students from different courses were not collected which further comparison may not be performed, we have compared between private and public universities which have found no significant differences between the two types of universities. Although our study provide comparison before and during COVID-19 lockdown, the absence of information post COVID-19 lockdown may limit our ability to examine the recovery rate of the students post COVID-19 lockdown. Therefore, repeating the study in the post COVID-19 lockdown period may give further insights on the recovery rate of the students. Despite these limitations, this study was the first to examine the impact of COVID-19 lockdown on physical activity and mental health among undergraduate students from both private and public universities in Malaysia.

CONCLUSION

In conclusion, significant impact on physical activity level and mental health was found in our study. Students spend more time at home during COVID-19 lockdown leading to reduced physical activity and increased sedentary behaviours. Higher prevalence of mental health was also observed during COVID-19 lockdown as compared to before COVID-19 lockdown. Although weak correlation was observed between physical activity and mental health, our study findings could therefore assist educational institutions and policymakers in forming strategies to improve student's overall health. However, further longitudinal studies should be performed to examine the long-term effects of COVID-19 lockdown among university students.

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CONFLICTS OF INTEREST

The authors report there are no competing interests to declare.

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