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Original Research Article

Physical Activity among College Students during COVID-19 Pandemic Lockdown in Mangaluru, Karnataka

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Conflict of interest: Nil

Abstract:

The COVID-19 pandemic prompted unprecedented measures worldwide, including in India, affecting the physical activity, nutrition, and sleep patterns of students. This study aimed to assess these impacts among students in Karnataka during the lockdown. A cross-sectional online survey gathered data on demographics, physical activity, and weight changes. Results revealed a high prevalence of unintentional weight gain (80.99%), with reasons including lack of exercise and unhealthy eating. Physical activity levels were low, particularly in vigorous activities, while sedentary behaviour was common. These findings underscore the importance of addressing lifestyle changes during pandemics to mitigate adverse health effects.

Keywords: COVID-19 Pandemic, Physical Activity, Exercise, Sedentary Lifestyle.

Introduction

On 11March 2020, the WHO defined the Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) infection as a pandemic [1] ;Coronavirus disease (COVID-19) is a deadly disease which continues to affect many countries in the world. This is caused by the new coronavirus strain SARS-CoV-2 which has become a serious public health concern worldwide [2]. Since March 2020, India has been affected by the corona- virus disease 2019 (COVID-19) pandemic, which resulted in 30.5 million cases as of July 13, 2021 [3]. The Indian government has implemented various measures to prevent the spread of COVID-19, including social distancing, physical distancing, and large-scale social restrictions. Prolonged mandatory social distancing was chosen according to scientific evidence that the main route of transmission of the virus was via direct and indirect contact through air, saliva and respiratory secretions, droplets and aerosol, emitted by infected subjects [4], as pointed out in March WHO recommendation and confirmed [5,6].

Lockdown actions, which inhibited people's movements and social activities, were considered suitable right from the beginning in Italy [7], in Spain a few days later [8] and other countries such as China and South Korea also adopted them in the early stages of the spread of this disease in order to limit viral transmission and to prevent, or minimize, the impact of infectious disease, to avoid the collapse of health facilities and to contain deaths [9].

Forbidding both long-distance travels and short trips, closing shops, restaurants, schools, workplaces and any service considered nonessential, social distancing, and isolation at home suddenly reduced the amount of daily activities one could do, altered lifestyle and dietary habits, and additionally caused social and economic consequences. Different studies have pointed out how extended lockdown periods can adversely affect human health and wellbeing [9,10] with an increasingly sedentary lifestyle having negative consequences on psychophysical conditions and life quality [11]. Physical inactivity is an important research topic in social isolation conditions, as it is associated with a higher risk of cardiovascular and metabolic disease onsets that may predispose one to a greater risk of severe illness from COVID-19 [12–14]. A series of restrictive measures were imposed with the closure of gyms and sport centres and the ban of the majority of outdoor and social activities, with restrictions on walking distance. Therefore, a drastic reduction in physical activity occurred without adjusting dietary habits to lockdown conditions, resulting in weight gain and unhealthy consequences [15]. Increasing the amount of time spent in sedentary activities is also associated with the daily conditions of digital-education, e-learning and smart working [16].

Inparticular, a study of Cellini and colleagues [17] reported that, starting from the second week of lockdown, young adults (both students and workers aged 18–35) stated they had changed their time management, increasing the use of digital media and spending more time in bed, and reported a poorer sleep quality. Regarding the latter topic, Siversten and colleagues [18] documented a high and growing prevalence of sleep problems and insomnia in young adults; it is thus known that an extensive use of media devices interacts with sleep, especially in the two hours before bedtime [19].

In quarantine and isolation periods, nutritional habits changed because of the limited access to food, caused by the restrictions in grocery shopping. This reduced availability consequently led to a diet switch to unhealthy food, poor in fresh fruit and vegetables [20]. When individuals respond to stress by eating more, the selected foods are typically high in sugar and fat, and people also drink alcohol to feel better, leading to weight gain and negative health consequences [21]. Food choices and meal pattern changes were documented as more unhealthy during the COVID-19 confinement periods in several parts of the world, with widespread evidence of an upsurge in the intake of unhealthy food and out of control eating, associated with a documented decline in physical activity and increased sedentary (sitting) behaviours [22]. Zupo and colleagues [23] identified a common trend about dietary behaviours during the COVID-19 lockdown in many countries

It is known that obesity is related not only to abnormal eating behaviours, but also to stress and sleep deprivation [24]. Lockdown conditions can lead not only to alterations in food choice, timing, and quantity, but also loss of sleep quality. The disruptions to sleep quality and quantity, together with physical inactivity, induce decreased rates of skeletal muscle protein synthesis and impair insulin resistance, compromising immune defence [25]. Significant changes in sleep quality, quantity and timing associated with COVID-19 home confinement were demonstrated, and consequently changes in lifestyle habits occurred [26]. A survey conducted during the last 14 days of the Italian lockdown has already highlighted effects on sleep quality with disturbances such as insomnia associated with symptoms of depression and anxiety [27].

Since it has been shown that physical activity, nutrition and sleep play fundamental roles in human health and physiology and that poor sleep, physical inactivity, and time spent indoors may be determined by a condition of isolation [28], we intended to evaluate the relationship between some of these aspects in the lockdown situation and weight conditions in a sample of students and workers of an academic community in Tamilnadu. In particular, the first aim of the current research was to analyse the impact of home confinement during the COVID-19 lockdown on weight changes perceived over two months after the beginning of the isolation period. This aspect has been studied among the whole academic community, but the present study distinguishes between students. Another aim was to evaluate factors associated with weight changes perception, such as the role of the Body Mass Index (BMI), the time spent in sedentary activities and sleep quality.

Aims and Objectives of the Study

Aim of the Study:

1. To study the prevalence of Physical activity among students during Covid 19 pandemic lockdown.
2. To study the association between physical activity with Body Mass index among students during Covid 19 pandemic lockdown.
3. To study the association between physical activity and demographic among students during Covid 19 pandemic lockdown

Methodology

This is online descriptive cross-sectional study. The study will be carried out all the willing students in Mangaluru, Karnataka. Due to the pandemic situation, the research was conducted online. All the college faculties are requested their students get participation in this study. The online questionnaires were sent to each student through email and social media (WhatsApp). It was conducted fully anonymously by means of a Google Form. Each of the participants could opt out of the research at any time and will be the opportunity to see the results of the tests performed. For data collection, the investigators used online approaches (as opposed to face-to-face data collection) because of maintaining spatial distancing and proper precaution during the pandemic. Initially, respondents provide informed consent via e-survey. The inclusion criteria of participants were i) All students studying in Karnataka, ii) having voluntary participation. The exclusion criteria included being Non willing and incomplete surveys.

A semi-structured and self-reported questionnaire containing informed consent along with four sections (i.e., socio-demographics, The International Physical Activity Questionnaires was utilized during data collection.

Weight before the lockdown was useful in calculating Body Mass Index (BMI) to evaluate the incidence of weight classes using BMI international cut-off values, and specifically: <18.5 kg/m2 underweight, 18.5–24.9 kg/m2 normal weight, and 25 kg/m2 overweight/obese; information on lifestyle habits concerning the amount of time spent in sedentary activities in a week (answer options were: Never, 1 h, 2/3 h, 4/5 h, 6/8 h and >8 h), referring to

SIT-Q by Wijndaele and colleagues[29] detailing various potential static activities (with or without the use of digital media devices), such as reading newspapers/watching news; watching movies and series; making video calls; surfing social networks; sleep quality, with an ad hoc question to evaluate if the perception of sleep quality had changed (No; Yes, positive changes/negative changes) referred to the home confinement obligatory period, as was similarly carried out by other studies in the same context.

Statistical analysis

The data analysis will be performed using Microsoft Excel 2019 and SPSS version 25.0 (Chicago, IL, USA). Microsoft Excel will be used for data cleaning, editing, sorting, and coding.

The excel file will be then imported into SPSS software. Descriptive statistics (i.e., frequencies, percentages, means, standard deviations) and first-order analysis (i.e., chi-square tests, Fisher's exact test) will be performed. Likewise, t-tests or one-way ANOVA. All statistical tests will be considered significant at 95% confidence interval with a p-value less than .05.

Ethical Considerations:

All subjects would be recruited from the study following obtaining an informed consent. All consenting formalities would be completed using digital platform only.

Results & Discussion:

A total of 263 students participated in the study. Mean age of the study participants was 19.63+1.86 years of age. Male mean age was 19.70+1.74 and female mean age was19.60+1.92 years.

The mean BMI was 22.10+4.05 kg/m2. Male mean BMI was 22.58+4.44 and female mean BMI was21.89+3.83 kg/m2. The mean Weight was 58.47+11.61 kg. Male mean Weight was 65.38+10.49 and female mean Weight was 54.99+10.56 kg.

Table 1: Demographic Information

Demographic information's		Number of students	%
Sex	Male	88	33.46%
	Female	175	66.54%
Age:	18 years	62	23.57%
	19 years	72	27.38%
	20 years	86	32.70%
	21 years	24	9.13%
	>21 years	19	7.22%
Weight in Kg	<50 kg	76	28.90%
	51-60 kg	96	36.50%
	61-70 kg	52	19.77%
	>70 kg	39	14.83%
Did you Gain unintentional weight gain in corona virus lock-down.	Yes	213	80.99%
	No	50	19.01%
If you gained weight, mention how much	0 -2	176	66.92%
	3 -4	61	23.19%
	5 -6	26	9.89%
What may be the reason for your unintentional weight gain	Don't know	19	7.22%
	Excess sleep	37	14.07%
	Home-made food	30	11.41%
	Junk food	3	1.14%
	Lack of exercise	26	9.89%
	Lack of exercise Eating	76	28.90%
	More food while sitting simply	7	2.66%
	Lack of physical activity and over eating	20	7.60%
	No physical activities and healthy food in home	8	3.04%
	Simply sleeping after eating	37	14.07%
	Unhealthy food, inadequate sleep	0	0.00%
Weight change	Gained 5- 10 % of weight	98	37.26%
	Gained Less than 5% of weight	87	33.08%

	Gained more than 10% of weight 5 - 10%	4	1.52%
	Lost Less than 5% of weight	5	1.90%
	No change	69	26.24%
Height in cm	< 150 cm	37	14.07%
	151-160 cm	92	34.98%
	161-170 cm	86	32.70%
	171-180 cm	37	14.07%
	>180 cm	11	4.18%
BMI	Underweight	45	17.11%
	Normal	164	62.36%
	Over weight	46	17.49%
	Obese	8	3.04%

Above table shows the demographic information of students those who are participated in this study.

The table 1 provided contains demographic information about a group of students. Here is a breakdown of the data:

Sex: There are more females (66.54%) than males (33.46%) in the group.

Age: The most common age group is 20 years old (32.70%), followed by 19 years old (27.38%) and 18 years old (23.57%).

Weight: The most common weight range is 51-60 kg (36.50%), followed by <50 kg (28.90%) and 61-70 kg (19.77%).

Unintentional weight gain during lockdown: The majority of students (80.99%) reported gaining weight unintentionally during the lockdown.

Reasons for unintentional weight gain: The most common reasons for unintentional weight gain were lack of exercise eating (28.90%) and more food while sitting simply (2.66%).

Weight change:

The most common weight change was gaining 5-10% of weight (37.26%), followed by gaining less than 5% of weight (33.08%) and no change (26.24%).

Height:

The most common height range is 151-160 cm (34.98%), followed by 161-170 cm (32.70%) and <150 cm (14.07%).

BMI: The majority of students (62.36%) have a normal BMI. 17.11% of students are underweight, 17.49% are overweight, and 3.04% are obese.

Table 2: Demographic Informations

		Number of students	%
Type of Family:	Nuclear family	199	75.67%
	Joint family	45	17.11%
	Extended family	19	7.22%
Place of living:	Rural	98	37.26%
	Semi urban	77	29.28%
	Urban	88	33.46%
.Monthly family income Rs:	Less than 10,000	29	11.03%
	11,000-20,000	45	17.11%
	21,000-40,000	77	29.28%
	41,000-60,000	40	15.21%
	61,000-75,000	19	7.22%
	76,000-90,000	18	6.84%
	More than 90,000	35	13.31%
Course studying :	Allied health Course	35	13.31%
	Arts & Science	6	2.28%
	Engineering	5	1.90%
	Medical	210	79.85%
	Nursing	7	2.66%
Year of study	1st year	202	76.81%
	2nd year	30	11.41%
	3rd year	21	7.98%
	4th year	10	3.80%

Above table shows the demographic information of students those who are participated in this study. The table 2 provided contains demographic information about a group of students. Here is a breakdown of the data:

Type of Family: The majority of students (75.67%) come from nuclear families, followed by joint families (17.11%) and extended families (7.22%).

Place of living: Almost equal number of students lives in rural (37.26%) and semi-urban (29.28%) areas, while slightly fewer students live in urban areas (33.46%).

Monthly family income: The most common monthly family income range is 21,000-40,000 Rs (29.28%), followed by 11,000-20,000 Rs (17.11%) and less than 10,000 Rs (11.03%).

Course studying: The majority of students (79.85%) are studying medical courses, followed by allied health courses (13.31%).

Only a small percentage of students are studying arts & science (2.28%), engineering (1.90%), or nursing (2.66%).

Year of study: The majority of students (76.81%) are in their 1st year of study, followed by 2nd year (11.41%), 3rd year (7.98%), and 4th year (3.80%).

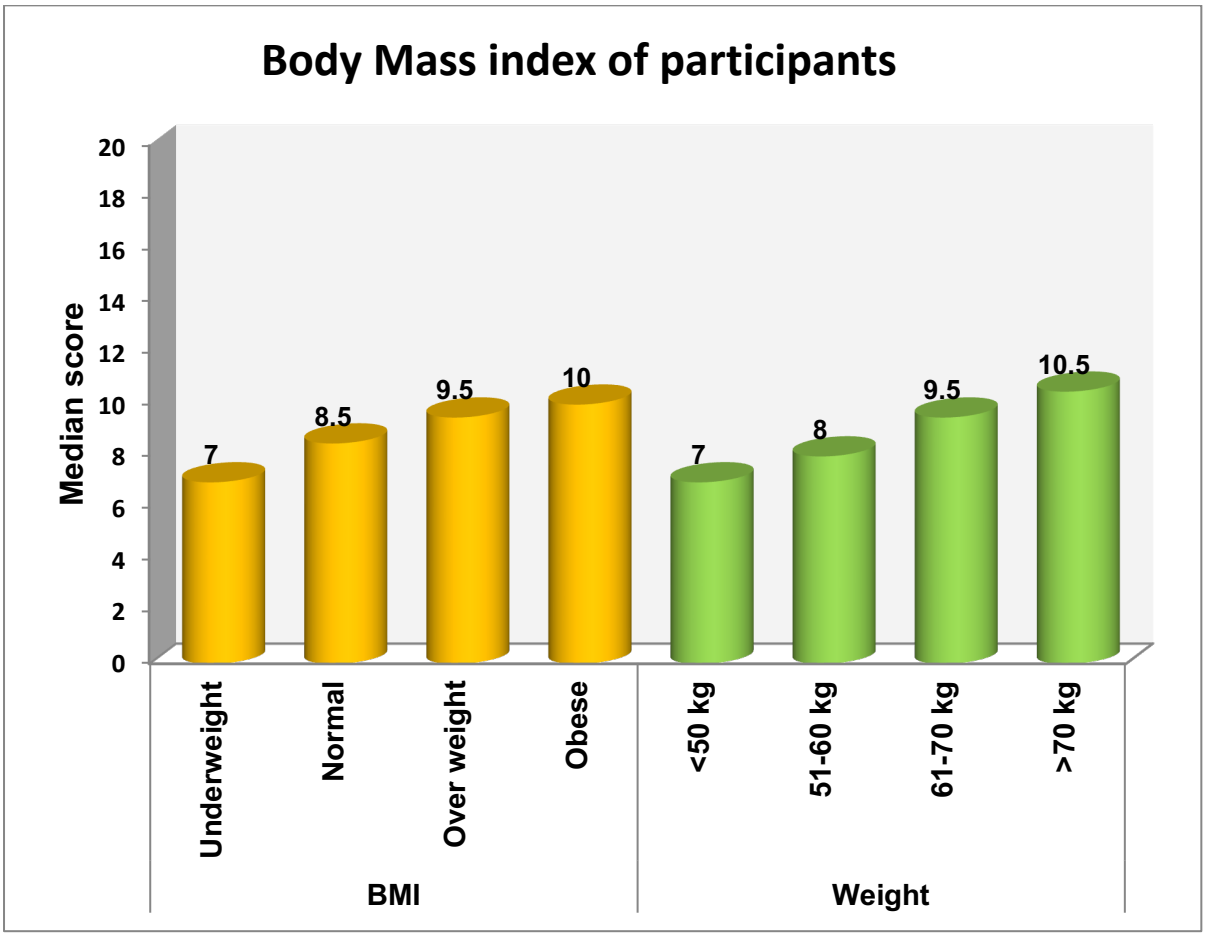

Figure 1: Body Mass index distribution of participants

The image you sent me is a graph that shows the body mass index (BMI) of participants. The x-axis shows the BMI, and the y-axis shows the number of participants. The graph is divided into five categories: underweight, normal, overweight, obese, and very obese. The median score is 22.1.

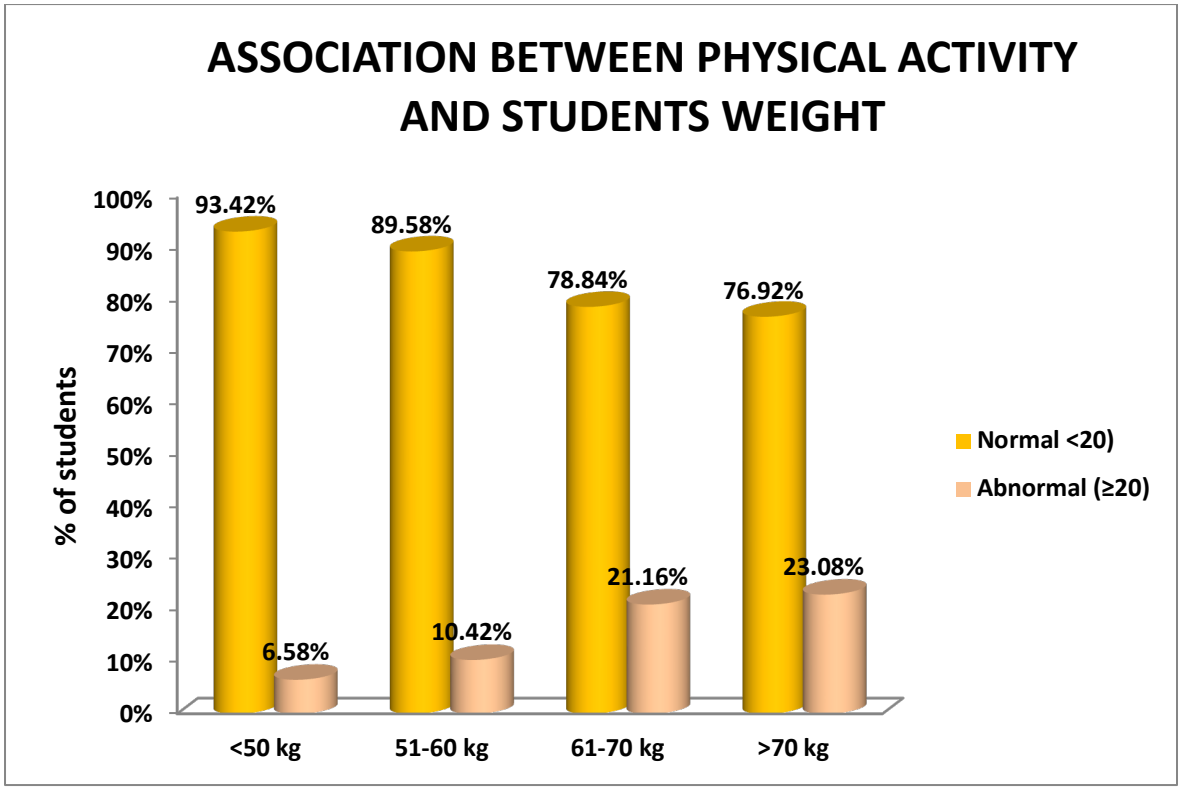

Figure 2: Association between physical activity and student's weight

Figure 2 For students with low levels of physical activity, there is a higher percentage of students who are "Abnormal (≥20)" weight compared to those who are "Normal (<20)" weight. As the level of physical activity increases, the percentage of students in both weight categories gets closer. For students with the highest levels of physical activity, there is a slightly higher percentage of students who are "Normal (<20)" weight compared to those who are "Abnormal (≥20)" weight.

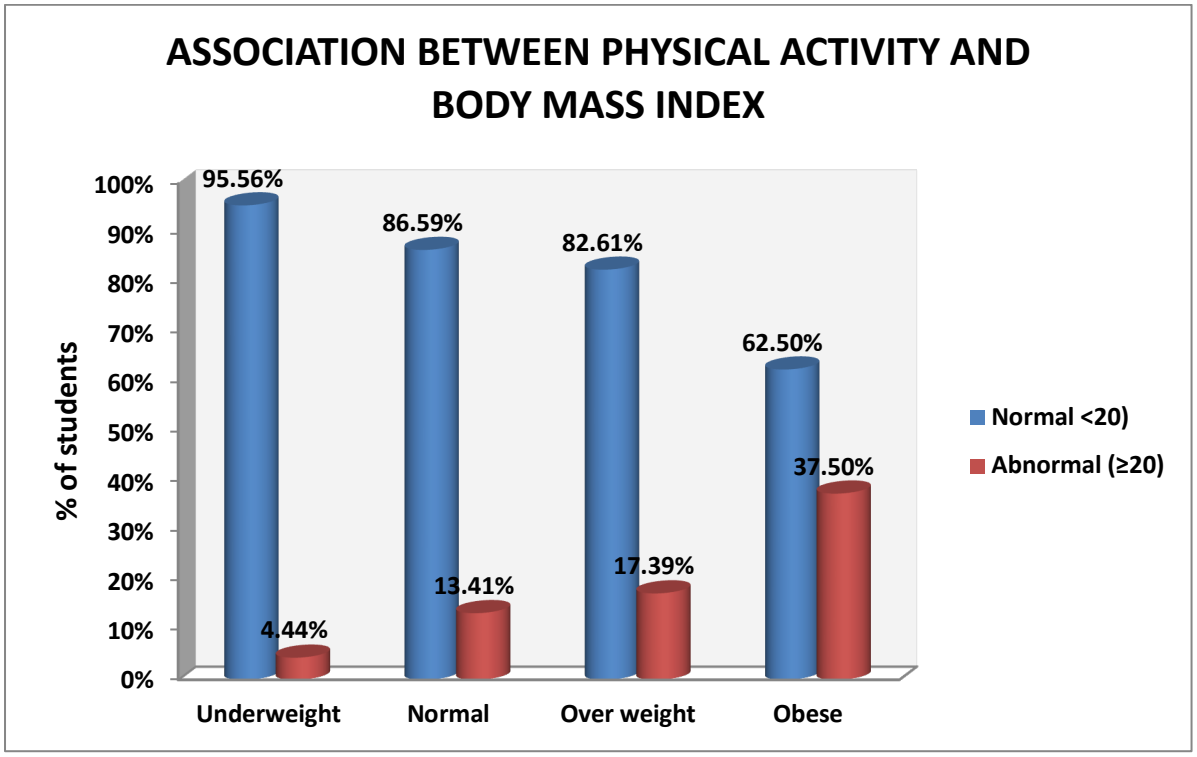

Figure 3: Association between physical activity and body mass index

Figure 3 At low levels of physical activity, the majority of individuals have abnormal BMI. As physical activity increases, the lines converge, indicating a more balanced distribution of normal and abnormal BMI.

At high levels of physical activity, a slightly higher percentage of individuals have normal BMI compared to abnormal BMI. Possible explanations are increased physical activity leads to higher calorie expenditure, potentially contributing to weight management and a lower BMI. Regular exercise can help build muscle mass, which increases metabolism and further aids in calorie burning. Physical activity can also improve cardiovascular health and insulin sensitivity, potentially reducing the risk of obesity-related health issues.

Important to note this graph shows a correlation, not causation. Other factors like diet, genetics, and overall health can also influence BMI. The specific impact of physical activity on BMI may vary depending on individual factors and the intensity and duration of activity.

Table 3: The International Physical Activity Questionnaires

		Number of students	%
1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	No vigorous physical activity	162	61.60%
	1 day per week	28	10.65%
	2 days per week	12	4.56%
	3 days per week	14	5.32%
	4 days per week	9	3.42%
	5 days per week	12	4.56%
	6 days per week	8	3.04%
	7 days per week	18	6.84%
2. How much time did you usually spend doing vigorous physical activities on one of those days? _____ hours per day (OR) _____ minutes per day (OR) Donâ€™t know	< 15 min	19	18.81%
	16 -30 min	23	22.77%
	31 -60 min	5	4.95%
	1 hour	24	23.76%
	1-2 hours	25	24.75%
	>2 hours	5	4.95%
3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis?Do not include walking.	No vigorous physical activity	121	46.01%
	1 day per week	34	12.93%
	2 days per week	20	7.60%
	3 days per week	29	11.03%
	4 days per week	10	3.80%
	5 days per week	17	6.46%
	6 days per week	8	3.04%
	7 days per week	24	9.13%
4 . How much time did you usually spend doing moderate physical activities on one of those days? _____ hours per day (OR) _____ minutes per day (OR) Donâ€™t know	< 15 min	63	45.32%
	16 -30 min	12	8.63%
	31 -60 min	26	18.71%
	1 hour	23	16.55%
	1-2 hours	10	7.19%
	>2 hours	5	3.60%
5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?	No vigorous physical activity	60	22.81%
	1 day per week	22	8.37%
	2 days per week	14	5.32%
	3 days per week	19	7.22%
	4 days per week	20	7.60%
	5 days per week	16	6.08%
	6 days per week	14	5.32%
	7 days per week	98	37.26%
6 . How much time did you usually spend walking on one of those days? _____ hours per day (OR) _____ minutes per day (OR) Donâ€™t know	< 15 min	14	7.22%
	16 -30 min	59	30.41%
	31 -60 min	90	46.39%
	1 hour	19	9.79%
	1-2 hours	5	2.58%
	>2 hours	7	3.61%
	< 6 hours	26	9.89%

7. During the last 7 days, how much time did you spend sitting on a week day? _____ hours per day (OR) _____ minutes per day (OR) Donâ€™t know	7-12 hours	91	34.60%
	13-18 hours	34	12.93%
	19-24 hours	29	11.03%
	>24 hours	57	21.67%
	Don't know	26	9.89%

Above table 3 shows the International Physical Activity Questionnaires of students those who are participated in this study

Vigorous Physical Activity: 61.6% of students reported no vigorous activity in the last week. The most common duration for those doing vigorous activity was 1 hour (23.76%). Overall, participation in vigorous activity seems relatively low.

Moderate Physical Activity:46% of students reported no moderate activity in the last week. The most common duration for moderate activity was less than 15 minutes (45.32%). Participation in moderate activity seems slightly higher than vigorous activity, but still limited.

Walking: 22.81% of students reported no walking for at least 10 minutes in the last week. The most common duration for walking was 31-60 minutes (46.39%).Walking seems to be the most common form of physical activity among the students.

Sitting Time: 21.67% of students reported sitting for more than 24 hours daily on weekdays. Another 34.6% reported sitting for 7-12 hours daily. A significant portion of students seem to be engaging in prolonged sitting, which can be detrimental to health.

Overall: The data suggests that physical activity levels, particularly vigorous activity, are relatively low among this group of students. Walking seems to be the most common form of activity, but overall participation in both moderate and vigorous activities could be improved.

Prolonged sitting time is also prevalent, highlighting the need for more movement throughout the day. It's important to note that this is just a snapshot of the students' activities and doesn't represent individual situations. Encouraging and facilitating increased physical activity and reducing sedentary time could benefit the students' overall health and well-being.

Limitations:

One of the key limitations of this study was a single center study with a comparatively short sample size, results of this study cannot be generalized. Generalization requires the support of results from similar large studies

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Ethical statement:

Institutional ethical committee accepted this study. The study was approved by the institutional human ethics committee. Informed written consent was obtained from all the parents of study participants and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

Authors' contributions:

Dr Ashok Kumar MR: Conceived, Data Collection and statistical analysis.

Dr Anjan Kumar A N: Supervision, Proof Reading and Manuscript draft editing.

Dr jayaramesh: Literature Review, Discussion.

Dr Asha: Responsible for Data's Integrity and Authenticity

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript.

Data Availability:

All datasets generated or analyzed during this study are included in the manuscript.

Informed Consent:

Written informed consent was obtained from the participants before enrolling in the study

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