Open Access

Original Article

Association of Academic Performance with Body Mass Index and Gender Among Physical Therapy Students

Hafiz Rana Muhammad Arslan, Sidra Muneer*, Faizan Ur Rehaman, Shahbaz Ahmed*****

University of South Asia, Lahore Pakistan, *Riphah International University, Lahore Pakistan, **Azra Naheed Medical College, Lahore Pakistan, *** University of Lahore, Lahore Pakistan

ABSTRACT

Objective: To determine the association of academic performance with body mass index and gender among undergraduate physical therapy students.

***Study Design*:** Cross-sectional study.

Place and Duration of Study: University of South Asia, Lahore Pakistan, from Mar to Aug 2019.

Methodology: Three hundred and twenty-one students (either gender) were selected through consecutive sampling technique. Body mass index scale and cumulative grade point average was used to collect data.

Results: The mean age of the study participants was 19.65±1.369 years, mean body mass index was 22.7±4.7 kg/m^2, and mean cumulative grade point average was 3.0518±0.78. Overweight participants were 51(15.8%), and obese were 16(5.0%). A significant association of academic performance (cumulative grade point average) with body mass index and gender (*p*-value was <0.001). Females have good grades than males, with 16 males and 49 females with Grade-A, and 15 males and one female with Grade-D+.

Conclusion: There was a significant association between academic performance (cumulative grade point average) with body mass index and gender. Female students had good grades than male students. High body mass index affects the academic performance of students.

Keywords: Academic grades, Body mass index, Cumulative grade point average

How to Cite This Article: *Arslan HRM, Muneer S, Rehaman F, Ahmed S. Association of Academic Performance with Body Mass Index and Gender among Physical Therapy Students Pak Armed Forces Med J 2022; 72(5): 1607-1610. DOI: https://doi.org/10.51253/pafmj.v72i5.5386*

INTRODUCTION

Academic performance or academic achievement is the extent to which a student, teacher, or institution has attained its short or long-term educational goals.[1] Cumulative grade point average Cumulative Grade Point Average(CGPA) and achievement degree like high school and bachelor's degrees symbolize academic achievement. Academic performance is persistently calculated through examination or unremitting assessment. However, there is no universal conformity on how it is best evaluated or which aspects are most important, practical knowledge such as skills or declarative knowledge such as facts.[2] Academic performance of students is a cause of worry for both students and parents because of tough competition. Academic performance is directly related to university access and job opportunities. It is well known that the socioeconomic status of such parents' education encourages how well students do in school.[3]

Body mass index Body Mass Index(BMI) measures a person's weight considering their height, and it defines the level of an overweight or obese person. Overweight is medically defined as a person who falls in a category of BMI of 25 or more.[4,5]

All age groups have presupposed that a decline in physical activity and sedentary behaviours lead to obesity worldwide. Weight gain in students markedly predisposes them to physical inactivity.[6] Long periods of stay at home, like watching television and playing computer games, are coupled with increased obesity.[7] Also, it is an increased extent of children being determined to different education setups, and minimum participation rates in sports and physical education have increased the risk of obesity.[8]

The proportion of the overweight and obese population remained almost constant. Persons with obesity have a lesser intelligence quotient (IQ) and reveal a considerable decline in quality decision-making function, remembrance, concentration, and motor skills compared to normal-weight peers.[9]

According to previous literature, obese individuals have lesser IQ level,[10] so here we conducted this research to determine whether there is an association between academic performance and the BMI of the Students.

Correspondence: Dr Hafiz Rana Muhammad Arslan, Lecturer Clinical Physiotherapist, University of Soth Asia, Lahore, Pakistan

Received: 23 Sep 2020; revision received: 20 Oct 2020; accepted: 03 Nov 2020

METHODOLOGY

This cross-sectional study was conducted at the Department of Physical Therapy, University of South Asia, Lahore Pakistan, form March to August 2019. The study was approved by the Ethical Committee of the University of South Asia and the authorization of related departments. (IRB-USA-FLHS/130/2019). Sample size was calculated by Epitools using the formula: $n=(Z2xPx(1-P))/e^2$ where estimated proportion=0.305, desired precision of estimate=5% and confidence level=95%.[11]

Inclusion Criteria: Under-graduate physical therapy students of either gender and age 18 to 25 years were included.

Exclusion Criteria: Students with medical problems like hepatitis, blood pressure, and diabetes were excluded.

Three hundred and twenty one students were selected for data collection (those who were easily available and agreed to deliver the information). Non-probability consecutive sampling technique was used for data collection. Standardized variables including body mass index (BMI) and academic performance were measured as cumulative grade point average (CGPA). The participants were explained the testing procedure thoroughly.

BMI was calculated by the formula: weight (kg)/ [height (m)]^2 and interpreted as underweight (<18.5), normal or healthy weight (18.5-24.9), over-weight (25.0 – 29.9), and obese (≥30.0). The University of South Asia follows the 4.00 CGPA, which was converted to the percentage (Table-I).

Table-I: Cumulative Grade Point Average

Grades	Marks Percentage	Grade Points
A+	85-100%	4.00
A	80-84%	3.75
B+	75-79%	3.50
B	70-74%	3.00
C+	65-69%	2.50
C	60-64%	2.00
D+	55-59%	1.50
D	50-54%	1.00
F	Below 50%	0.00
W	Official Withdraw	0.00

Statistical Package for Social Sciences (SPSS) version 24.0 was used for the data analysis. Qualitative variables were presented as frequency and percentage. The chi-square test was performed to check the association between academic performance and BMI of students, and a *p*-value ≤0.05 was considered significant.

RESULTS

Three hundred and twenty one students were included in the study. The mean age of the study participants was 19.65±1.369 years (Range:18-25 years), mean body mass index was 22.70±4.70kg/m^2, and mean cumulative grade point average was 3.05±0.78. Overweight participants were 51(15.8%), and obese were 16(5.0%). A significant association of academic performance (cumulative grade point average) with body mass index and gender (*p*-value was <0.001). Females have good grades than males, with 16 males and 49 females with Grade-A, and 15 males and one female with Grade-D+ (Table-II).

Table-II: Characteristics of the Study Participants (n=321)

Characteristics	Minimum	Maximum	Mean±SD
Age (years)	9	25	19.65±1.37
Height(meter)	1.42	1.83	1.61±0.073
Weight(kilogram)	38.00	98.00	58.51±11.63
Body Mass Index	13.46	42.65	22.71±4.74
Cumulative Grade Point Average	1.00	4.0	3.05±0.78

According to BMI, participants were categorized as underweight (57, 17.7%), healthy weight (197, 61.5%), overweight (51, 15.8%), and obese (16, 5.0%) (Table-III).

Table-III: Frequency Distribution of Body Mass Index (BMI) (n=321)

Body Mass Index	
	Frequency (%)
Underweight (<18.5)	57(17.7)
Normal or Healthy Weight (18.5 – 24.9)	197(61.5)
Overweight (25.0 – 29.9)	51(15.8)
Obese (30.0 and Above)	16(5.0)
Total	321(100.0)

There were 5(1.6%) participants with Grade-A+, 65(20.2%) with Grade-A , 53(16.5%) with Grade-B+, 80(24.8%) with Grade-B, 35(10.9%) with Grade-C+, 51(15.8%) with Grade-C, 16(5.0%) with Grade-D+ and 16(5.0%) participants with Grade-D (Table-IV).

There was a significant association between academic performance (CGPA), body mass index (BMI) and gender (*p*-value <0.05) (Table-V).

DISCUSSION

A study was conducted to determine the association of academic performance with body mass index (BMI) and gender among undergraduate physical therapy students at the University of South Asia, Lahore Pakistan. The study showed that among 321 participants, the mean age was 19.65±1.369 years, mean

height (m) 1.6075±0.073, mean weight (kg) 58.5±11.6, mean BMI was 22.7±4.7, and mean CGPA was 3.0518±0.78. Overweight participants were 51 (15.8%), and obese were 16(5.0%). There were 5(1.6%) participants with Grade-A+, 65(20.2%) with Grade-A , 53 (16.5%) with Grade-B+, 80(24.8%) with Grade-B, 35 (10.9%) with Grade-C+, 51(15.8%) with Grade-C, 16 (5.0%) with Grade-D+ and 16(5.0%) participants with Grade-D.

Table-IV: Frequency Distribution of Academic Performance as Cumulative Grade Point Average (CGPA) (n=321)

Academic Performance Cumulative Grade Point Average	
	Frequency (%)
Grade A+ (85-100%)	5(1.6)
Grade A (80-84%)	65(20.2)
Grade B+ (75-79%)	53(16.5)
Grade B (70-74%)	80(24.8)
Grade C+ (65-69%)	35(10.9)
Grade C (60-64%)	51(15.8)
Grade D+ (55-59%)	16(5.0)
Grade D (50-54%)	16(5.0)
Total	321(100)

The study by Ghazvini *et al*. in 2011 deter-mined the effect of gender differences on academic performance. Their study findings suggest a gender disparity in the factors under examination, with girls displaying risk management locus, using behaviours, encouragement, time management, fear, and self-tes-ting techniques more thoroughly, and receiving better marks in literature. Boys use attention, information retrieval and choosing key ideas more and have higher marks in mathematics. According to our study, Association has been performed between academic performance and the gender of participants.[13]

Another previous study conducted by Yu *et al*. in 2010 showed that describing obesity/intelligence quotient (IQ) association, particularly childhood IQ, with adulthood obesity. There was an inverse Full IQ / obesity correlation, except for pre-school children. However, after correction for educational achievement, the Full IQ / obesity relationship was not substantially different. The lower IQ in childhood was linked with obesity in later adulthood; likely with an educational degree that mediated the persistence of obesity in later life.[14] CEO *et al*. conducted a study in North Korea in 2006. According to which overweight and obese students, academic performance was poor. They were considered less physically active, which affects their academic performance compared to students with normal BMI. Our study supports the results of the previous study.[15]

Table-V: Association between Academic Performance (CGPA), Body Mass Index (BMI) and Gender (n=321)

Association between Academic Performance and Body Mass Index		Body Mass Index				
		Under Weight (<18.5)	Normal or Healthy Weight (18.5-24.9)	Over Weight (25.0– 29.9)	Obese (30.0 and Above)	*p*-value
Academic Performance (Cumulative Grade Point Assessment)	Grade A+ (85-100%)	2(40.0)	3(60.0)	0(0.0)	0(0.0)	<0.01
	Grade A (80-84%)	2(3.1)	63(96.9)	0(0.0)	0(0.0)	
	Grade B+ (75-79%)	7(13.2)	46(86.8)	0(0.0)	0(0.0)	
	Grade B (70-74%)	21(26.3)	56(70.0)	3(3.8)	0(0.0)	
	Grade C+ (65-69%)	8(22.9)	16(45.7)	11(31.4)	0(0.0)	
	Grade C (60-64%)	14(27.5)	6(11.8)	25(49.0)	6(11.8)	
	Grade D+ (55-59%)	2(12.5)	4(25.0)	6(37.5)	4(25.0)	
	Grade D (50-54%)	1(6.3)	3(18.8)	6(37.5)	6(37.5)	
Association between Academic Performance and Body Mass Index		**Gender**				
		Male	**Female**	***p*-value**		
Academic Performance (Cumulative Grade Point Assessment)	Grade A+(85-100%)	3(50.0)	<0.01	<0.01		
	Grade A(80-84%)	16(24.6)	49(75.4)			
	Grade B+(75-79%)	10(18.9)	43(81.1)			
	Grade B(70-74%)	16(20.0)	64(80.0)			
	Grade C+(65-69%)	19(54.3)	16(45.7)			
	Grade C(60-64%)	35(70.0)	15(30.0)			
	Grade D+(55-59%)	15(93.8)	1(6.3)			
	Grade D(50-54%)	14(87.5)	2(12.5)			

A study was conducted by Pan *et al*. in 2013, aimed to investigate the impact of high BMI and body fat percentage on academic performance. According to that study, 25% were overweight, and 13% were Obese. The impact of BMI on students' academic achievement showed negative results that people having more BMI (overweight and obese) have academic performance lower than normal weight in-dividuals.[12]

The study conducted by Wehigaldeniya *et al*. in 2017, investigated the relationship between academic performance and body mass index. They revealed a significant association between BMI and CGPA. Our study supports the result of the previous study as a significant association between academic performance and BMI.[16] Another similar study was conducted by Olivares *et al*. in 2016, aimed to determine the effect of fitness and fitness on academic performance. Their findings show a correlation between healthy body weight and improved academic performance.[17] The study by Alswat *et al*. in 2017, examined the relationship between academic performance and BMI. According to their study, there was no correlation between BMI and academic performance. Neverthe-less, our study does not support the result of that study because, according to our study, there was a significant association between body mass index and academic performance. [18]

Many other factors (family problems, family level of education, initial schooling) can also affect students' academic performance. In addition, all the students may have different levels of perception and ability to understand. Therefore, future studies should be done comparing the level of perception, ability to understand, and motivation. Such research findings could probably alter how university administrations view fitness and physical activity. Consequently, a student would not be judged based on a body mass index, but a productive learning environment and genetic endowment would continue to affect academic performance.

CONCLUSION

There was a significant association between academic performance (cumulative grade point average CGPA) with body mass index (BMI) and gender (Male/Female), with female students having good grades than male students. High BMI affects the academic performance of students.

Conflict of Intrest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

HRMA: Study design, data analysis, critical review, drafting the manuscript, critical review, approval of the final version to be published, SM: Data analysis, data interpretation, critical review, appro-val of the final version to be published, FR: Conception, study design, drafting the manuscript, app-roval of the final version to be published, SA: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investi-gated and resolved.

REFERENCES

1. Antonopoulou M, Mantzorou M, Serdari A, Bonotis K, Vasios G, Pavlidou E, et al. Evaluating Mediterranean diet adherence in university student populations: Does this dietary pattern affect students' academic performance and mental health? Int J Health Plann Manage 2020; 35(1): 5-21. doi: 10.1002/hpm.2881.
2. Chen LJ, Fox KR, Ku PW, Taun CY. Fitness change and subsequent academic performance in adolescents. J Sch Health 2013; 83(9): 631-638. doi: 10.1111/josh.12075.
3. Day J, Ternouth A, Collier DA. Eating disorders and obesity: two sides of the same coin? Epidemiol Psichia Soc 2009; 18(2): 96-100.
4. Anderson AS, Good DJ. Increased body weight affects academic performance in university students. Prev Med Rep 2016; 5: 220-223. doi: 10.1016/j.pmedr.2016.12.020
5. Al-Lahham S, Jaradat N, Altamimi M, Anabtawi O, Irshid A, AlQub M, et al. Prevalence of underweight, overweight and obesity among Palestinian school-age children and the associated risk factors: a cross sectional study. BMC Pediatr 2019; 19(1): 483.
6. Balkis M, Erdinç D. Gender differences in the relationship between academic procrastination, satifaction with academic life and academic performance. Elec J Res Educ Psychol 2017; 15(1): 105-125. doi.org/10.14204/ejrep.41.16042.
7. González-Morales R, Canto-Osorio F, Stern D, Sánchez-Romero LM, Torres-Ibarra L, Hernández-López R, et al. Soft drink intake is associated with weight gain, regardless of physical activity levels: the health workers cohort study. Int J Behav Nutr Phys Act 2020; 17(1): 60. doi: 10.1186/s12966-020-00963-2.
8. Katzmarzyk PT, Chaput J-P, Fogelholm M, Hu G, Maher C, Maia J, et al. International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE): contributions to understanding the global obesity epidemic. Nutrients 2019; 11(4): 848.
9. Kim J-H, So W-Y. Association between overweight/obesity and academic performance in South Korean adolescents. Cent Eur J Public Health 2013; 21(4): 179-183. doi: 10.21101/cejph.a3853.
10. Yu Z, Han S, Cao X, Guo X. Intelligence in relation to obesity: a systematic review and meta- analysis. Obes Rev 2010; 11(9): 656-70. doi: 10.1111/j.1467-789X.2009.00656.x.
11. Jackson LA, Von Eye A, Fitzgerald HE, Witt EA, Zhao Y. Internet use, videogame playing and cell phone use as predictors of children's body mass index (BMI), body weight, academic performance, and social and overall self-esteem. Computers Human Behav 2011; 27(1): 599-604. doi:10.1016/j.chb.2010.10.019.
12. Pan L, Sherry B, Park S, Blanck HM. The association of obesity and school absenteeism attributed to illness or injury among adolescents in the United States, 2009. J Adolesc Health 2013; 52(1): 64-69. doi: 10.1016/j.jadohealth.2012.04.003.
13. Ghazvini SD, Khajehpour M. Gender differences in factors affecting academic performance of high school students. Procedia Soc Behav Sci 2011; 15(1): 1040-1045. doi:10.1016/ j.sbspro.2011.03.236.
14. Yu Z, Han S, Cao X, Guo X. Intelligence in relation to obesity: a systematic review and meta- analysis. Obes Rev 2010; 11(9): 656-670. doi: 10.1111/j.1467-789X.2009.00656.x.
15. Coe DP, Pivarnik JM, Womack CJ, Reeves MJ, Malina RM. Effect of physical education and activity levels on academic achievement in children. Med Sci Sports Exerc 2006; 38(8): 1515-1519.
16. Wehigaldeniya W, Oshani P, Kumara I. Height, weight, body mass index (BMI) and academic performance (AP) of university students in Sri Lanka: with special reference to the University of Kelaniya. Int J Sci Res 2017; 7(2): 217-219.
17. Olivares PR, García-Rubio J. Associations between different components of fitness and fatness with academic performance in Chilean youths. PeerJ 2016; 4: e2560. doi:10.7717/peerj.2560.
18. Alswat KA, Al-shehri AD, Aljuaid TA, Alzaidi BA, Alasmari HD. The association between body mass index and academic performance. Saudi Med J 2017; 38(2): 186-191. doi: 10.15537/ smj.2017.2.16320.