



An Analysis of Physical Activity and Sedentary Behavior among Medical Students of a Tertiary Education Institute

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Keywords: Physical activity; Sedentary behavior; Ipaq; Mbbs; Bpt; Pharm-D; B-Pharm.

Abstract

Introduction: Medical students in tertiary educational institutes attend long hour lectures, study for hours leaving no time for any physical activity, leading many students to adopt a sedentary lifestyle. This effects the human physiology mainly through; reduced lipoprotein lipase activity and decreased carbohydrate metabolism resulting in insulin sensitivity, directly causing cardiovascular diseases with increasing risks of metabolic disorders and cancers.

Aims and Objectives: To analyse and measure the physical activity and sedentary behaviour of all the medical students (MBBS, B-PHARM, PHARM-D and BPT) of all years in a tertiary education institute (Shadan Institute of Medical Sciences). The data is then cross-examined.

Materials and Methods: It is a prospective study aiming to measure the physical activity of all medical students, of all batches, using the International Physical Activity Questionnaire Short Form (IPAQ-SF). All students were given consent forms along with a physical copy of IPAQ-SF over 7 days and their respective responses noted. The data was grouped using IBM-SPSS software.

Result: As per our hypothesis, significant proportion of MBBS students live a sedentary lifestyle (22.4%), the highest of any course. BPT students have the highest number of physically active students (67.5%) followed by B-Pharm and Pharm-D at 53.5% and 51.6%. Males constituting the minority were still more physically active than females.

Introduction

“A sedentary behavior is the real sin against the Holy Spirit”
Friedrich Nietzsche.

In an era where it is ever becoming difficult to manage time in an ever competitive society, there is a growing concern towards one lifestyle; focusing more on productivity, than anything else. Such is a case exhibited by none other than the stu-

dents in tertiary educational institutes cramming hours to meet the deadlines that is required in a hectic atmosphere that the medical field provides. To reach their goals and ambitions there is an ever increase in the students investing the majority of their time attending lectures and long hours in the library to memorize facts and figures. Ironically, as students who are aware of human physiology, not much concern is given to their own physiology and thus we come to the question of physical activ-



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ity or to be more presumptuous the lack of such activity. This has led to many of the students to adopt a sedentary lifestyle and thus providing to us the main theme of this research paper. Though the major health risks of sedentary behavior are kept in ambiguity, the associated health problems are on the rise, an increase in sedentary behavior effects the human physiology through a number of ways; An impaired lipid metabolism with reduced lipoprotein lipase activity, decreased carbohydrate metabolism resulting in insulin sensitivity and vascular functions. Sedentary behavior has a definitive impact on the human body causing cardiovascular disease mortality and morbidity, cancer risks and a risk of metabolic disorders such as diabetes mellitus, hypertension, dyslipidemia musculoskeletal disorders and cognitive impairment [1-8].

Population

This cross sectional survey and observation is carried out in the private medical college Shadan Institute of Medical Sciences, Peeranchuru, Hyderabad. All batches from courses MBBS, BPT, B-Pharm and Pharm-D are taken in this study.

Population Distribution of students		
COURSE	NUMBER OF STUDENTS	RELATIVE FREQUENCY
MBBS		
First Year	122	11.6%
Second Year	132	12.6%
Third Year	128	12.2%
Final Year	114	10.9%
Interns	48	4.6%
BPT		
First Year	29	2.7%
Second Year	36	3.4%
Third Year	29	2.7%
Final Year	29	2.7%
B-Pharm		
First Year	70	6.7%
Second Year	58	5.5%
Third Year	53	5.0%
Final Year	73	6.9%
Pharm-D		
First Year	29	2.7%
Second Year	23	2.2%
Third Year	25	2.3%
Fourth Year	20	1.9%
Fifth Year	18	1.7%
Final Year	7	0.6%
TOTAL SAMPLE SIZE: 1043		100%

Limitations

It is understood that the students may or may not be completely truthful when responding to the questionnaires. Also, the questionnaires may be inadequate because it may not complete a full picture of the subjects, feelings, emotions, and behavior. Individuals may read differently into each question and therefore reply based on their own interpretation of the question.

Literature review

The use of IPAQ Questionnaire has been adopted in many studies to measure sedentary lifestyle of many demo graphs,

but the use of it to measure medical students' physical activity is limited and requires further research.

According to the study done by Suchitra Deolaikar et.al 2023 in the research paper titled "Descriptive study of physical activity and sitting time among medical students in North India" (total sample size of 250) 11.2% of the students living a sedentary lifestyle. It had shown a significant association between physical activity and body mass index, with the low prevalence of obesity among students engaged in moderate and high levels of physical activity.

Dr Jose Vincent from Amla Institute of Medical Sciences in Kerala in his paper titled "The prevalence of physical activity among MBBS students in a medical college in Kerala" had found that over a population of 150 students nearly 29% of the students were found to be "Physically Inactive."

In article titled "Physical Activity and Sedentary Behavior in medical students at a Peruvian Public University" by Janampa-Apaza, Pere-Mori et.al 2021 found that in a study population of 513 students sedentary behaviour was 60.9% among clinical and 55.5% in pre-clinical (<20year olds).

Methodology

Study design

This cross sectional survey and observation is carried out in the private medical college Shadan Institute of Medical Sciences, Peeranchuru, Hyderabad. The total population included all the students of MBBS, BPT, B-Pharm and Pharm-D.

Study Period: The study was conducted in a span of two months (August 2023-September 2023).

Sample Size: The total population of the students in the tertiary education institute is 1500 out which we received a total number of 1043 responses.

Inclusion criteria: Students belonging to Shadan Institute of Medical Sciences of the following courses:

MBBS, BPT, B-Pharm and Pharm-D.

Students of all years of the degree of these courses (including interns) were taken into this study.

Exclusion criteria: Students who were absent on the day this study was conducted.

Students who did not consent to this study. Post-Graduate Students were not taken into consideration for this study.

Study Tools: The relationship between Sedentary Behaviour and the health of the individual student was assessed using the International Physical Activity Questionnaire (IPAQ). Introduced in Geneva 1988 as a conventional international measurement to assess physical activity, revised version of 2020.

Consent was taken from a face to face basis from the students who were given a physical copy of the short form IPAQ questionnaire.

Data analysis: Data was analysed using IBM-Statistical Package for the Social Sciences for Windows, version 21 (SPSS Inc. 2021) and descriptive statistics will be used to compute demographic variables. Categorical variables would be expressed in frequencies and percentages. This comparison between adequate and inadequate knowledge and its association with so-

ciodemographic will be carried out using the Chi-Square test. Significance was set at $p < 0.05$.

Instruments; Reliability and Validity.

To measure physical activity, each participant was given the short form of the International Physical Activity Questionnaire (IPAQ) (Cocker et al, 2009; Tully & Margaret, 2011). The short form IPAQ contains four activity domains that include;

Vigorous activity,

Moderate physical activity,

Walking and Time spent sitting.

The data will be collected in hours and minutes spent in each and from this data we shall calculate certain 'Metabolic Equivalents' (MET).

From this scoring we divide the students in 3 main groups:

Sedentary (S)

Minimally Physically Active (MPA)

Physically Active (PA)

Then we cross examine with all the courses of the students and their batches.

The IPAQ is internationally recognized as a valid and reliable instrument for assessing Physical Activity. (Cocker et al, 2009).

The IPAQ Questionnaire has a reliability ranged between 0.96 and 0.46, taking an average of about 0.8. Correlations between this self-report sleep and the MOS Sleep subscales were statistically significant with the exceptions of the MOS Snoring subscale. There was fair to moderate agreement between the IPAQ and the accelerometer-measured physical activity and sitting [9].

Procedure

The Education Management and the Dean of the college had already previously informed the students of all the above aforementioned courses about the survey to be conducted in order to recruit the students from their respective classes. Once the students were done with their classes they were to be remained seated for a momentary time where the researchers presented information on the procedures and data collection protocol, along with copies of the questionnaires. Before the questionnaires were distributed, each subject was informed about the assurance of their anonymity and confidentiality and verbal consent was taken on a face to face basis before beginning the study. Furthermore, the subjects were informed of the purpose of the study, content of the questionnaires, and directions for completing the questionnaires. In addition to the questionnaires, demographic information was collected from all subjects.

Statistical analysis

Data was analysed using IBM-Statistical Package for the Social Sciences for Windows, version 21 (SPSS Inc. 2021) and descriptive statistics will be used to compute demographic variables. Categorical variables would be expressed in frequencies and percentages. This comparison between adequate and inadequate knowledge and its association with sociodemographic will be carried out using the Chi-Square test. Significance was set at $p < 0.05$.

Manuscript

Introduction

Despite the wealth of knowledge on the importance of being physically active, we see that a majority of Indians do not meet the standard. Furthermore it has been observed that during college or post-graduation courses a sedentary lifestyle will lead to obesity prevalence leads to higher chances of obesity. [10]. It could be referenced to the increased pressure and a need for time which would have been spent on physical activities [11]. This decrease in physical activity is a serious and important health matter that needs further research, as many health behaviours that carry over into adulthood are established during late adolescence [12]. Although a number of national samples have described physical activity and exercise in various populations, there is limited research examining student sedentary behavior, physical activity and exercise stages of change. A lack of physical activity has been associated with poor physiological wellbeing, such as increased risk of obesity, high blood pressure, heart disease, and type II diabetes. Research is now showing that there is need to better understand sedentary behavior in order to effectively impact physical activity. Sedentary behaviors such as television and phone use, watching have been associated with obesity in children and adults. However, one of the more popular hypothesis explaining the differences in sedentary behaviors and physical activity is the displacement hypothesis. This hypothesis suggest that the more time an individual devotes to a sedentary behavior, the less time he or she will devote to physical activity. This hypothesis also states that in order for this to occur, a new activity must be introduced to force out an old activity or behavior. A meta-analysis by Marshall et al. (2004) showed that sedentary behaviors are related to being physically inactive and is significantly associated with increased fatness. Therefore, the purpose of this study was to analyze the relationship of sedentary behavior and physical activity of the students. Also, a segment of the data will be analyzed based on gender differences, as research has shown this to have a significant impact on physical activities and barriers to physical activity, such as television and computer use.

Hypothesis

MBBS Students will not meet the daily recommended amounts of physical activity

MBBS students will have the highest percentage of sedentary students and lowest percentage of physically active.

BPT students will have the highest percentage of physical activity.

Males will be more physically active than females.

Statistical analysis

Result & Inference

MBBS

On an analysis of the data collected from MBBS students we can see that there is a considerable proportion of students living a sedentary lifestyle, largest proportion seen in final year students (IV students having 41.7% being sedentary). On further analysis of this data, we can see a progressive increase in physical activity as the years of the course increases. This may be attributed to the increase in medical and clinical postings starting from 2nd year and as the year increases more time is

given for the clinical postings ranging from 2 hours in 2nd year, 3 hour in 3rd year and an eventual 6 hours in 4th year.

Highest Physically active students (45.8%) belong to interns as they have both day and night shift in the teaching hospital along with an emphasis towards providing medical care. Apart from this there is an increased time spent on clinical practicals.

On the contrary, the highest sedentary students were seen in final year students/IV students (41.7%). This is attributed to the increased time studying and understanding clinical subjects that have a large syllabus and are time consuming.

Table 1: Tabular representation of the data collected showing the number and percentage of students with their respective physical activity status (MBBS).

		ACTIVITY			Total
		MPA	PA	SEDENTARY	
YEAR	I	55(45.1%)	31 (25.4%)	36(29.5%)	122
	II	45(34%)	43(32.5%)	44 (33.5%)	132
	III	49 (38.2%)	51 (39.8%)	28 (21.8%)	128
	IV	31 (21.5%)	42 (36.8%)	41 (41.7%)	114
	INTERNS	10 (20.8%)	22 (45.8%)	16 (33.3%)	48
Total		186	236	122	544

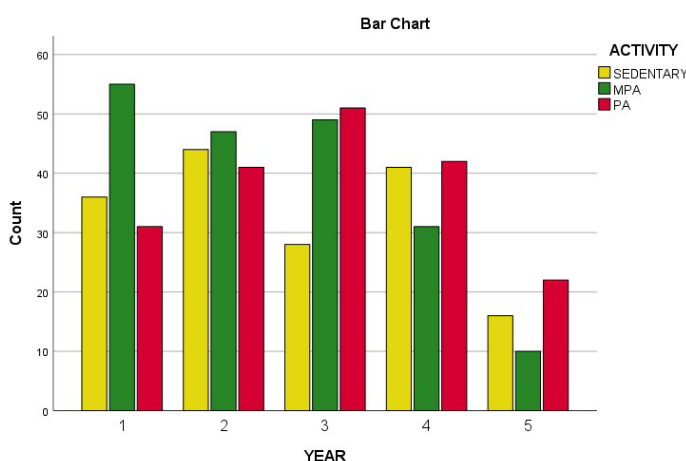


Figure 1: Graphical representation of the data collected comparing students with their respective physical activity status

Year wise the average time spent in these activities are represented in Table 1.1 as shown

Table 1.1: Graphical representation of the data collected comparing students with their respective physical activity status

	Mean	Std. Deviation
Days spent on VIGOROUS ACTIVITY	4.25 days	1.671 days
Minutes a day spent on VIGOROUS ACTIVITIES	35.09 minutes	34.362 minutes
Days spent on MODERATE ACTIVITY	4.57 days	1.744 days
Minutes a day spent on MODERATE ACTIVITIES	25.21 minutes	14.123 minutes
Days spent on WALKING	5.76 days	1.504 days
Minutes a day spent on WALKING	26.47 minutes	15.144 minutes
Time spent on SITTING (includes the time spent on attending lectures, watching television, entertainment, etc)	256.60 Minutes	70.45 Minutes

When it comes to gender based differentiation we can see that even though they constitute a majority, females are less physically active than males. But contrary to our hypothesis we can see that there is an almost equal distribution of both physically active males and females among MBBS students (Table 1.2).

$$\begin{aligned} \text{TOTAL PHYSICALLY ACTIVE MALE PRECENTAGE} &= \text{MPA}\% + \text{PA}\% \\ &= 70.3\% \end{aligned}$$

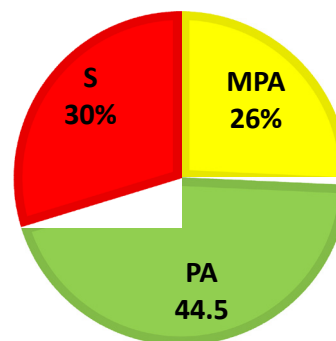
$$\begin{aligned} \text{TOTAL PHYSICALLY ACTIVE FEMALE PRECENTAGE} &= \text{MPA}\% + \text{PA}\% \\ &= 69.3\% \end{aligned}$$

This may be attributed to the fact that males and females both participate to similar lifestyles in order to maximise learning and attendance of long lectures. It is to be notes that MBBS males are less keen to join for any sports or active games as compared to their other course counterparts.

Table 1.2: Gender distribution of MBBS students. MPA- MINI-MALLY PHYSICAL ACTIVE, PA-PHYSICALLY ACTIVE. Note the almost similarities in the percentages of the two sexes.

					Total
		MPA	PA	SEDENTARY	
GENDER	MALE	45 (25.7%)	78 (44.5%)	52 (29.7%)	175 (100%)
	FEMALE	147 (39.8%)	109 (29.5%)	113 (30.6%)	369 (100%)

MALE



FEMALE

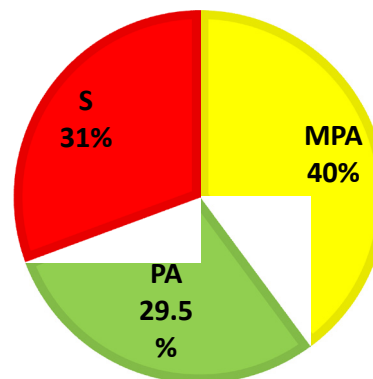


Figure 1.2: Pie-Chart representation of the gender distribution of MBBS students.

Pharmacy students (b-pharm and pharm-d)

B-Pharm and Pharm-D students exhibit much similar results, both showing higher physical activity and lower sedentary rates as compared to their MBBS counterparts. The mean time spent for Vigorous activities, moderate activities and walking of B-Pharm and Pharm-D students (Refer Table 2.1 and 3.1, comparing with Table 1.1) are considerably higher when compared with MBBS students.

B-Pharm and Pharm-D students have a greater freedom of time than the MBBS students due to lower syllabus and less time spent in studying. Also both the Pharmacy side had exhibited a greater inclination towards physical fitness, gym training and dancing as mentioned in their IPAQ-questionnaires. Even with a smaller population of students, Pharm-D students exhibit far greater rates of physical activity when compared to their larger B-Pharm neighbors. Sedentary Behavior in Pharm-D students is a few students to zero or even non-existent.

Table 2.0: Tabular representation of the data collected showing the number and percentage of students with their respective physical activity status for B-Pharm students.

	MPA	PA	SEDENTARY	Total
I YEAR	15 (21.4%)	35 (50%)	20 (28.5%)	70 (100%)
II YEAR	13 (22.4%)	36 (62%)	9 (15.5%)	58 (100%)
III YEAR	19 (35.8%)	22 (41.5%)	12 (22.6%)	53 (100%)
IV YEAR	20 (27.3%)	43 (58.9%)	10 (13.7%)	73 (100%)

Table 3.0: Tabular representation of the data collected showing the number and percentage of students with their respective physical activity status for Pharm-D student.

	MPA	PA	SEDENTARY	Total
I YEAR	14 (48.2%)	12 (41.3%)	3 (10.3%)	29 (100%)
II YEAR	13 (56.5%)	9 (39.1%)	1 (4.3%)	23 (100%)
III YEAR	11 (44%)	7 (28%)	7 (28%)	25 (100%)
IV YEAR	7 (35%)	13 (65%)	0 (0%)	20 (100%)
V YEAR	0 (0%)	18 (100%)	0 (0%)	18 (100%)
VI YEAR	2 (28.5%)	4 (57.1%)	1 (14.2%)	7 (100%)
total	47	63	12	122

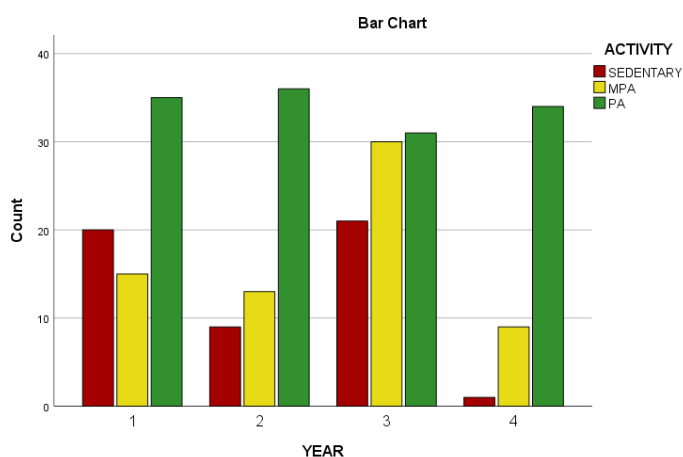


Figure 2.0: Graphical representation of the data collected comparing students with their respective physical activity status for B-Pharm students.

Table 2.1: Average/Mean days and minutes spent by a B-Pharm student in the respective activity present in IPAQ-SF, for B-Pharm students.

	Mean	Std. Deviation
Days spent on VIGOROUS ACTIVITY	4.16 Days	1.700Days
Minutes a day spent on VIGOROUS ACTIVITIES	49.26Minutes	44.881Minutes
Days spent on MODERATE ACTIVITY	4.80Days	1.690Days
Minutes a day spent on MODERATE ACTIVITIES	29.78Minutes	14.415Minutes
Days spent on WALKING	5.75Days	1.528 Days
Minutes a day spent on WALKING	32.57Minutes	17.570 Minutes
Time spent on SITTING (includes the time spent on attending lectures, watching television, entertainment, etc)	269.49Minutes	64.29Minutes

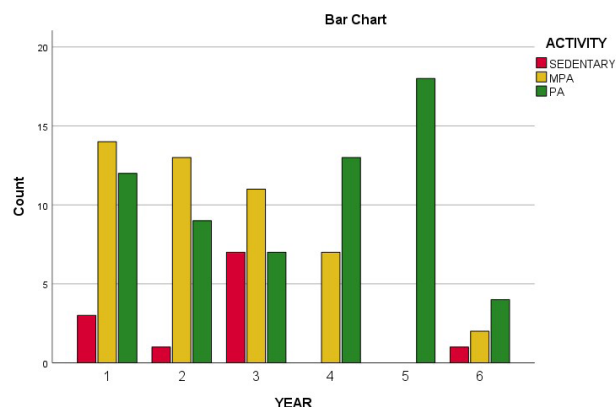


Figure 3.1: Graphical representation of the data collected comparing students with their respective physical activity status for B-Pharm students.

Table 3.1: Average/Mean days and minutes spent by a Pharm-D students in the respective activity present in IPAQ-SF.

	Mean	Std. Deviation
Days spent on VIGOROUS ACTIVITY	4.55 Days	1.715 Days
Minutes a day spent on VIGOROUS ACTIVITIES	59.29 Minutes	60.358 Minutes
Days spent on MODERATE ACTIVITY	4.42 Days	1.777 Days
Minutes a day spent on MODERATE ACTIVITIES	34.31 minutes	17.151 minutes
Days spent on WALKING	5.79 Days	1.424 Days
Minutes a day spent on WALKING	35.80 minutes	19.615 minutes
Time spent on SITTING (includes the time spent on attending lectures, watching television, entertainment, etc)	279.92 Minutes	47.653 Minutes

Due to them having greater time for extra-curricular activities, it is noteworthy to point that Pharmacy students hold more programmes such as Sports Week or Cultural Events that promote Physical Activity. Pharmacy students were even more expressive and extroverted than MBBS students which could explain a higher level of Physical Fitness.

On analysis of Table 2.2 and 3.3 with Fig 2.2 and Fig 3.2 we can see that in line with the hypothesis, male students are more physically active than females. Unlike the MBBS students, here there is a clear disparity between the male and female physical activity.

As mentioned above, in extra-curricular activities males have a greater dominance than females.

Table 2.2: Gender distribution of B-Pharm students. MPA- MINIMALLY PHYSICAL ACTIVE, PA-PHYSICALLY ACTIVE. Note the almost similarities in the percentages of the two sexes.

		MPA	PA	SEDENTARY	Total
GENDER	MALE	16 (16.3%)	67 (68.3%)	15	98 (100%)
	FEMALE	51 (32.6%)	69 (44.2%)	36 (23%)	156 (100%)
Total		67	136	51	254

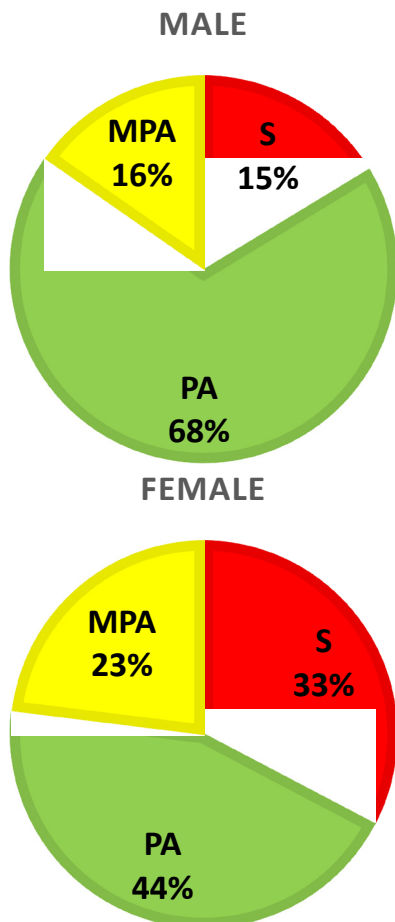


Figure 2.1: Pie-chart representation of the gender distribution for B-Pharm students.

	MPA	PA	SEDENTARY	Total
MALE	6 (19.3%)	23 (74.2%)	2 (6.4%)	31 (100%)
FEMALE	41 (45%)	40 (44%)	10 (11%)	91 (100%)
Total	47	63	12	122

Table 3.2: Gender distribution of Pharm-D students. MPA- MINIMALLY PHYSICAL ACTIVE, PA-PHYSICALLY ACTIVE. Note the almost similarities in the percentages of the two sexes for Pharm-D students.

Bachelors’ of Physio Therapy (BPT)

BPT students exhibit the highest physical activity among all of the medical students within the tertiary education institute. This is mainly due to the fact that they are well educated on the matter of physical activity and their clinical postings involve medical assessment of a person’s effective motor functions. The demonstrations for physical activity to the patient apart from having the lowest educational burden, synergizes the increased physical activity and lower sedentary rates.

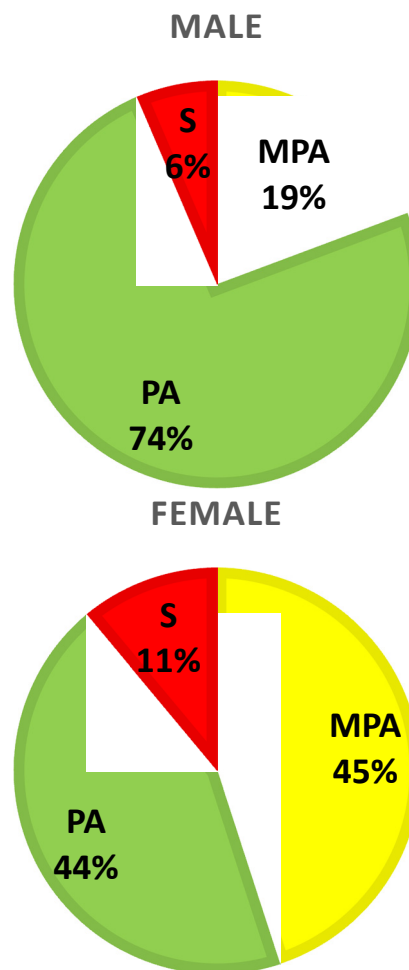


Figure 3.1: Pie-chart representation of the gender distribution for Pharm-D students.

Table 4.0: Tabular representation of the data collected showing the number and percentage of students with their respective physical activity status for BPT students.

	MPA	PA	SEDENTARY	Total
I YEAR	7 (24.1%)	21 (72.4%)	1 (3.4%)	29 (100%)
II YEAR	9 (5%)	22 (61.1%)	5 (13.8%)	36 (100%)
III YEAR	0 (0%)	29 (100%)	0 (0%)	29 (100%)
IV YEAR	11 (38%)	11 (38%)	7 (24.1%)	29 (100%)
Total	27	83	13	123

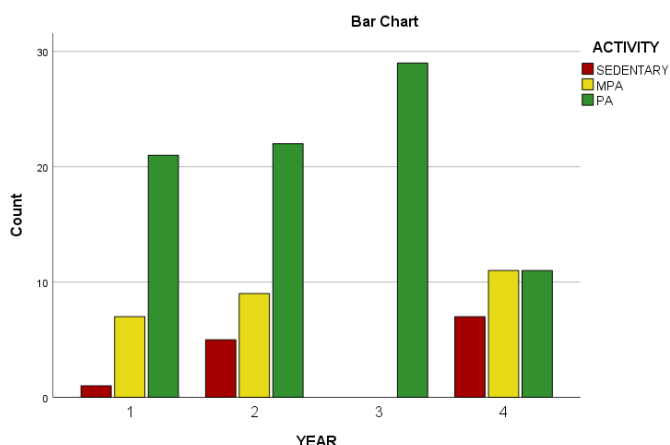


Figure 4.0: Graphical representation of the data collected comparing students with their respective physical activity status for BPT students.

Table 4.1: Average/Mean days and minutes spent by a BPT students in the respective activity present in IPAQ-SF. Gender disturbance of BPT students. MPA- MINIMALLY PHYSICAL ACTIVE, PA-PHYSICALLY ACTIVE. Note the almost similarities in the percentages of the two sexes for BPT students.

	Mean	Std. Deviation
Days spent on VIGOROUS ACTIVITY	4.31 Days	1.843 Days
Minutes a day spent on VIGOROUS ACTIVITIES	59.68 Minutes	52.439 Minutes
Days spent on MODERATE ACTIVITY	5.03 Days	1.765 Days
Minutes a day spent on MODERATE ACTIVITIES	37.31 Minutes	16.575 Minutes
Days spent on WALKING	6.35 Days	1.078 Days
Minutes a day spent on WALKING	38.13 Minutes	17.309 Minutes
Time spent on SITTING (includes the time spent on attending lectures, watching television, entertainment, etc)	294.63 Minutes	25.488 Minutes

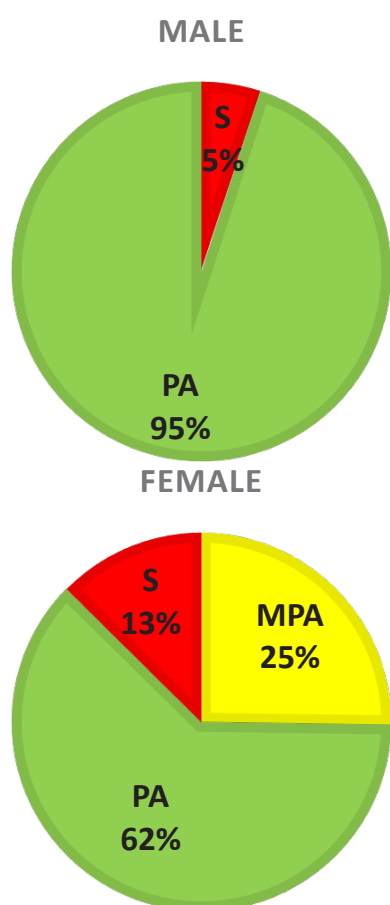


Figure 4.1: Pie-chart representation of the gender distribution for Pharm-D students.

Declaration

Funding: None.

Conflict of interest: None declared.

Ethical approval: Acquired by the ethics committee

Conclusion

Even though the research on the topic of Sedentary Behavior and it's effects require further research, though the undeniable fact is that it opens doors to a milieu of diseases. These diseases when beginning adolescents show the detrimental effects in

adulthood. College and university students require themselves to maintain adequate care of their bodies so they can achieve their many goals and aspirations.

Table 5.0: Summary of the data collected for all the courses and the students of the Tertiary Education Institute.

COURSE		Grade			Total
		Sedentary	Minimally Physically Active	Physically Active	
MBBS	Count	122	186	236	544
	% within COURSE	22.4%	34.2%	43.4%	100.0%
B PHARMACY	Count	51	67	136	254
	% within COURSE	20.1%	26.4%	53.5%	100.0%
BPT	Count	13	27	83	123
	% within COURSE	10.6%	22.0%	67.5%	100.0%
PHARM-D	Count	12	47	63	122
	% within COURSE	9.8%	38.5%	51.6%	100.0%
Total	Count	198	327	518	1043
	% within COURSE	19.0%	31.4%	49.7%	100.0%

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