ORIGINAL ARTICLE

Does COVID-19 Pandemic Influence Physical Activity Level Among Medical Students? An Online Survey

Abdul Rahman Ramdzan[1], Chuah Cheng Yee[1], Hamshavali Selvaraj[1], Izian Izani[1], Md Arman Tanding[1], Pak Yue Yuan[1], Rodrey Raymond[1], Sabrina Zairul[1], Wong Kha Kin[1], *Zulkhairul Naim Ahmad Sidek[2], Khor Ban Hock[3]

[1] Department of Public Health Medicine, Universiti of Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.
[2] Department of Medical Education, Universiti of Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia.
[3] Faculty of Food Science and Nutrition, Universiti of Malaysia Sabah, Jalan UMS, Kota Kinabalu 88400, Malaysia.

ABSTRACT

Introduction: COVID-19 was identified as a global pandemic, and lockdowns have been enforced as part of government policies and public health recommendations. There is not enough data to assess how l ockdowns affect physical activity. Therefore, the purpose of this study is to determine the variations in the level of physical activity among medical students before and during COVID-19 and its associated factors. **Methods:** From August to October 2020, 225 medical students from Universiti Malaysia Sabah (UMS) participated in this cross-sectional survey. The International Physical Activity Questionnaire (IPAQ) was used to determine participants' levels of physical activity. The independent t-test was used to determine the relationship between MET score differences in physical activity level and the socio-demographic characteristic and associated factors. The paired t-test was used to compare the MET score of total physical activity before and during COVID-19. **Results:** Changes in physical activity occurred before and during COVID-19, with the MET level prior to the pandemic being greater. The factors that are discovered to be related with physical activity before and during COVID-19 include M40 household income (p-value = 0.04), no fixed activity schedule (p-value = 0.01), high family demand (p-value = 0.03) and being far away from exercise facilities (p-value = 0.04). **Conclusion:** The COVID-19 pandemic mitigation strategy has an impact on medical students' physical activity. Changes in physical activity are influenced by changes in family income and other environmental factors. It may be necessary to take health-promoting actions aimed at inactive people in order to improve wellbeing.

Keywords: Physical inactivity; University students; IPAQ; MET; COVID-19

Corresponding Author:
Zulkhairul Naim Ahmad Sidek, PhD
Email: zulkhairul@ums.edu.my
Tel: +6088320000

INTRODUCTION

The World Health Organisation (WHO) declared COVID-19 a global pandemic on March 12, 2020, and ordered that preventative steps be made to slow the viral spread. In Malaysia, there have been a total of 9334 confirmed cases of COVID-19, including 126 fatalities [1], as of August 30, 2020. Governmental regulations and public health recommendations have imposed lockdowns and limitations due to the current pandemic. For instance, to break the COVID-19 chain, the Malaysian government began enforcing a Movement Control Order on March 18, 2020 [2]. While these measures are successful in lowering the infection rate, they also have unintended consequences by restricting access to many forms of exercise, participation in regular daily activities, and physical activity (PA) (e.g., closed gyms, no group gatherings, increased social isolation) [3]. By potentially impairing physical fitness, which is favourably correlated with the capacity to deal with immunologic and cardiac sequelae of more serious outcomes, the limits increase the burden on population health [4,5].

The WHO defines physical activity as any skeletal muscle-produced movement that needs the expending of energy, which includes actions made when working, playing, doing domestic duties, travelling, and partaking in recreational activities [6]. Regular and sufficient levels of physical activity enhance muscular and cardiorespiratory fitness, enhance bone and functional health, lower the risk of hypertension, coronary heart disease, stroke, diabetes, various cancers including breast cancer and colon cancer, and depression, as well as lower the risk of falls and fractures to the hip or vertebrae. They are

also essential for maintaining an appropriate energy balance and maintaining a healthy weight [6].

According to the social ecology model [7], one must view physical activity involvement through a multi-dimensional lens made up of personal, behavioural, and social environment variables in order to fully comprehend it. Personal aspects include things like self-efficacy and benefits perception [8], behavioural determinants include things like smoking and sedentary behaviour, and social environment includes things like access to recreational options [9]. Public health advocates continue to vigorously campaign for home-based physical exercise in order to avoid any unintended consequences of the COVID-19 protective limits [10].

There is insufficient evidence to assess how confinement (such as lockdowns and limits) affects physical activity. One Canadian study found that more active participants had increased their physical activity following COVID-19, while more inactive participants had decreased their physical activity [11]. Another study found that home confinement led to a reduction in overall physical activity, both in terms of the number of days and hours, and restricted access to exercise. [12]. In order to build a fundamental foundation from which to generate appropriate suggestions for lifestyle alterations during this time, it is crucial that a study be conducted to evaluate how physical activity is influenced by prolonged confinement. The purpose of this study was to determine the level of physical activity among UMS medical students during the COVID-19 pandemic and its relationship with sociodemographic, individual, behavioural, and social environment characteristics.

MATERIALS AND METHODS

Study Design

From August to October 2020, a cross-sectional study was conducted for this survey. The study population was issued a validated self-administered electronic survey that was made utilising Google Forms. The University Malaysia Sabah Faculty of Medicine and Health Sciences' first through fifth-year medical students were the study's target population.

Sample Size and Sampling Method

Based on the mean difference metabolic equivalent of task (MET) of physical activity by Romero et al., the population of medical students at the Faculty of Medicine and Health Sciences (FHMS) at Universiti Malaysia Sabah (UMS) was calculated using Cochran's Formula, and the sample size was determined to be 266 students after considering a 20% non-response rate [13]. Convenient sampling was used, with the following inclusion criteria: (a) medical students; (b) English-literate; (c) no major medical conditions; while students who were pregnant or disabled were excluded.

Study Instrument

Data for this study were gathered using a self-administrated Google form. There were three separate parts to this questionnaire, designated as sections A, B, and C. The participants were required to fill in their sociodemographic information in Part A, which included gender, phase of study, ethnicity, state of origin, current staying location, Body Mass Index, family income, current smoking status and alcohol consumption. The participants were required to complete Part B of the International Physical Activity Questionnaire (IPAQ) [14]. MET computed as follows: Walking = 3.3 METs; Moderate Intensity = 4.0 METs; Vigorous Intensity = 8.0 METs; TOTAL MET-min/week = (Walk METs*min*days) + (Moderate METs*min*days) + (Vigorous METs*min*days). The IPAQ has high reliability and good Cronbach's alpha values of 0.8. The subjects self-reported and completed each questionnaire [15]. The participants were subsequently instructed to complete Part C, which questioned them about the variables influencing changes in physical activity during COVID-19 [16,17].

Statistical analysis

The data was gathered using Google Forms, and it was analysed using IBM Statistical Package for Social Sciences (SPSS) Statistics version 27. The questionnaires were used to generate descriptive analyses. For continuous data, the mean and standard deviation were shown; for categorical data, frequencies and percentages were shown. Bivariate analysis was used to examine whether there was a relationship between the dependent and independent variables using the Independent T-Test and One-Way ANOVA tests. A paired T-test was used to assess the MET score of overall physical activity before and after COVID-19. 0.05 was used as the significant level for the analyses.

Ethical approval

Permission to conduct research was approved from the Research Ethics Committee from Faculty of Medicine and Health Sciences, University Malaysia Sabah with the approval number of JKEtika 1/21 (2).

RESULTS

Respondent

The total number of respondents whom participated in our study was 225. Among those 225 respondents, the majority were female which accounted for 69.8% (n=157) with mean + SD of their age was 22.03 ± 1.33. 62.2% (n=140) were clinical students. Based on ethnicity, 52.0% (n=117) were Malay and 57.8% (n=130) were from East Malaysia (Sabah, Sarawak, WP Labuan). According to the location where the participants staying currently, majority of them staying

Table I : Sociodemographic characteristics of UMS medical students

Variable	n (%)
Gender, n (%)	
Male	68 (30.2%)
Female	157 (69.8%)
Age	
Mean + SD	22.03 ± 1.331
Phase of study, n (%)	
Pre-clinical	85 (37.8%)
Clinical	140 (62.2%)
Ethnicity, n (%)	
Malay	117 (52%)
Chinese	34 (15.1%)
Indian	20 (8.9%)
Bumiputera	48 (21.3%)
Others	6 (2.7%)
State of origin, n (%)	
East coast (Kelantan, Terengganu, Pahang)	5 (2.2%)
East Malaysia (Sabah, Sarawak, WP Labuan)	130 (57.8%)
North coast (Perlis, Kedah, Pulau Pinang)	31 (13.8%)
South coast (Negeri Sembilan, Melaka, Johor)	26 (11.6%)
West coast (Perak, Selangor, WP Kuala Lumpur, WP Putrajaya)	33 (14.7%)
Location, n (%)	
Within UMS campus	91 (40.4%)
Outside of UMS campus, within Sabah	38 (16.9%)
At home (Peninsular & Sarawak)	96 (42.7%)
BMI, n (%)	
Underweight	38 (16.9%)
Normal	118 (52.4%)
Overweight	45 (20.0%)
Obese	24 (10.7%)
Family income, n (%)	
B40 (<RM4,850)	101 (44.9%)
M40 (RM4,850 - RM10,959)	108 (48.0%)
T20 (> RM10,959)	16 (7.1%)
Current smoking status, n (%)	
Active smoker	2 (0.9%)
Ex-smoker	2 (0.9%)
Non-smoker	221 (98.2%)
Alcohol consumption, n (%)	
No	186 (82.7%)
Yes	39 (17.3%)

Table II : Differences of MET scores of physical activity before and during COVID-19

Type of physical activity	MET before Covid-19 (MET-min/week)	MET during Covid-19 (MET-min/week)	p-value*
Total physical activity, mean(±SD)	3943.53(±3549.97)	3789.28(±4812.29)	0.620

*p-value by paired t-test

Table III : Relationship between MET score differences of physical activity level and sociodemographic

Variable	Category, N =225	n	Mean (±SD)	p-value
Gender	Female	157	200.62(±5264.83)	0.083
	Male	68	973.61(±2658.28)	
Phase of study	Preclinical	85	205.81(±5959.15)	0.368
	Clinical	140	372.87(±3660.29)	
Ethnicity	Malay	117	257.77(±5491.84)	0.147
	Chinese	34	57.30(±3980.65)	
	Indian	20	928.93(±3005.10)	
	Bumiputera	48	1405.04(±3227.73)	
	Others	6	2342.58(±2558.63)	
State of origin	East coast	5	879.60(±2538.89)	0.812
	East malaysia	130	123.04(±5284.07)	
	North	31	54.36(±4263.47)	
	South	26	670.40(±3030.98)	
	West coast	33	823.92(±3647.16)	
Current staying location	At home (Peninsular & Sarawak)	96	389.34(±5788.65)	0.292
	Outside UMS, within Sabah	38	279.44(±4486.19)	
	Within UMS campus	91	675.45(±3129.25)	
BMI	Underweight	38	1588.70(±3287.13)	0.187
	Normal	118	284.07(±5385.26)	
	Overweight	45	47.76(±3908,15)	
	Obese	24	416.95(±3573.10)	
Family income	B40 (<RM4,850)	101	659.34(±4662.43)	0.046
	M40 (RM4,850 - RM10,959)	108	933.63(±4805.22)	
	T20 (> RM10,959)	16	29.31(±2391.25)	
Current smoking status	Active smoker	2	1366.00(±159.81)	0.545
	Ex-smoker	2	3559.70(±3412.92)	
	Non-smoker	221	112.47(±4683.03)	
Alcohol consumption	Yes	39	351.74(±3801.18)	0.457
	No	186	260.35(±4822.14)	

at home (according to states), which comprised of 42.7% (n=96). In our study, it had shown that 52.4% (n=118) were having normal BMI. Our study showed the highest number of respondents (44.9%, n=101) with the family income of M40 (RM4, 850 - RM10, 959). Besides, up to 98.2% of the respondents (n=221) were non-smoker and 82.7% (n=186) did not consume alcohol. (Table I)

Table II demonstrated that the MET score before and during COVID-19 (p=0.620) did not differ significantly from 3943.53(3549.97) MET-min/week

Table IV : Relationship between MET score differences of physical activity level and factors affecting the physical activity changes

Factors affecting the physical activity	Category, N=225	n	Mean (±SD)	p-value
F1. Activity schedule	Yes	98	815.31(±5972.09)	0.006
	No	127	902.42(±3137.27)	
F2. Stressful life changes	Yes	35	494.90(±5457.69)	0.371
	No	190	273.84(±4503.23)	
F3. Family demand	Yes	42	1228.57(±5788.26)	0.033
	No	183	471.63(±4316.17)	
F4. Exercise interest	Yes	171	136.51(±5192.96)	0.919
	No	54	210.45(±2291.76)	
F5. Stress reliever	Yes	203	89.40(±4816.38)	0.527
	No	22	752.71(±2831.14)	
F6. Time consumption	Yes	48	308.78(±3996.66)	0.439
	No	177	279.82(±4826.02)	
F7. Distance from exercise facilities	Yes	74	1053.17(±3134.05)	0.043
	No	151	286.27(±5200.53)	
F8. COVID-19 perception	Yes	56	845.19(±4305.04)	0.201
	No	169	74.69(±4760.97)	
F9. Encouragement	Yes	173	155.22(±4805.59)	0.069
	No	52	1183.85(±4007.69)	
F10. Sport equipements accessibility	Yes	125	366.66(±4324.06)	0.446
	No	100	111.25(±5057.02)	
F11. Assignments workload	Yes	143	345.03(±4884.44)	0.419
	No	82	178.44(±4246.82)	
F12. Social distancing	Yes	104	495.78(±5384.00)	0.309
	No	121	139.28(±3931.37)	

to 3789.28(4812.29) MET-min/week. These findings indicated that COVID-19 does not affect degree of physical activity.

According to Table III, there was a significant difference in the MET score differences of family income and physical activity level (p=0.046), with MET score differences of 659.34(4662.43), 933.63(4805.22), and 29.31(2391.25) for B40, M40, and T20, respectively. These findings indicated that changes in physical activity both before and throughout COVID-19 are influenced by family income. Otherwise, there was not a significant difference between the levels of physical activity as measured by the MET score with the other sociodemographic.

Table IV showed there was a significant difference in the MET score differences of physical activity level between the participants with scheduled activity 815.31(±5972.09) and without scheduled activity 902.42(±3137.27), (p=0.006). There was also a significant difference in the MET score differences of physical activity level between the participants with demanding family 1228.57(±5788.26) and non-demanding family 471.63(±4316.17), (p=0.033). Additionally, there was a significant difference in the MET score differences of physical activity level between the participants with distance was too far from exercise facilities 1053.17(±3134.05) and the participant with distance was not far from exercise facilities 286.27(±5200.53), (p=0.043). Otherwise, there was no significant difference in the MET score differences of physical activity level with the other factors affecting the physical activity changes.

DISCUSSION

The MET level before COVID-19 was higher than it was throughout the study's physical activity changes

before and during COVID-19. Medical students' physical activity levels are affected by COVID-19, where the MET level before COVID-19 was higher than during. This outcome was consistent with other research [18,19,20]. A study looked into how the COVID-19 epidemic affected medical students' levels of physical activity [18]. The study measured physical activity levels using MET scores before and during the pandemic and discovered a statistically significant decline in activity levels.

According to a study by Ammar et al. (2020), the COVID-19 pandemic significantly decreased levels of physical activity [19]. This study examined how adults' levels of physical activity changed during the lockdown and found that they were lower than they had been prior to the epidemic. In order to validate the results, the study used self-reported measurements and suggested the use of objective measures like MET scores.

Family income significantly differed, indicating that it does influence physical activity both before and throughout COVID-19. During COVID-19, it was discovered that the household income had an impact on whether they had access to exercise equipment in their home [21]. Van Dyck et al. (2015) conducted research to examine the relationship between socioeconomic variables and levels of physical activity [22]. Despite not concentrating on the impact of COVID-19 explicitly, this study offers proof that family wealth can influence levels of physical activity. Regarding the influence of household income on providing exercise equipment during COVID-19, it is logical to assume that households with higher incomes may have better access to exercise equipment [21].

Activity schedule, family demand and distance from exercise facilities were the only factors that are found to affect physical activity before and during COVID-19. Students that have fixed activity schedule was found more discipline in doing physical activity during COVID-19. The impact of a fixed activity schedule on physical activity during COVID-19 has not been explicitly studied. However, having a regular schedule and structure can help individuals maintain discipline and engage in physical activity. It is reasonable to assume that students with fixed activity schedules may exhibit higher levels of discipline in performing physical activity during the pandemic.

High family demand was found to affect the student for doing physical activity regularly during COVID-19. The influence of high family demand on regular physical activity during COVID-19 is not supported by specific references. However, family support and encouragement have been shown to positively impact physical activity behaviour in various studies [22,23,24]. It can be inferred that a high level of family demand may contribute to increased engagement in regular physical activity.

Far away from exercise's facilities was also the factor that are found to affect physical activity before and during COVID-19. A research investigated the influence of built environments on physical activity levels [25]. They found that proximity to exercise facilities, such as parks or gyms, positively influenced physical activity engagement. It is reasonable to suggest that the distance from exercise facilities could affect physical activity levels both before and during the COVID-19 pandemic. Despite this difficult circumstances, medical student should continue on to be active in our physical activity as to keep themselves being healthy physically and mentally [26].

Strength and limitation of the study

This study had its strengths and limitations. In-depth analyses of numerous variables that may have an impact on people's levels of physical activity during the COVID-19 pandemic were done as part of the study. The impact of COVID-19 on physical activity can be better-understood thanks to this all-encompassing approach. The study is one of the first to look into how COVID-19 affects university students' levels of physical exercise, especially in Malaysia. This adds to the scant amount of research that already exists on the subject and offers insightful information on this particular group.

However, the study admits the possibility of recollection bias given that it was carried out about six months after the Movement Control Order (MCO) owing to COVID-19 was put into effect. Memory restrictions may affect participants' capacity to accurately recall and report their amounts of physical activity during the early pandemic. The study emphasises that it is not possible to establish a causal link between changes in physical activity levels and COVID-19 and cannot exclude the potential of other confounding factors or demonstrate that COVID-19 was the sole factor in the observed changes in physical activity. The study was only carried out at one higher education facility in Malaysia, which restricts the findings' applicability to other institutions or populations. Variations in demographics, cultural factors, and environmental contexts across different settings may affect the results' applicability to other contexts.

Recommendation

It is recommended to incorporate the use of pedometers or similar objective measurement devices in future studies to accurately record participants' physical activity levels. Pedometers provide an objective measure of steps taken and can provide more reliable data compared to self-reported measures. Future studies should consider including additional

outcome measures for assessing physical activity among the target population. For example, incorporating wearable devices that track heart rate, duration of activity, or sedentary behaviour can provide a more comprehensive understanding of participants' physical activity patterns (Hallal et al., 2020) [27].

Studies that include a broader range of participants can provide valuable insights into the specific challenges and opportunities faced by different student groups in maintaining physical activity levels during challenging circumstances. By expanding the scope of research, universities can develop tailored interventions and strategies to promote physical activity among students from diverse academic backgrounds. To enhance the generalizability of findings, future studies should aim to include students from various faculties or disciplines within the university. By increasing the sample size and diversifying the participant pool, the study can capture a broader representation of the student population and provide more robust conclusions.

CONCLUSION

In conclusion, the COVID-19 pandemic has led to changes in physical activity levels. Factors such as M40 household income, absence of a fixed activity schedule, and distance from exercise facilities have been identified as influencers of these changes. It is crucial to conduct future studies that encompass students from various faculties within the university to obtain a more comprehensive understanding of physical activity patterns among the entire student population. Despite the difficulties presented by the pandemic, it is important for medical students and all individuals to prioritize their physical activity to maintain overall health and well-being. Engaging in regular physical activity contributes not only to physical health but also to mental well-being.

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