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Impact of Physical Activity on Quality of Life Among Undergraduate Medical Students During COVID-19 Pandemic

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Abstract

Implementation of Movement Control Order (MCO) due to COVID-19 pandemic has led to some major impact on physical activity and quality of life due to homebound restriction. The objectives are to find out the factors associated with physical activity and the the impact of physical activity on the quality of life during COVID-19 pandemic among medical students. A cross-sectional study was conducted among undergraduate medical students at a private medical college, Manipal University College Malaysia (MUCM) in July 2021. Online questionnaires were distributed and the total responses were 161. The data was then analysed using Epi Info Version 7.2.4. Apart from demographics profile, International Physical Activity Questionnaire-Short Version (IPAQ-SF) was used to assess level of physical activity and WHOQOL-BREF was used to assess quality of life. The analysis included frequency, percentage, mean, standard deviation, unpaired T-test and ANOVA. Study showed that 76.27% of students were active and the rest were inactive during COVID-19 pandemic. The results revealed that there is a positive association between the presence of indoor or outdoor spaces and physical activity, it was emphasized with a p-value of <0.001. However, there was no association found between age, ethnicity, BMI with physical activity. Quality of life was assessed by 4 different domains which are physical health, psychological health, social relationship, and environment. Physical activity had a significant impact on many domains which contribute towards the quality of life of MUCM students. There were significant positive associations between physical activity and all the domains except physical health. These associations were proved by the p-values which are physical health (0.067), psychological health (0.012), social relationship (0.005) and environment (0.035). In conclusion, students should lead a healthy and active lifestyle by carrying out different types of physical activities to benefit from its positive impact on the quality of life.

Keywords

Physical Activity, Quality of Life, Medical Students, Malaysia, COVID-19, Lockdown

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1. Introduction

In December 2019, there was a cluster of unknown acute respiratory tract infection cases reported in the city of Wuhan in China which originates from Hunan South China Seafood Market. In January 2020, investigation found that it was caused by a new type of coronavirus and later on the disease was subsequently named COVID-19 by the World Health Organization. [1-3] This disease can rapidly spread from person to person through airborne or droplets and particles which are released by infected person when they cough, sneeze or even speak. [1, 3] The incubation period is on

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average 5-6 days but can range from 1-14 days. There can be a range of symptoms from mild (headache, muscle pains, runny nose, sore throat or diarrhoea) to severe (pneumonia, organ failure, RTI, septic shock which can eventually lead to death. Some may not even develop any symptoms which is referred to as a symptomatic carrier. [4-6]

In a short span of time, this disease has rapidly spread across the world including Malaysia which then led to declaration of global pandemic on March 2020 by WHO.[1] As of 2nd of July 2021 there were 182,319,261 confirmed cases of COVID-19, including 3,954,324 deaths across the world. [7] However, the Ministry of Health (MOH) in Malaysia reported that there were 765,949 COVID-19 cases including 5327 deaths and 694,538 cases of recovery. [8] In response to that, the government implemented "Movement Controlled Order" (MCO1.0) from 18th March till 31st August 2020. [9, 10] After the sudden surge in cases with most attributed to the return of election campaigners from Sabah, MCO2.0 was reinstated till March 2021. [11, 12] Despite all the efforts, there were continuous rising of cases which then lead to nationwide movement control order (MCO3.0) from 12th May to 7 June 2021. On the 28th June 2021, the announcement of implementing of Phase 1 "Full Movement Control Order" (total lockdown) was made by the Prime Minister. FMCO however was extended till date 2nd of July. [13]

With the presence of MCO, all the movements were restricted, social gathering including weddings, seminars and even sport were limited. All the recreational activities (jogging, cycling and exercising) were allowed without physical contact and with maintaining physical distance. [14]

The nationwide lockdown and travel restrictions have been very effective in reducing the rate of COVID 19 infection. In contradiction, it can also lead to numerous side effects affecting personal health. Participation in physical classes, office, sports activities or even time spent on walking as part of the commute has drastically reduced. Therefore, physical inactivity is a notable consequence especially during prolonged periods of lockdown. [15, 16] Reduction in physical activity increases the risk of conditions such as cardiovascular disease [17], obesity [18], diabetes mellitus [19], osteoporosis [20], breast and colon cancer [21].

Moderate amount of physical activity has shown to oppose effects of immunosenescence [22]. Moreover, physical activity has a positive effect on psychological well-being [23]. Many studies suggest that physical activity lowers the risk of depression [24], anxiety [25], improve self-esteem and body image.[26] Furthermore, physical activity shows positive effect on academic performance [27, 28] and provides a higher level of concentration in class along with more confidence to face academic challenges among medical students [29]. Physical activity also contributes to improving the quality of life of an individual in all its aspects [30]

Description of quality of life of an individual should not portray the beliefs of health professionals or family members and it is not concerned with a person's situation or what they possess. [31] Quality of life (QOL) can be given an arithmetic of more or less widespread interpretations, relying on the extent of evaluative elements affecting a person's life that it is taken into account. [32] The World Health Organization (WHO) defined Quality of life (QOL) as an individuals' perception of their position in life in the context of culture and value system where they are inserted, which involves their goals, perspectives, standards and concerns. [33] QOL is a multifaceted concept consisting of four main domains which includes physical, psychological, social relationships and environment. [34] WHOQOL-BREF is a valid assessment of QOL that contains all these four domains and it is a 26 items assessment that represent the WHOQOL-100 item survey. [35] The four domain scores indicate a person's understanding of quality of life in each particular area and the domain scores are gauged in a positive way whereas the score increases indicate the higher quality of life. [36]

Quality of life is very crucial especially among scholars and multiple aspects have been influencing the QOL of a medical student which eventually leads to lower QOL of them in comparison to the general population. [37] Previous researchers have identified that the QOL scores among medical students has decreased especially when they are doing their undergraduate course. [38] However, some studies show that physical activities among scholars have been beneficial in upgrading their psychological health as well as enhancing their QOL. The study also stated that scholars who endure strength training practices or aerobic exercise have an advanced QOL than other scholars. [37] Another study that was conducted among medical students reveals that poor academic performance and low quality of life is often associated with mental distress. So, identifying medical students' valuations for their own wellbeing may help to direct approaches to ameliorate the psychological health and QOL of students at risk. [39]

To our knowledge, no research has been done regarding the impact of physical activity on quality of life during COVID-19 pandemic among medical students. With this question in mind, we aim to find out the (a)factors that are associated with physical activity and (b)the impact of physical activity on the quality of life during COVID-19 pandemic among medical students. The research hypothesis is that low physical activity leads to poor quality of life among undergraduate medical students during COVID-19 pandemic.

2. Methodology

2.1. Study Design, Population, Time and Place

A cross-sectional study was conducted among undergraduate medical students at a private medical college, Manipal University College Malaysia (MUCM) in July 2021. The college has two campuses: Muar campus and Melaka campus in Malaysia. The college consists of students following the MBBS, BDS and FIS courses. In the MBBS course, Semester 1 to 5 is conducted in the Melaka campus while Semester 6, 7 and 8, 9, 10 are conducted in the Muar and Melaka campuses respectively. In our study, MBBS students of Semester 1 to 10 in Muar and Melaka campuses were included.

2.2. Sample Size

Our sample size was calculated using "Microsoft Excel Calculator" where estimated proportion (%) and precision error (%) must be included to find the appropriate sample size.[40] According to the study prior to this which is "The impact of physical activity on psychological health during COVID-19 pandemic in Italy" had shown that 39.96% of individuals were classified as low active during the COVID-19 Pandemic while 30.63% as high active. [23] As per the study, a 0.3996 of estimated proportion was taken. Based on the "Microsoft Excel Calculator" with our population size 1300, expected frequency of 39.96%, precision error of 8% and with a confidence level of 95%, the minimum sample size was estimated to be around 135 students.

A 10% of non-response rate was allowed in this study. Upon using the formula below, we concluded that 150 students were our final sample size of this study.

$$n_{final} = \frac{n_{calculated}}{1 - (non - response\ rate)}$$

$$n_{final} = \frac{135}{1 - 0.1}$$

$$n_{final} = \frac{135}{0.9}$$

$$n_{final} = 150$$

However, we received a total of 161 responses.

2.3. Sampling

Purposive sampling which is a type of non-probability sampling method was used to select participants for the study. An online google form was circulated among all the MBBS students including students from Sem 1 – Sem 10 as they were all included in the study. Besides that, other inclusion criteria are those medical students who agreed to participate and fully completed the questionnaires. The exclusion criteria are those with incomplete questionnaires, irrelevant responses, those who do not provide informed consent and disagree to participate in this research.

2.4. Data Collection

The data was collected by giving questionnaires to undergraduate medical students in Manipal University College Malaysia via google form. The questionnaire consisted of 3 parts. The first part contained informed demographic information (age, gender, ethnicity, semester), anthropometry (height, weight, BMI), socioeconomic data (residence, house type, spaces) and underlying health conditions.

In part two, physical activity was assessed by using International Physical Activity Questionnaire- Short Version (IPAQ-SF). IPAQ-SF consisted of 9 questions and it assessed type of physical activity, frequency and duration in the past 14 days during MCO. Type of physical activity consisted of walking, moderate activity (carry light load, light cycling) and vigorous activity (heavy lifting, intense aerobic sports). Frequency was asked in terms of days per week and duration was asked in minutes per day. Responses were converted to Metabolic Equivalent Task minutes per week (MET-min/week) via automatic scoring of IPAQ-S. [41] The result was categorized into 3 levels such as high, moderate and inactive with specific criteria. High: At least 3 days of intense activity and accumulating at least 1500 MET-minutes/week; more than 7 days of any combination of walking, moderate or intense activity achieving a minimum of at least 3000 MET-minutes/week. Moderate: 3 or more days of intense physical exercise of minimum 20 minutes a day; 5 or more days of moderate physical exercise or walking at least 30 minutes a day; 5 or more days of combined physical activity (walking, moderate and intense exercise) achieving the value of 600 MET min/week. Inactive: No activity or does not meet the criteria of high and moderate level.

In part three of the questionnaires, WHOQOL-BREF English version was used as the tool to measure quality of life of participants. It consisted of 26 questions. The first two questions asked about overall quality of life and general health. The remaining 24 questions were classified into 4 domains (physical- 7 questions, psychological- 6 questions, social relationships- 4 questions, and environment- 8 questions). Participants were given a scale of 1 to 5 to choose their answers. The mean value of each domain was used as the raw value. Transformed domain scores were obtained after multiplying the raw value by 4. The maximum score of each domain is 100 and the higher the score, the higher the quality of life.

2.5. Data Processing and Data Analysis

The data was downloaded from the Google Form and was entered into Microsoft Excel. Data was then analysed using Epi

Info Version 7.2.4. In the first part of study, independent variables include BMI, age (years), gender, ethnicity, underlying diseases, geographical or environmental area and the dependant variable was physical activities. In the second part of study, the independent variable was physical activity (low, moderate, high) and the dependant variable was quality of life. The frequency and percentage of independent variables which were BMI, age (years), gender, ethnicity, underlying diseases and geographical or environmental area was calculated and was compared with levels of physical activity (inactive and active). The differences between the mean values of the analysed WHOQOL-BREF domains (physical, psychological, social and environmental) depends on the level of physical activity (inactive, minimally active and HEPA active) of the respondents. The level of significance was set as 0.05 (5%). The statistical tests used for the hypothesis testing were determined by the independent and dependent variables used in the study as shown in Table 1.

Table 1. Independent and dependent variable with statistical test.

Independent variable	Dependent variable	Statistical test
BMI	Physical activity	Chi square test
Age (years)	Physical activity	Chi square test
Gender	Physical activity	Chi square test
Ethnicity	Physical activity	Chi square test
Underlying diseases	Physical activity	Chi square test
Geographical/environmental area	Physical activity	Chi square test
Physical activity	Quality of life	ANOVA

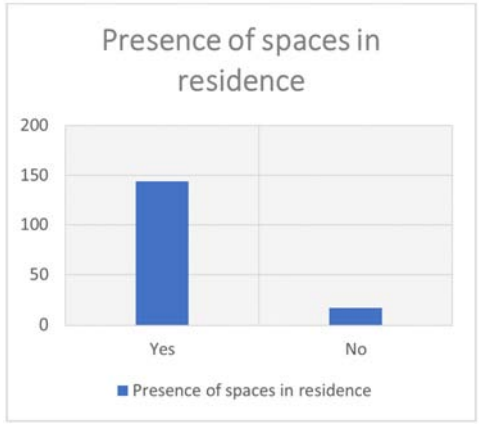
2.6. Ethical Consideration

The research was approved by the Research Ethics Committee, Faculty of Medicine, Manipal University College Malaysia. The participants were informed that their participation in the study was completely voluntary. An informed consent form with all the relevant and important details of the study was given to the participants. After obtaining their consent, they proceeded to the online survey by answering the questionnaire. At the same time the participants were assured that the study was completely confidential and were encouraged to answer all the questions provided.

3. Results

Table 2. Sociodemographic characteristics of undergraduate medical students of MUCM (n=161).

Variables	Frequency (%)
Age	
<22	52 (32.30%)
≥22	109 (67.70%)
Mean (SD)	21.9 (1.49)
Gender	
Male	59(36.65%)
Female	102(63.35%)
Ethnicity	
Malay	14(8.7%)
Chinese	34(21.12%)
Indian	93(57.76%)
Others	20(12.42%)
Semester	
Pre-clinical	59 (36.65%)
Clinical	102(63.35%)
BMI	
Underweight	23(14.29%)
Normal	110(68.32%)
Overweight	21(13.04%)
Obese	6(3.73%)
Extremely obese	1(0.62%)
Residence	
At home, living with family	91(56.52%)
Melaka campus	2(1.24%)
Muar campus	50(31.06%)
Outside campus, living alone	6(3.73%)
Outside campus living with friends	12(7.45%)
House type	
Apartment / flat	14(8.7%)
Bungalow	15(9.32%)
College hostel	43(26.71%)
Condominium	1(0.62%)
Duplex / studio	2(1.24%)
One-story house	1(0.62%)
Semi-detached house	22(13.66%)
Terrace / linked / Superlink house	59(36.65%)
Townhouse	4(2.48%)
Spaces	
Yes	144(89.445)
No	17(10.56%)
Underlying disease	
Yes	30(18.63%)
No	131(81.37%)



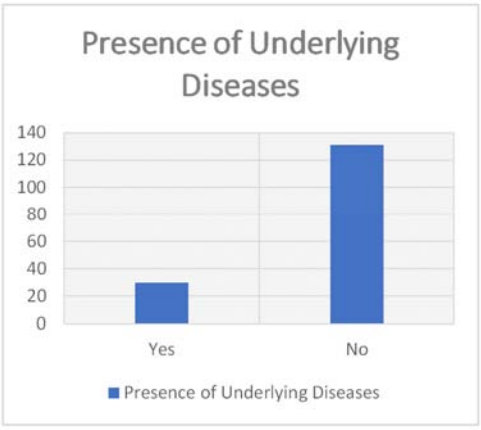


Figure 1. Frequency of BMI, spaces and underlying diseases.

We distributed the questionnaires to all the MBBS students in MUCM and we received 161 responses from them. Table 2 shows the frequency and percentage of the sociodemographic characteristics of undergraduate students in MUCM. The age of the respondents was divided into 2 categories which are students who were in the age of below 22 and with the age of 22 and above. A majority of the students were in the 22 and above category (67.7%), while the mean age of this study was 21.9 years with a standard deviation of 1.49. Meanwhile, 59 respondents (36.65%) were male and 102(63.35%) were female. As for the ethnicity, the predominant ethnic group were Indians (57.76%), followed by Chinese (21.12%), Others (12.42%) and Malays (8.7%). In terms of semester, 59 (36.65%) of the respondents were in the pre-clinical phase while 102 (63.35%) were in the clinical phase. In the aspect of BMI, majority of them were in the normal category (68.32%), while 23 of them were underweight (14.29) and the rest were categorised in the overweight (13.04%), obese (3.73%) and extremely obese (0.62%) categories. Most of the students are staying at home with their family (56.52%), followed by staying at Muar Campus (31.06%), the rest are staying outside either alone (3.73%) or with friends (7.45%) and Melaka campus (1.24%). Highest number of the respondents were staying at terraced/link/super link house (36.65%), followed by staying at the college hostel (26.67%), and staying at a condominium and one-story house were the least (0.62%). In the presence of space for physical activities to be performed, 144 of them had the space (89.445) while the rest didn't. Lastly, 81.37% of the respondents didn't have any underlying conditions or previous sports injuries but 30 of them did suffer from those conditions (18.63%).

Table 3. Level of activeness among undergraduate medical students of MUCM during COVID-19 Pandemic (n=59).

Level of Activeness	Frequency (%)
Low	14(23.73%)
Moderate	22(37.29%)
High	23(38.98%)

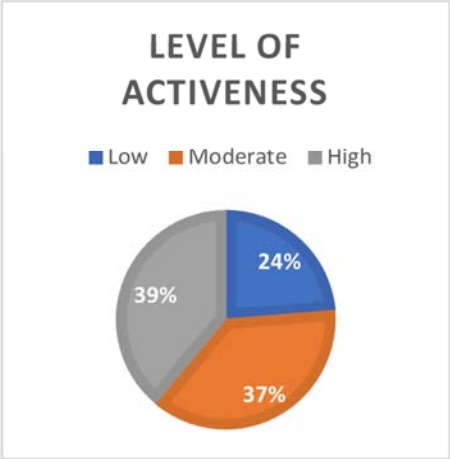


Figure 2. Level of activeness in percentage.

Despite our sample size being 161, in table 3 the sample size is 59 as those who answered "not sure" in part 2 of questionnaires were eliminated. Out of 59 participants, 23.73% of them had low activeness in physical activity, 37.29% had moderate activeness and 38.98% had high activeness during COVID-19 pandemic.

Table 4. Assessment of quality of life among undergraduate medical students of MUCM during COVID-19 Pandemic (n=161).

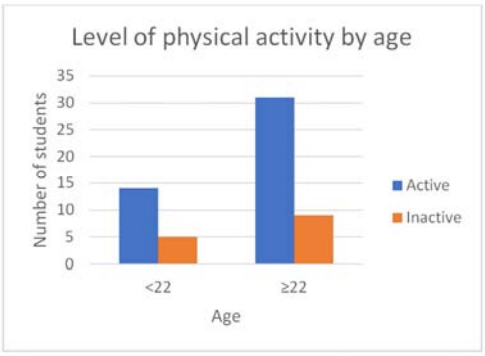
Types of Domains	Mean (SD)
Physical health (Domain 1)	49.52 (12.65)
Psychological health (Domain 2)	56.46 (14.82)
Social relationships (Domain 3)	58.46 (19.71)
Environment (Domain 4)	67.17 (16.80)

Table 4 shows the mean score of each domain in quality of life among undergraduate medical students of MUCM during COVID-19 pandemic. Among 4 domains, environment scored the highest score which is 67.17. Second highest is social relationships with 58.46, followed by psychological health 56.46. Physical health domain scored the least out of the 4 domains with 49.52.

Table 5. Association between age(years), gender, BMI, ethnicity, underlying diseases, presence of indoor or outdoor spaces and physical activity life among undergraduate medical students of MUCM during COVID-19 Pandemic (n=59).

Independent variables	Physical activity		Odds ratio (95% CI)	Chi - square	P - value
	Active (%)	Inactive (%)			
AGE					
≥ 22 years	31 (68.9)	9 (64.3)	1.23 (0.35 – 4.35)	0.10	0.748
<22 years	14 (31.1)	5 (35.7)			
GENDER					
Female	23 (51.5)	7 (50.0)	1.05 (0.32 – 3.47)	0.01	0.942
Male	22 (48.9)	7 (50.0)			
BMI					
Overweight	11 (0.24)	2 (14.3)	2.09 (0.40 – 10.96)	0.78	0.378
Underweight	5 (11.1)	1 (7.1)	1.90 (0.20 – 18.11)	0.32	0.573
Normal	29 (64.4)	11 (78.6)			
ETHNICITY					
Chinese	10 (22.2)	3 (21.4)	1.67 (0.11 – 25.43)	0.14	0.712
Indian	28 (62.2)	8 (57.1)	1.75 (0.14 – 21.88)	0.19	0.661
Other	5 (11.1)	2 (14.3)	1.25 (0.07 – 22.88)	0.02	0.880

Independent variables	Physical activity		Odds ratio (95% CI)	Chi - square	P - value
	Active (%)	Inactive (%)			
Malay	2 (4.4)	1 (7.1)			
UNDERLYING DISEASES					
Yes	9 (20.0)	5 (35.7)	0.45 (0.12-1.68)	1.46	0.227
No	36 (80.0)	9 (64.3)			
PRESCENCE OF OUTDOOR OR INDOOR SPACES					
Yes	45 (100.0)	9 (64.3)	Undefined	17.56	<0.001
No	0 (0.0)	5 (35.7)			



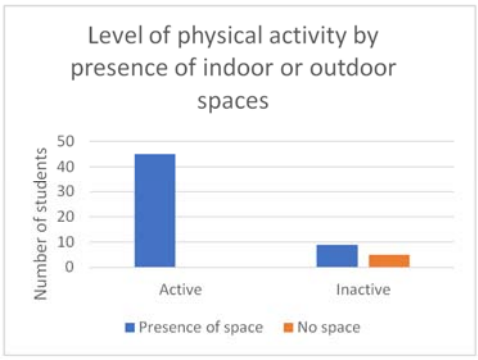


Figure 3. Level of activeness by age and level of activeness by presence of spaces.

Table 5 shows the association between sociodemographic profile of students and physical activity. It is seen that students who are 22 years of age or older were 1.23 times more likely to be active than those below 22 years of age (95% CI for OR 0.35 to 0.45; P - value: 0.748). Females were 1.05 times more likely to be active than males (95% CI for OR 0.32 to 3.47; P-value: 0.942). Furthermore, students who were overweight were 2.09 times more likely to be active (95% CI for OR 0.40 to 10.96; P- value: 0.378) while those underweight were 1.90 times more likely to be active (95% CI for OR 0.20 to 18.11; P- value: 0.573) than those who were normal weight. Chinese students were 1.67 times more likely to be active than Malay students (95% CI for OR 0.11 – 25.43; P-value: 0.712). Moreover, students of Indian ethnicity were 1.75 times more likely to be active (95% CI for OR 0.14 – 21.88; P-value: 0.661) than Malay students. As for underlying diseases, it was found that students with underlying diseases were less likely to be physically active compared to students without underlying diseases but there was no significant association (95 % CI for OR 0.12-1.67; P- value: 0.227). The odds of students who have outdoor or indoor spaces were undefined for being physically active as compared to those without outdoor or indoor spaces but there was a significant association (95% CI for OR undefined; P- value: <0.001).

Table 6. Association between physical activity and quality of life among undergraduate medical students of MUCM during COVID-19 Pandemic (n=59).

Quality of life	Physical activity Mean (SD)			P value
	Low	Moderate	High	
Physical health (D1)	45.29 (17.23)	54.73 (9.88)	53.87 (11.10)	0.067
Psychological health (D2)	49.14 (20.36)	60.81 (11.57)	65.65 (16.39)	0.012
Social relationship (D3)	46.43 (21.55)	67.32 (12.86)	64.65 (21.96)	0.005
Environmental (D4)	59.43 (20.68)	69.50 (12.28)	73.70 (15.59)	0.035

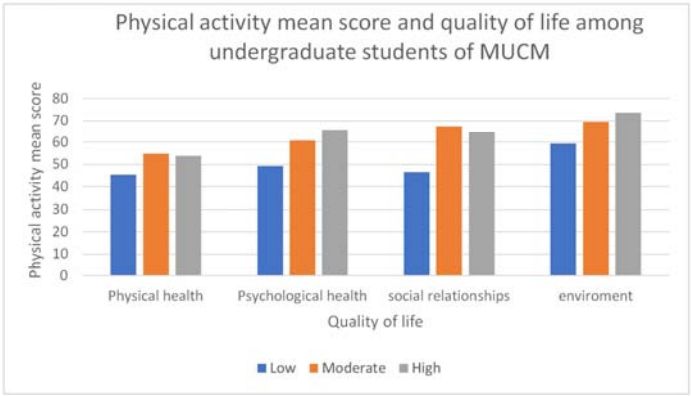


Figure 4. Association between physical activity and quality of life.

Table 6 shows the association between physical activity (low, moderate and high) and four domains of Quality of life (physical health, psychological health, social relationships and environment). Students with moderate level of physical activity had the highest physical health mean score of 54.73 (SD= 9.88) followed by students with high and low levels of physical activity with mean score of 53.87 (SD= 11.10) and 45.29 (SD= 17.23) respectively. The p-value is 0.067 thus showing no significant association between physical activity and physical health. Medical students with high level of physical activity had the highest psychological health mean scores of 65.65 (SD= 16.39) followed by students with moderate and low levels of physical activity with mean scores of 60.82 (SD= 11.57) and 49.14 (SD= 20.36). The p-value is 0.012 thus showing a significant association between physical activity and psychological health. Next, students with moderate level of physical activity had highest social relationships mean score of 67.32(SD= 12.86) followed by students with high and low levels of physical activity with mean score of 64.65 (SD= 21.96) and 46.4286 (SD= 21.55) respectively. The p-value is 0.005 thus showing significant association between physical activity and social relationships among medical students. Students with high level of physical activity had the highest environment mean scores of 73.80 (SD= 15.59) followed by students with moderate and low levels of physical activity with mean scores of 69.50 (SD= 12.28) and 59.43 (SD= 20.68) each. The p-value is 0.035 thus showing a significant association between physical activity and environment.

4. Discussion

During this COVID-19 pandemic lockdown, majority of studies have found that physical activity is decreasing. [42] Negative psychosocial impact such as stress and mental disturbance is also seen during lockdown. [43] With these two findings, we are aiming to study the effect of physical activity on quality of life during COVID-19 pandemic among medical student and the factors that associated with physical activities.

In our study, we came across that only 23.73% of participants had low physical activity whereas most of the participants had moderate and high physical activity. Our findings did not meet our expectations as seen in previous studies. One of the studies has shown that physical activity among young adults in Bavarian Universities, Germany is decreasing by 40% during COVID-19 lockdown period. [44] Another study had shown 48.6% decreased in physical activity among undergraduate students in Italy during lockdown. [45] However, there are studies that give similar results with our current research. In respect to previous studies done, people in Belgium exercised more during COVID-19 pandemic lockdown. This is due to people who were already practicing highly intensity of physical activities before COVID-19 pandemic. Furthermore, Health benefits of exercise and environmental influence such as threatened health, rather than social influence caused an increased in physical activity during lockdown. [46] Another research has shown that low activeness before COVID-19 was significantly increased during lockdown. This could be due to changes in daily routine and habits. Additional reason that suggested rise in level of activeness is people are spending more time in low level of physical activities which categorised as low-intensity such as cooking or cleaning during the lockdown. [23]

Furthermore, this study showed that there was no significant association between age, gender, ethnicity, BMI, underlying disease and physical activity among undergraduate medical students of MUCM. However, in a previous study among the Canadian community, ethnicity was significantly associated with physical activity. [47] A significant association was revealed between physical activity and health related quality of life despite BMI in a previous study among US adults which assess the relationship between health-related quality of life, physical activity and BMI. [48] Moreover, our study revealed a significant association between the presence of indoor or outdoor spaces and physical activity. In contrary to our finding, a previous cross-sectional study to evaluate the relationship between quality of urban green space and physical activity in Norwich, UK shows that there is no significant association between availability of green spaces and physical activity [49].

According to our study, the association between physical activity and Quality of life (QOL) shows significant association for low, moderate and high level of physical activity in relation to psychological health, social relationships and environment domain scores among medical students. However, there was no significant association noticed between low, moderate and high level of physical activity and physical health domain score of QOL. A previous study that was conducted in Germany on impact of COVID-19 in relation between physical activity, screen time and Health-related Quality of life among children and adolescents showed a positive association between physical activity and mental and psychological health among female participants in the early to later childhood. [50] In a pilot study that was conducted in Tunisia during COVID-19 outbreak among the population who aged from 18-30 years old without any hindrance that could affect their level of physical activity showed that the vigorous intensity physical activity had positive correlation to the physical health domain of the participants. Apart from that, in that study the researchers found that there were large correlations between the social and

psychological domains of QOL and all intensities of physical activity. [51] Besides, another study that was conducted to find out if there are any changes in the physical activity and QOL among students before and during COVID-19 lockdown shows that there was an increase in psychological domain score among females however there was no major changes in the QOL domain scores noticed among the male participants. [52] In addition, a study that was conducted in Italy during COVID-19 pandemic shows that COVID-19 spread had caused reduction in the physical activity levels which subsequently led to a negative effect on the psychological well-being of the participants. [23] Moreover, a cross-sectional online survey that was conducted among Brazilian population showed that physical inactivity linked to diminishing of physical health as well as the mental health of the participants during this COVID-19 pandemic. [53]

We definitely observed some limitations in this study. Since it's a cross-sectional study, we were only able to measure the associations at one point in time through questionnaires; therefore it was difficult to establish temporal relationships between the variables. Furthermore, as we did not do any follow ups in this study so changes over time cannot be observed in this study. Besides this, the response rate varies according to batches and this insufficiency of data can't be representative for each semester as a whole. The response rate was the lowest in the senior most batch compared to the other batches, the reason being that final examinations were going on for them. Other than that, the data was collected during MCO phase 4 (total lockdown) period, the results can vary according to the phases and duration of MCO. It was necessary for the participants to recall the duration of their activities when they were answering the questionnaires; this led to inaccuracy of data as most of them weren't sure about the duration. Lastly, generalization to other settings was not possible as the study was only conducted among one private medical college.

According to our result, even though most of the students were found highly active during COVID-19 pandemic, those who were under the low active category had the poorest quality of life based on the mean score. We recommend that participants should be more vigilant about their health especially when it comes to being active as it can affect one's quality of life directly or indirectly. Future research should explore more on the different phases of MCO period as the results can vary according to the phases. We can also include participants from different states as SOP varies according to the states/regions and this can also affect a person's level of activeness. Besides that, future studies should include students from various universities or professions so that we can prevent generalization problems because of confining to only one university. Other than that, to make sure that the results are accurate and feasible, future researchers must ensure participation is more equally distributed among the students from different semesters.

5. Conclusion

In conclusion, physical activity had a significant impact on many domains which contribute towards the quality of life of students in MUCM. Students with moderate level of physical activity had the highest mean scores in physical health and social relationship domains followed by students with high and low levels of physical activity respectively. There was significant association between physical activity and social relationships. Moreover, students with high level of physical activity had the highest mean scores in psychological health and environmental domains followed by students with moderate and low levels of physical activity respectively. There was a significant association between physical activity and psychological health. The association between physical activity and environment was also found to be significant. 83.3 % of students who had outdoor or indoor spaces to perform physical activity were active. There was a significant association between presence of outdoor or indoor spaces and physical activity. Hence, medical colleges should encourage medical students to participate in physical activity and lead an active lifestyle both during and after the COVID - 19 pandemic to benefit from its positive impact on the quality of life.

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