



Physical Activity Level and Body Mass Index Among University Students: A Correlative Study

Kariakdinliu Panmei¹, Neethu John², Nangsal Sangmo³, Starmoon V Mathew⁴, Shycil Mathew^{5*}

Abstract

Context /Background:

An increase in mortality rates is primarily caused by physical inactivity. In emerging nations, there is more physical inactivity among college or university students. The risk of getting non-communicable diseases rises with the drop in physical activity at this age. The goal of the study was to understand the level of physical activity among university students and determine whether there is any relationship between the level of physical activity and body mass index. This is because a gradual increase in sedentary lifestyle coupled with an increase in consumption of a modern hypercaloric diet has led to a substantial increase in the number of overweight or obese youth.

Methods: A descriptive-correlative study was conducted among 292 undergraduate students in a selected health science university, Mangalore. The samples were selected by using disproportionate stratified sampling techniques. A standardized international physical activity questionnaire was used to determine the level of physical activity, and a BMI screening tool was used to measure the body mass index of students.

Results:

The majority of the subjects (34.9%) were in the age group of 22–23 years. Most of the subjects (65.8%) had not done any type of exercise, and the majority (52%) were walking. More than half (64.4%) of the subjects engaged in exercise for less than 20 minutes/per day. Most university students have a moderate level of PA. The majority 55.5% of university students have normal BMI status, and there is a moderate positive correlation that exists between physical activity and the BMI status of university students, at a $p < 0.05$ level of significance.

Conclusion:

According to the results of the current study, the majority of students only engage in a moderate amount of physical activity. Students at universities should be encouraged to play sports in their spare time to raise their level of physical activity. Otherwise, you must schedule time for exercise every day while you are studying. By engaging in more physical exercise, one can improve their body and cardiorespiratory fitness. Conversely, low physical fitness in adolescence and sedentary behaviour during childhood and adolescence will have a negative impact on adult health outcomes.

Keywords: Physical activity, BMI, metabolic equivalent task, anthropometric measurement, nutritional status, malnutrition.

DOI Number: Doi: 10.4704/nq.2022.20.14.NQ88003

Neuro Quantology 2022; 20(14):10-16

INTRODUCTION

According to WHO, a person's physical, mental, and social well-being are all included in their state of health (Eddolls WT et al., 2018). Physical

activity has a positive impact on a person's health and well-being, and regular physical activity is linked to improved health and well-being and can be determined by BMI (Chen X et

*Corresponding Author: Shycil Mathew

*Address: Shycil Mathew, Assistant professor stage-II, Department of community health nursing, Yenepoya Nursing College, Mangaluru.

¹PBB.Sc.(N) Students, Yenepoya Nursing College, Mangaluru.

²PBB.Sc.(N) Students, Yenepoya Nursing College, Mangaluru.

³PBB.Sc.(N) Students, Yenepoya Nursing College, Mangaluru.

⁴PBB.Sc.(N) Students, Yenepoya Nursing College, Mangaluru.

⁵Shycil Mathew, Assistant professor stage-II, Department of community health nursing, Yenepoya Nursing College, Mangaluru.

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Received:

Accepted:



al.,2020). BMI is a referencing tool to determine a person's standard weight status given their corresponding height. The BMI can be used to categorize people's weight and possibly to assess their nutritional and health status (Benjamin-Neelon SE et al.,2019).

It has been argued that healthy lifestyle habits should be encouraged at a young age rather than allowing unhealthy habits to become established which may require change later (So WY et al.,2012, Siwik V, et al.,2013). College is a transitional period from adolescence to adulthood and is also a crucial period for the development of healthy lifestyles and the formation of healthy behaviors (Corder K et al., 2020). Being involved in physical activities may also help in maintaining good-looking bodies and promotes physical fitness (Fountaine CJ et al., 2011).

Physical exercise is defined as body movement caused by skeletal muscle activation that results in energy expenditure (Jalal SM, et al., 2020). It is a vital part of daily living and has long-term positive effects on our health (Radwan H et al., 2019). Among college students who have busy study schedules and other obligations, there has been a noticeable reduction in physical activity in recent years. sedentary behaviours, such as using a phone when indoors, showing signs of a decline in activity levels, or being physically inactive (Praveen Kumar S 2021, Fagaras SP et al., 2015, Çiçek G.2018). Contrarily, being physically inactive increases the risk of non-communicable diseases (Meenapriya M. Gayathri R, Vishnu PV,2018). The current study's goal was to examine university students' levels of physical activity and determine the links between those levels and BMI, it has now become a global issue.

Material and Methods:

A descriptive correlative study was conducted among 292 undergraduate students in a selected health science university, Mangaluru. The samples were selected by using disproportionate stratified sampling techniques. Demographic proforma consisted of age, gender, nationality, type of food consumed, place of stay, and type of exercise, a standardized International physical activity questionnaire consists of 9 items to assess the level of physical activity among undergraduate

students, and students were categorized into low physical activity, moderate physical activity, and high physical activity. All scores were expressed in MET minutes/week. The following values have been used for the analysis of IPAQ data; Low PA; - Walking MET = 3.3 x walking minutes x walking days, Moderate PA; - Moderate MET = 4.0 x walking minutes x walking days, High PA; - Vigorous MET = 8.0 x walking minutes x walking days. A Body Mass Index (BMI) screening tool was used to determine the BMI status by checking their height and weight and calculating BMI using the formula, $BMI = \text{weight (Kg)} / \text{height}^2 \text{ (m}^2\text{)}$ (Fagaras SP, et al., 2015, Çiçek G 2018). Height was recorded to the nearest 0.5 cm using the calibrated stadiometer. Weight was recorded using the calibrated Omron weighing scale to the nearest 0.1 kg. The categorization of the adolescents was done based on the WHO revised consensus guidelines for BMI classification for the Asian population and students were classified as underweight, normal weight, overweight, obese I, and obese II.

Inclusion criteria

- Undergraduate Medical, Nursing, and Physiotherapy students who are willing to participate in the study

Exclusion criteria

- Students who are physically challenged.
- Students who have any contraindications for performing physical activity.

Sample size calculation:

In this study, the Sample consists of 292 undergraduate health science university students. Population size (for finite population correction factor or FPC) (N): 120
Hypothesized % frequency of outcome factor in the population (p): 50%+/-5
Confidence limits as % of 100 (absolute +/- %) (d): 5% Design effect (DEFF): 1
Sample Size(n) for 95 % Confidence Level
Sample Size 292

Equation

Sample size $n = [DEFF * Np (1-p)] / [(d^2 / Z^2_{1-\alpha/2} * (N-1) + p*(1-p))]$



STATISTICAL ANALYSIS

The statistical calculations were performed using computer-based statistical software Statistical Package for the Social Sciences (SPSS) version 21.0

Result(S)

Section 1: demographic Proforma of university students.

Table 1: Distribution of university students according to their sample characteristics. n=292

Si no.	Demographic variables	Frequency(f)	Percentage (%)
	Age in Year		
	18- 19	57	19.5
	20- 21	100	34.3
	22-23	102	34.9
	24-25	33	11.3
	Gender		
	Male	24	8.2
	Female	268	91.8
	Nationality/ ethnicity	270	92.5
	Indian	22	7.5
	Tibetan		
	Type of program		
	Nursing	149	51
	Medical	80	27.4
	Physiotherapy	63	21.6
	Place of stay		
	Hostel	271	92.8
	Home	1	0.4
	Rent / PG	20	6.8
	Type of food consume	8	2.7
	Veg	284	97.3
	Mixed		
	Performing any type of exercises	100	34.2
	Yes	192	65.8
	No		
	If yes, what type of exercise performing	52	17.8
	Walking	6	2.1
	Yoga	1	0.3
	Spinner	17	5.8
	Spinner	3	1.0
	Treadmill	6	2.1
	Basketball	6	2.1
	Basketball	4	1.4
	Push up	4	1.4
	Push up	1	0.3
	Jogging	4	1.4
	Tabata	4	1.4
	Tabata	1	0.3
	Cycling	1	0.3
	Zumba	2	0.7
	Wall sit		
	Stretching		
	Duration of physical activity	188	64.4
	Less than 20 min	69	23.6
	20-30 minutes	35	12.0
	More than 30 minutes		

The data presented is the frequency (n) with the percentage in parenthesis (%)

The data in table 1 depict the distribution of university students according to their age, gender, nationality, place of stay, type of program, type of food consumed, type of exercise, what type of exercise performed, and duration of PA

➤ The data presented in table 1 depicts that:

- Most of the subjects (34.9%) were in the age group of 22-23 years.
- Most of the subjects (91.8%) were females and 8.3% were male.
- Majority (51%) of subjects were studying nursing programs.
- Most of the subjects (92.5%) were belongs to Indian Nationality.
- Most of the subjects (92.8%) stayed at a hostel
- Most of the subjects (96.2%) consumed a mixed diet
- Most of the subjects (65.8 %) were not performed any type of exercise and the majority (52%) were performing walking
- More than half (64.4%) of the subjects engaged in exercise for less than 20 minutes/per day.

Section II: Level of physical activity among university students.

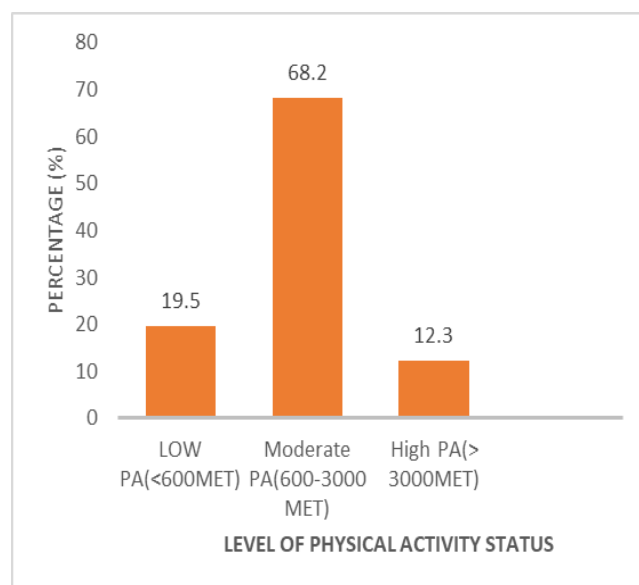


Figure 1: Bar diagram showing the distribution of subjects according to their level of Physical Activity

The data presented in figure 1 depicts that 68.2% of subjects have moderate levels of PA



Table 2: Mean median and standard deviation of level of physical activity of university students. n=292

Variable	Mean	Median	SD	Grade
Level of PA	1660.67(MET)	1386.00	1705.995	Moderate PA

Metabolic equivalent of task (MET).

The data presented in the table shows that the university students have a moderate level of PA, the mean PA score was 1660.67 MET standard deviation of 1705.99 MET.

Section 3: BMI status of university students.

Table 3: Distribution of university students according to their BMI status n=292

BMI status	Frequency(n)	Percentage (%)
Underweight	76	26.0
Normal weight	162	55.5
Overweight	23	7.9
Obese 1	29	9.9
Obese 2	2	0.7

BMI status presented is the frequency (n) with the percentage in parenthesis (%).

Categorization of the total university students based on the BMI (n=292). *BMI: Body mass index. The data presented is the frequency (n) with the percentage in parenthesis (%)

The data presented in table 3 depicts that the majority 55.5% of university students have normal BMI status.

Table 4: Anthropometric measurements of university students. n=292

Variable	Minimum	Maximum	Mean ±SD	Median
Weight(kg)	32	90	52.88±8.5	52
Height (cm)	1.34	1.84	159.77±7.29	160
BMI (%)	13.5	33.9	20.70± 2.93	20.57

Mean ± Standard Deviation (SD).

Data table 4 shows that the majority of the subject has normal BMI with a mean and SD of 20.70± 2.93.

Table 5: Physical activity level of the participants based on BMI variables. n=292

Variables	Physical activity level f (%)		
	Low PA	Moderate PA	High PA
Underweight	22(7.6)	43(14.6)	11(3.8)
Normal weight	26(9)	119(40.7)	17(5.8)
Overweight	7(2.4)	13(4.3)	3(1)
Obese 1	2(2.6)	22(7.4)	5(1.7)
Obese 2	1(0.3)	1(0.3)	--

Categorization of the total university students based on the BMI (n=292). *Physical activity levels presented are the frequency (n) with the percentage in parenthesis (%).

Data table 5 shows students were found to fall into the underweight category in the low physical activity level, moderate physical activity level, and high physical activity level categories when the characteristics of the participants were assessed based on their BMI: 22(7.6%), 43(14.6), and 11(3.8), respectively. The majority of students fell into the normal BMI group, with 119 (40.7%) having a moderate level of physical activity, 119 (40.7%) having a high level, and 26 (9%) having a low level of physical activity

A few of the students had BMIs that fell into the overweight range. Only 7 (2.4%) of them engaged in low levels of physical activity, 13 (4.3%) engaged in moderate levels of physical activity, and 3 (1%) engaged in high levels of physical activity.

A small number of students were found to be obese, as measured by their BMI. Of them, 2 (2.6%) had low physical activity levels, 22 (7.4%) had moderate levels, and even there may discover obese - 2 BMI category of them which 2(0.3%) were engaged in a low and moderate level of physical activity.

Most 36 (12%) students who were overweight or obese category engaged in just moderate physical activity, and very few did high PA.

Section 4: correlation between the level of physical activity and BMI status of university students.

The relationship between physical activity and BMI is analyzed using Karl Pearson Correlation Coefficient. To test the relationship, the following hypothesis was tested at a 0.05 level of significance:

H₀₁: There is no significant correlation between the level of physical activity and the BMI of university students.

Table 6: Correlation of physical activity and BMI of university health students. n=292

Variables	Mean	SD	r value	p-value
PA (MET)	1660.67	1705.99		
BMI	20.700	2.93	0.564	0.034

Metabolic equivalent of task (MET)



The data presented in table 6 shows the correlation between physical activity (PA) and BMI of university students. The calculated r value is 0.564 with $P < 0.05$ which indicates that there is a moderate positive correlation exists between physical activity and BMI status of university students.

Section 5: Association between physical activity of university students with selected demographic variables

This section deals with the association between the physical activity of university health science students with selected demographic variables. This is analyzed using the chi-square test. To test the association, the following null hypothesis was tested at the 0.05 level of significant

H_{02} : There is no significant association between the physical activity of university students and selected demographic variables.

Table 7: Association of the physical activity of university students and selected demographic variables. n=292

SL NO	Variables	X ²	p values
1	Age	68	0.001*
2	Gender	27	0.007*
3	Nationality	18	0.089
4	Type of programmed	525	0.005*
5	Place of stay	20	0.688
6	Type of food consumed	11	0.986
7	Performing exercise	25	0.381
8	Type of exercise	107	0.238
9	Duration of physical activity	41	0.704

*Level of significance $p < 0.05$

Data presented in table 7 shows there is a significant association found with selected demographic variables such as age, gender, and type of program at a 0.05 level of significance.

Section 6: Association of BMI status of university students with selected demographic variables

This section deals with the findings related to the association of BMI with selected demographic variables. This is analyzed using the chi-square test.

To test the association the following null hypothesis was tested at a 0.05 level of significance.

H_{03} : There is no significant association between the BMI status of university students and the selected demographic variables.

Table 8: Association of BMI status of a university with selected demographic variables. n- 292

SL NO	Variables	x ²	p values
1	Age	10	0.531
2	Gender	14	0.006*
3	Nationality	4	0.328
4	Type of programmed	26	0.001*
5	Place of stay	2	0.956
6	Type of food consume	9	0.307
7	Performing exercise	4	0.792
8	Type of exercise	41	0.721
9	Duration of physical activity	6	0.063

*Level of significance $p < 0.05$

Data presented in table 8 shows that there is a significant association found between gender and type of program of university students at a 0.05 level of significance.

Discussion(S)

The move from high school to college will bring about lifestyle changes that can seriously jeopardize a student's health state. Currently, physical activity is emphasized as a vital part of general health.

Section 1: Demographic proforma of university students.

Most of the subjects (34.9%) were in the age group of 22-23 years, most of the subjects (91.8%) were females and 8.3% were male. The majority (51%) of subjects were studying nursing programs. Most of the subjects (92.5%) were belongs to Indian Nationality. Most of the subjects (92.8%) stayed at a hostel. Most of the subjects (96.2%) consumed a mixed diet. Most of the subjects (65.8 %) were not performed any type of exercise and the majority (52%) were performing walking. More than half (64.4%) of the subjects engaged in exercise less than 20 minutes/day. A similar study was conducted by (Douglas.D, Franz, and Shingariai.A in 2018) according to the study groups there were a slightly larger number of females, and most of the students (92.2) % were aged between 17 to 24 years.



Section 2: Level of physical activity among university students.

The results showed that the university students have a moderate level of PA. the mean PA score was 1660.67 standard deviation of 1705.99. A contradictory study conducted by (Yousif MM, Kaddam LA, and Humeda HS,2019) the study showed that 44.9% of medical students had a low activity level. In Another study conducted by (You HW, Tan PL, AF ML,2020).50% of the respondents are categorized as minimally active

Section 3: BMI status of university students.

The result showed that the majority 55.5 % of subjects have normal BMI with a mean of 20.70 and an SD of 2.93. In a similar study conducted by (Simona-Pia Fagaras et al.,2015) the study results showed that most of the students have normal body weight, in a similar study conducted by (Alhazmi A, Aziz F, and Hawash MM,2021) results by study showed that more than half of the respondents had normal BMI.

Section 4: Correlation between level of physical activity and BMI status of university students.

The results showed that there is a moderate positive correlation exists between physical activity and the BMI status of university students with an r-value of 0.564 with $p < 0.05$. The above study results are contradictory to the study conducted. by (Alhazmi A, Aziz F, and Hawash MM,2021) results of the study showed that upon correlation BMI insignificantly correlated with physical activity. Another contradictory study result showed that there was no significant relationship between physical activity and body mass index (BMI) in this study conducted by (Yousif MM, Kaddam LA, and Humeda HS,2019) Another study was conducted by (You HW, Tan PL, and AF ML,2019) the study results showed that the relationship between physical activity and BMI indicates a very weak negative correlation.

Section 5: Association between physical activity of university students with selected demographic variables.

The result showed that there is a significant association found with selected demographic variables such as age, gender, and type of program at a 0.05 level of significance.

Section 6: Association of BMI status of university students with selected demographic variables

The results showed that there is a significant association found between gender and the type of program of university students at a 0.05 level of significance.

Limitation (s):

- Anthropometric measurements were measured only in terms of Body mass index.
- The study duration was short.
- limitation is that all the samples were from single settings and healthcare specialties. Thus, there is a limitation of generalizability.

Conclusion (s):

The majority of students merely exercise to a moderate extent, according to the findings of the current study. The study's conclusions have implications for nursing practice, nursing education, nursing administration, and nursing research. Specifically, it suggests that even though health science students were aware of the importance of physical activity, there is a need for ongoing education regarding the maintenance of BMI status and to be physically active in order to live a better life that results in, at least in part, being free from non-communicable disease.

Clinical significance: Physical activity is an important part of daily living that promotes long-term health advantages. In addition to lowering risks, it also helps to build and maintain strong bones and muscles, fight obesity, and lessen stress and anxiety. Regular physical activity promotes well-being and a healthy lifestyle and has been shown to help prevent and treat non-communicable diseases like heart disease, stroke, diabetes, and numerous illnesses.

Acknowledgment

The author acknowledges the support rendered by the college authority to conduct the research study.

Conflict of Interest: The authors declare that they have no conflict of interest.



References:

- Alhazmi, A., Aziz, F. and Hawash, M.M., 2021. Association of BMI, Physical Activity with Academic Performance among Female Students of Health Colleges of King Khalid University, Saudi Arabia. *International Journal of Environmental Research and Public Health*, 18(20), p.10912.
- Benjamin-Neelon, S.E., Platt, A., Bacardi-Gascon, M., Armstrong, S., Neelon, B. and Jimenez-Cruz, A., 2019. Greenspace, physical activity, and BMI in children from two cities in northern Mexico. *Preventive Medicine Reports*, 14, p.100870.
- Chen, X., Cui, J., Zhang, Y. and Peng, W., 2020. The association between BMI and health-related physical fitness among Chinese college students: a cross-sectional study. *BMC Public Health*, 20(1), pp.1-7.
- Çiçek G. Quality of Life and Physical Activity among University Students. *Universal Journal of Educational Research*. 2018;6(6):1141-8.
- Corder, K., Winpenny, E.M., Foubister, C., Guagliano, J.M., Hartwig, X.M., Love, R., Clifford Astbury, C. and van Sluijs, E.M., 2020. Becoming a parent: A systematic review and meta-analysis of changes in BMI, diet, and physical activity. *Obesity Reviews*, 21(4), p.e12959.
- Eddolls, W.T., McNarry, M.A., Lester, L., Winn, C.O., Stratton, G. and Mackintosh, K.A., 2018. The association between physical activity, fitness and body mass index on mental well-being and quality of life in adolescents. *Quality of Life Research*, 27(9), pp.2313-2320.
- Fagaras, S.P., Radu, L.E. and Vanvu, G., 2015. The level of physical activity of university students. *Procedia-Social and Behavioral Sciences*, 197, pp.1454-1457.
- Fountaine, C.J., Liguori, G.A., Mozumdar, A. and Schuna Jr, J.M., 2011. Physical activity and screen time sedentary behaviors in college students. *International Journal of Exercise Science*, 4(2), p.3.
- Jalal, S.M., Beth, M.R.M., Al-Hassan, H.J.M. and Alshealah, N.M.J., 2021. Body mass index, practice of physical activity and lifestyle of students during COVID-19 lockdown. *Journal of multidisciplinary healthcare*, 14, p.1901.
- Meenapriya, M., Gayathri, R. and Priya, V.V., 2018. Effect of regular exercise and health benefits among college students. *Drug Invention Today*, 10(7).
- Praveen Kumar S. 2021. Level of Physical Activity among University Students in Urban Chidambaram, Tamil Nadu—A Cross-Sectional Study. *Saudi J Med*:6(8):233-40.
- Radwan, H., Hasan, H.A., Ismat, H., Hakim, H., Khalid, H., Al-Fityani, L., Mohammed, R. and Ayman, A., 2019. Body mass index perception, body image dissatisfaction and their relations with weight-related behaviors among university students. *International journal of environmental research and public health*, 16(9), p.1541.
- Rajappan, R., Selvaganapathy, K. and Liew, L., 2015. Physical Activity Level Am Ong University Students: A Cross Sectional Survey. *Int J Physiother Res*, 3(6), pp.1336-43.
- Siwik, V., Kutob, R., Ritenbaugh, C., Cruz, L., Senf, J., Aickin, M., Going, S. and Shatte, A., 2013. Intervention in overweight children improves body mass index (BMI) and physical activity. *The Journal of the American Board of Family Medicine*, 26(2), pp.126-137.
- So, W.Y., Swearingin, B., Robbins, J., Lynch, P. and Ahmedna, M., 2012. Relationships between body mass index and social support, physical activity, and eating habits in African American university students. *Asian nursing research*, 6(4), pp.152-157.
- You, H.W., Tan, P.L. and AF, M.L., 2020. The Relationship between Physical Activity, Body Mass Index and Body Composition among Students at a Pre-University Centre in Malaysia. *IIUM Medical Journal Malaysia*, 19(2).
- Yousif, M.M., Kaddam, L.A. and Humeda, H.S., 2019. Correlation between physical activity, eating behavior and obesity among Sudanese medical students Sudan. *BMC nutrition*, 5(1), pp.1-8.

