Prevalence and Patterns of Physical Activity amongst Students of Ameeruddin Medical College, Lahore

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Abstract

Objective: To determine the low, moderate, and high-levels of physical activity based on total metabolic equivalent task (MET)- minutes per week of physical activity in relation to gender, accommodation, and academic year of medical school amongst students of a medical college.

Methods: This cross-sectional study includes 177 medical undergraduate students, selected through simple random sampling from December 2023 to March 2024. A scoring system was developed according to the International Physical Activity Questionnaire scoring system categorizing levels of physical activity as low, moderate, and high based on MET-minutes calculated for walking, moderate, and vigorous activities. To find relation of different levels of physical activity with age, gender, accommodation and education, the chi square test of significance was utilized. The p-value < 0.05 was considered statistically significant.

Results: Total weekly MET-minutes calculated by combining the MET-minutes of walking, moderate, and vigorous activities was less than 600 for 55 (31.1%) students categorized as low level of physical activity. Among the students, 77 (43.5%) had a total MET-minutes/week score between 600 and 3000, indicating a moderate level of physical activity. Meanwhile, 45 students (25.4%) had a score exceeding 3000, categorized as a high level of physical activity. Overall, the majority (43.5%) engaged in moderate physical activity in their daily lives, while 25.4% performed high levels of activity, and 31.1% engaged in low levels of physical activity. No significant relation of different levels of physical activity with age, gender accommodation and education were found.

Conclusion: Females exhibited lower levels of high-level activity compared to males. Both hostel residents and day scholars showed an improvement in moderate physical activity levels but a decline in vigorous activity levels. The overall high prevalence of physical inactivity especially amongst female residents of hostel or day scholars demands more awareness programs and mandatory extracurricular physical activities. Future research should be focused on determinants of physical inactivity amongst medical students.

Keywords: Physical activity, Physical activity MET-Minutes, Patterns of physical activity.

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Introduction

Physical activity is basically movement of the body produced by skeletal muscles with expenditure of energy. This refers to all types of movement, whether for enjoyment, commuting, or job-related tasks[1]. Every adult should participate in 150–300 minutes of moderate-intensity physical activity, 75–150 minutes of vigorous-intensity activity, or a combination of both each week, according to the World health organization recommendations[2]. Physical inactivity is characterized by not fulfilling the weekly recommended amount of minimum 150 minutes of moderate physical activity, 75 minutes of vigorous physical activity, or a combination of both[3].

Physical activity patterns (PAP) are expressions of levels of physical activities. To find the patterns of physical activity of an individual, energy

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expenditure during physical activity is weighed in terms of METs to generate a score in MET-minutes. The levels of physical activity are determined based on these MET-minutes scores. The International Physical Activity Questionnaire (IPAQ) short form reports all continuous scores in MET-minutes per week and an average MET score is calculated for each activity type, such as walking, moderate-intensity, and vigorous-intensity activities, to compute MET values and MET-minutes per week. The population is categorized into three levels of physical activity: 1. Low, 2. Moderate, and 3. High[4].

Globally, physical inactivity ranks 4th as a major risk factor for mortality. 7.2% of all deaths, 7.6% of cardiovascular deaths and 1.6% of hypertension cases worldwide are due to low physical activity levels[5]. Pakistan ranks third in the world in diabetes prevalence[6] tenth for obesity and has 18.9% hypertensive people above 15 years of age[7]. Most young people do not fulfil the current physical activity recommendations[8]. Sedentary lifestyles and insufficient physical activity lead to major health concerns, particularly for young individuals like college students[9]. A cross-sectional study done in 2016 among students at Khyber Girls Medical College, Peshawar, revealed that among hostel residents 44.2% were engaged in low-level physical activity, 11.6% in moderate, and 44.2% in vigorous. For day-scholars, 36% had low-level physical activity, 37.5% engaged in moderate, and 21.5% in vigorous activities[10]. Understanding the trends in physical activity among medical students is essential to address potential health challenges and implement targeted interventions. The potential implications of physical activity patterns on the health and well-being of medical students led us to undertake our research on this problem. With this context, the research was designed to evaluate the prevalence and patterns of physical activity among medical students. The study aims to determine low, moderate, and high levels of physical activity based on total MET-minutes/week, considering factors such as gender, accommodation, and academic year in a medical college.

Methodology

This cross-sectional study was conducted at Ameer Uddin Medical College over three months, from December 2023 to March 2024, following IRB clearance. The sample size was calculated to be 177, using a z-value of 1.96 at a 95% confidence interval, with a proportion of 21.5% and a margin of error of 5% for a population of 548, using the formula $n = z^2 \times (1 - p) / d^2$. Students were selected through simple random sampling. The study included undergraduate students currently enrolled at Ameer Uddin Medical College who provided informed consent. Students with disabilities or medical conditions restricting physical exertion were excluded. Data on age, gender, education, accommodation, type, intensity, frequency, and duration of past seven days of physical activity was collected using a standardized pre-tested questionnaire.

Patterns of physical activity were categorized into three tiers: low level, moderate level, and high level. Data analysis was done using SPSS version 25. The mean and standard deviation were calculated, along with the frequencies and percentages for age, gender, education, and accommodation. Crosstabulations were performed to analyze the relationship between gender, age, year of medical school, and accommodation with levels of physical activity. A clustered column chart was used to illustrate the levels of physical activity.

Using the average MET values established by the IPAQ Research Committee (3.3 METs for walking, 4.0 METs for moderate physical activity, and 8.0 METs for vigorous physical activity), the following continuous scores were calculated: 1. Walking MET-minutes/week = 3.3 x walking days x walking minutes. 2. Moderate MET-minutes/week = 4.0 × moderate-intensity activity days × moderate-intensity activity minutes. 3. Vigorous MET-minutes/week = 8.0 × minutes of vigorous-intensity activity × days of strenuous activity. 4. Total MET-minutes/week= Walking + Moderate + Vigorous MET-minutes/week. Total physical activity is achieved by adding walking, moderate-intensity, and vigorous-intensity activity. Walking, moderate-intensity exercise, or vigorous exercise combined with other

activities adding up to a minimum total of 600 to 3000 MET-minutes per week represents moderate level physical activity, while exceeding 3000 MET-minutes per week indicates high level physical activity. Failing to fulfill any of the two criteria indicates low physical activity. Physical inactivity, as per WHO guidelines, is defined as not doing moderate physical activity up to 150 minutes a week, 75 minutes a week of intense physical activity, or a combination of both. Association of age, gender, accommodation and education with physical activity is found by using chi square test of significance. The p-value considered statistically significant is < 0.05.

Results

The response rate remained 100%. The majority 63 (35.6%) were 21 years old with mean value 20.41 and standard deviation of 1.82. Female participants were 74 (41.8%) and 103 (58.2%) males. Day scholars were 108 (61%). (Table 01) Total MET-minutes/week valuated as the combination of walking, moderate, and vigorous MET-minutes/week was less than 600 for 55 (31.1%) students categorized as low level of physical activity. The majority 77 (43.5%) students had a total MET-minutes/week score ranging between 600 and 3000 categorized as a moderate level of physical activity. 45 (25.4%) students had a total MET-minutes/week score greater than 3000 categorized as a high level of physical activity. (Figure 02) The highest score achieved was 13302 MET-minutes/ week by only 1 (0.56%) student. Following the recommendations provided by the World Health Organization on physical inactivity, 93/177 (52.54%) failed to acquire 150 minutes of moderate physical activity per week, 94/177 (53.11 %) failed to accumulate 75 minutes of vigorous physical activity per week, or 93.5/177 (52.82%) failed to achieve the combination of both, and are therefore considered physically inactive. The levels of physical activity were high, moderate, and low for 30 (29.1%), 44 (42.7%), and 29 (28.16%) male students respectively, as compared to 15.

Table 1. Sociodemographic Variables

Sociodemographic Variables		(X)	(%)
Age in Years	18	29	16.4
	19	5	2.8
	20	49	27.7
	21	63	35.6
	22	30	16.9
	37	1	0.6
	Total	177	100
Year of Medical School study	First year	30	16.9
	Second Year	35	19.8
	Third Year	32	18.1
	Fourth year	68	38.4
	Final Year	12	6.8
	Total	177	100
Gender	Male	103	58.2
	Female	74	41.8
	Total	177	100
Accommodation	Day scholar	108	61
	Hostelite	69	39
	Total	177	100

Table 02. Levels Of Physical Activity According To Students' Age, Gender, Accommodation And Year Of Education

Predictors of physical activity				Level of physical activity			
Age	**Gender**	**Accommodation**	**Year of education**	**Low**	**Moderate**	**High**	**Total**
18	Male	Day scholar	First-year	1 (0.56%)	2 (1.13%)	1(0.56%)	4 (2.26%)
		Hostelite	First year	3 (1.69%)	7 (3.95%)	3 (1.69%)	13 (7.34%)
	Female	Day scholar	First-year	2 (1.13%)	5 (2.82%)	1 (0.56%)	8 (4.52%)
		Hostelite	First-year	2 (1.13%)	1 (0.56%)	1 (0.56%)	4 (2.26%)
19	Male	Day scholar	First-year	0 (0%)	0 (0%)	1 (0.56%)	1 (0.56%)
			Second-Year	1 (0.56%)	2 (1.13%)	0 (0%)	3 (1.69%)
	Female	Day scholar	Second-Year	1 (0.56%)	0 (0%)	0 (0%)	1 (0.56%)
20	Male	Day scholar	Second-Year	1 (0.56%)	1 (0.56%)	3 (1.69%)	5 (2.82%)
			Third-Year	4 (2.26%)	7 (3.95%)	1 (0.56%)	12 (6.78%)
		Hostelite	Second-Year	1 (0.56%)	2 (1.13%)	0 (0%)	3 (1.69%)
			Third-Year	1 (0.56%)	5 (2.82%)	3 (1.69%)	9 (5.08%)
			Fourth-year	0 (0%)	0 (0%)	1 (0.56%)	1 (0.56%)
	Female	Day scholar	Second-Year	2 (1.13%)	6 (3.39%)	1 (0.56%)	9 (5.08%)
			Third-Year	2 (1.13%)	2 (1.13%)	1 (0.56%)	5 (2.82%)
			Fourth-year	0 (0%)	1 (0.56%)	0 (0%)	1 (0.56%)
		Hostelite	Second-Year	1 (0.56%)	0 (0%)	0 (0%)	1 (0.56%)
			Third-Year	1 (0.56%)	2 (1.13%)	0 (0%)	3 (1.69%)
21	Male	Day scholar	Fourth-year	7 (3.95%)	7 (3.95%)	7 (3.95%)	21 (6.78%)
		Hostelite	Fourth-year	4 (2.26%)	6 (3.39%)	3 (1.69%)	13 (7.34%)
	Female	Day scholar	Third-Year	0 (0%)	1 (0.56%)	1 (0.56%)	2 (1.13%)
			Fourth-year	8 (4.52%)	9 (5.08%)	3 (1.69%)	20 (11.3%)
		Hostelite	Fourth-year	1 (0.56%)	3 (1.69%)	3 (1.69%)	7 (3.95%)
22	Male	Day scholar	Second-Year	1 (0.56%)	1 (0.56%)	1 (0.56%)	3 (1.69%)
			Fourth-year	1 (0.56%)	0 (0%)	0 (0%)	1 (0.56%)
			Final Year	2 (1.13%)	1 (0.56%)	2 (1.13%)	5 (2.82%)
		Hostelite	Second-Year	1 (0.56%)	0 (0%)	2 (1.13%)	3 (1.69%)
			Third-Year	0 (0%)	0 (0%)	1 (0.56%)	1 (0.56%)
			Fourth-year	1 (0.56%)	1 (0.56%)	0 (0%)	2 (1.13%)
			Final Year	0 (0%)	2 (1.13%)	1 (0.56%)	3 (1.69%)
	Female	Day scholar	Second-Year	0 (0%)	0 (0%)	3 (1.69%)	3 (1.69%)
			Fourth-year	1 (0.56%)	0 (0%)	0 (0%)	1 (0.56%)
			Final Year	1 (0.56%)	0 (0%)	1 (0.56%)	2 (1.13%)
		Hostelite	Second-Year	3 (1.69%)	1 (0.56%)	0 (0%)	4 (2.26%)
			Final Year	1 (0.56%)	1 (0.56%)	0 (0%)	2 (1.13%)
37	Female	Day scholar	Fourth-year	0 (0%)	1 (0.56%)	0 (0%)	1 (0.56%)
		TOTAL		55(31.02%)	75(42.38%)	45(25.42%)	177 (100%)

(high = at least 3000 met-minutes/week; moderate = at least 600 met-minutes/week; low = less than 600 met-minutes/week)

Table 3. Cross-Tabulations Age, Gender, Accommodation And Year Of Medical School

Variables			**High = Atleast 3000 MET-minutes/week ; Moderate = atleast 600 MET-minutes/ week ; Low = less than 600 MET-minutes/week**			**Total**	**Pearson Chi-Square value**	**Asymptotic Significance (sided)**
			Low	**Moderate**	**High**			
Age Categories		18-20	23	43	17	83	4.548	.103
		≥21	32	34	28	94		
Total		55	77	45	177			
Gender Categories	Male	29	44	30	103		2.038	.361
	Female	26	33	15	74			
Total		55	77	45	177			
Accommodation	Day Scholar	35	46	27	108		.231	.891

Hostilite		20	31	18	69			
Total		55	77	45	177			
Education Categories	1st & 2nd year	20	28	17	65		.029	.986
	3rd & 5th year	35	49	28	112			
Total		55	77	45	177			

(20.1%), 33 (44.5%), and 26 (35.1%) females having high, moderate, and low levels respectively. High level of physical activity appeared more prevalent in males, while moderate and low levels were more prevalent in females. Amongst day scholars 35 (32.4%) had low level, 46 (42.5%) moderate level, and 27 (25%) high level while 20 (28.9%) hostilites had low and 31 (44.9%) moderate and 18 (26%) high level of physical activity. Hostel students exhibit slightly higher levels of moderate and high-level physical activity (Table 02). There was no significant relation found between age, gender, accommodation, and Levels of physical activity by applying chi-square test of significance. By applying multinominal logistic regression, levels of physical activity were dependent variable and predictors were age, gender, education and accommodation. Our model fitting statistics were (chi-Square-6.619, P=.948) and Nagelkerke R^2 =0.042 while keeping reference category as Low none of the variable was significant predictor of physical activity. (P>0.05, CI and Odds ratio non-significant) (Table 03)

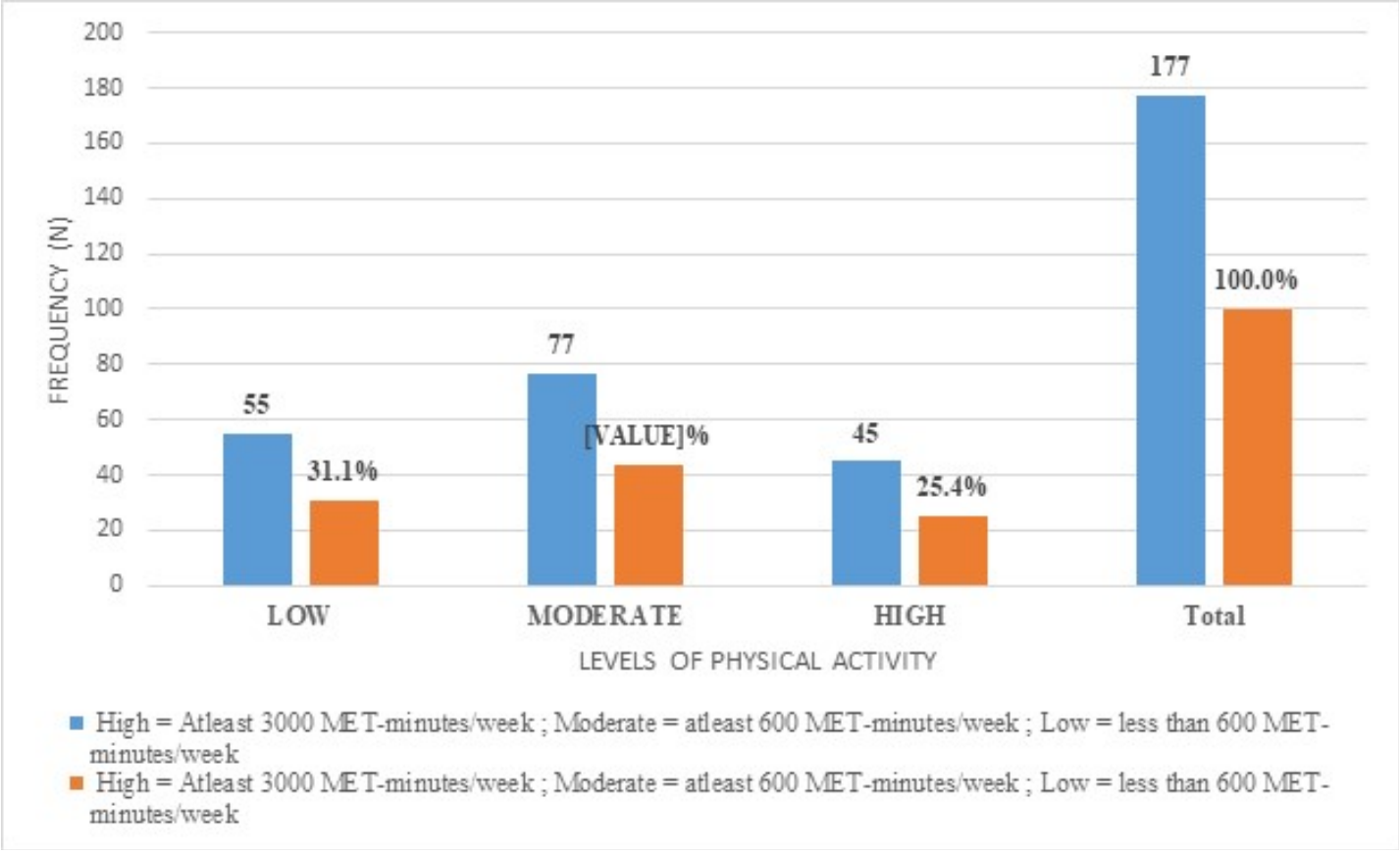

Fig 1. Levels Of Physical Activity

Discussion

According to a cross-sectional study carried out withs 407 students from medical colleges in Punjab and Sindh, Pakistan from May to June 2020 using an e-questionnaire including socio-demographics as well as the IPAQ short form to conduct the research, 48.2% were physically inactive[11]. The current study finding of 52.82% physically inactive is quite higher than the 14.5% physically inactive category according to an activity survey conducted at Banaras Hindu University, Varanasi, India[12] , 37% physically inactive category according to another study carried out amongst medical students at University of Khartoum, Sudan[13], 22.4% physically inactive category in a study from Germany[14] , 41% inactivity rate in a study from Sri Lanka [15] and 48.2% physical inactivity reported from Pakistan. This indicates a decline in physical activity levels compared to these studies, with the current findings lagging the activity levels observed in other Asian countries.

A study conducted in Davangere, Karnataka, found that 67% of medical students were inactive. Another study in 2021 among students at Wroclaw Medical University reported an inactivity rate of 80.7% (526 students), while a study at Majmaah University showed that 66.2% of 154 students were inactive. In comparison, the current study reports a physical inactivity rate of 52.82%, which is relatively lower than the rates observed in these studies from India, Poland, and Saudi Arabia.

An observational study carried out on medical students of Fatima Memorial Medical College from August 2021 to January 2022 using IPAQ showed that only 21% do vigorous activity, 45 % do moderate and 33.9% do mild[19]. While the current study has shown 43.5% performing moderate level activity in their daily life whereas 25.4% exercised high level and 31.1% having a low level of physical activity in their daily life, relatable to previous study findings with improved vigorous activity. Relatibility can be attributed to the same city with common environmental factors. A study conducted among medical students at Australian University, 56% students showed high level physical activity, 36 % showed moderate and 8 % exhibit low level physical activity[20] compared to 25.4% high, 43.5% moderate and 31.1% low level of physical activity in current. High level physical activity is seen more prevalent in these Indian and Australian studies while low is more prevalent in current. Another research conducted at Amala Institute of Medical Sciences, Thrissur, Kerala, India reported 54.44% moderate and 16.66% high levels of physical activity[21]. Another study conducted among Medical students at Sudan, 32% students showed moderate and 23.1% showed high levels of physical activity[22].While current study has shown 25.4% & 43.5% high and moderate levels of physical activity respectively. Current high levels are better than these previous studies from India and Sudan but moderate are still behind Indian findings. A study conducted among students of health sciences in Yogyakarta revealed that 54.4% of students exhibited low Physical activity.

According to the current study, 31.1% of students showed low physical activity which reflects improvement than the study conducted in Yogyakarta[23]. A 2016 descriptive cross-sectional study carried out among students at Khyber Girls Medical College, Peshawar, revealed that among hostel residents 44.2% were engaged in low-level physical activity, 11.6% in moderate, and 44.2% in vigorous. For day-scholars, 36% had low-level physical activity, 37.5% participated in moderate, and 21.5% in vigorous activities. [10] In the current study moderate and high levels appeared slightly higher in hostilites as 32.4% of day scholars had low levels compared to 28.9% of hostilites, 42.5% of day scholars practiced moderate level of physical activity in comparison to 44.9% of hostilites and high level was seen in 25% of day scholars compared to 26% of hostilites. Comparative to previous studies, current has shown improved moderate physical activity levels while deterioration in vigorous category for both hostilites and day scholars. A

study conducted among Rawalpindi medical university's fourth year students showed 27.7% low, 52.1% moderate and 20.2% high physical activity levels in males compared to 49.6% low, 36.8% moderate and 13.6% high physical activity levels in females[24] Another analytical cross-sectional study was carried out among Peruvian Public University's medical students during the years 2020 - 2021 using an international physical activity questionnaire (IPAQ) which showed that males exhibited 17.8% low, 49.5% moderate, and 32.8% high level, whereas females showed 35% low, 50% moderate, and 15% high levels of physical activity [25] Based on the findings of current study, the levels of physical activity were low, moderate, and high for 29/103 (28.16%), 44/103 (42.7%), and 30/103 (29.1%) male students respectively as compared to 26/74 (35.1%), 33/74 (44.5%) and 15/74 (20.1%) females having low, moderate and high levels respectively. High level physical activity appeared more prevalent in males while low was seen more in females in all these studies.

Conclusion

The findings indicate deterioration in overall physical activity. Females exhibited lesser high-level activity compared to males. . While moderate physical activity levels improved, vigorous activity levels declined among both hostel residents and day scholars. Overall high physical inactivity especially amongst female residents of hostel or day scholars demands more awareness programs and mandatory extracurricular physical activities for healthier future doctors. Future research should focus on identifying the factors contributing to physical inactivity among medical students

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