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RESEARCH ARTICLE

Association of body mass index with fitness index among male and female physical therapy students in Lahore

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ABSTRACT

Background: Body Mass Index is an important predictor of physical fitness that needs to be addressed in job-related work in physical therapy profession.

Objectives: To determine the association of BMI with Fitness Index among physical therapy students.

Methods: This was a cross-sectional associational study. The Sample of 156 undergraduate students between the ages of 20 to 30 years was included. By using a convenient sampling technique, data was collected from Azra Naheed Medical College and the Institute of Child Health and Children Hospital Lahore after ethical approval on 30th January 2018 from Azra Naheed Medical College. Harvard Step Index was used for measuring Fitness Index and Body Mass Index was measured using height and weight. SPSS 22 version was used for the analysis of outcomes of interest.

Results: In our study 85 (54.4%) females and 71 (45.51%) males students with mean age of 25.4±4.6 participated. In male physiotherapy students, 11 (17.18%) out of 64 were excellent in physical fitness, 12 (18.75%) were good, 4 (6.25%) were average, 4 (6.25%) were low average and 54 (57.44%) were poor. While in female physiotherapy students only 6 (6.59%) out of 91 were excellent, 18 (19.78%) were good, 5 (5.49%) above average, 2 (2.19%) were low average and 40 (43.95%) were poor. Regarding BMI and Fitness Index, 47 (30.12%) had poor, while 28 (17.94%) had good and 14 (8.94%) had excellent fitness level.

Conclusion: The study concluded that Physical therapy students were not having good fitness level. The male students were found fit compared to females, but they were also not to optimum required level of fitness. P value calculated through chi square test was 0.00 showed BMI and physical fitness was associated to each other.

Key words: body mass index, physical fitness index, physiotherapy student

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Introduction:

Physical fitness is the physical capacity to perform the daily task efficiently and deal with emergencies as well as physical well-being. It is not considered that the absence of deformity or disease is physical fitness.(1) There is a negative association of hypertension with BMI (Body Mass Index) and low aerobic capacity.(2) A meta-analysis among adults showed that the adults having low fitness are at greater relative risk for Cardiovascular Disease (CVD) as compared to those who were at a higher level of fitness index distribution.(3)

Moreover, the U.S. Centers for disease control and prevention contrasted health-related components and performance-related components. Diminished levels of fitness and obesity in children started at level of adulthood and resulted in conditions ranging from discomfort at work to the development of metabolic disorders and heart diseases.(4,5) Most commonly used measurements for adiposity in puberty includes BMI , circumference of waist and its ratio to the body.(6,7) The foregoing studies that interpret the alliance between body composition indices and fitness in adolescent used variables such as BMI.(8) An individual, who can accomplish a particular task or activity with a reasonable degree of efficiency without immoderate fatigue and with fast recovery from the effects of exertion, is considered to be physically fit.(9,10) Physical fitness leads to enhancement in the capacity for

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skilled performance and rapid recovery from fatigue. The estimated physiological effort can be measured from the magnitude of change in heart rate and its change to normal state during exercise.(11) If demographic variations are taken, rural and urban students have difference in fitness level but still optimum level was also not scored.(12)

Regarding profession of physiotherapy, Potter and Jones stated that entry level of physiotherapy students should be dependent on screening the risk level of injury and their work-related performance. Their service is dependent on their optimum level of health and self-management strategies of maintaining BMI, being fit, having good endurance to perform clinical tasks.(13) The executive strains of physiotherapy profession in need of the therapist to engross in activities , demanding good amount of endurance, flexibility and strength. A physiotherapist requires reasonably high level of physical fitness to perform routine job tasks efficiently. However, in physiotherapy curriculum, no attention is paid to the importance of physical fitness of physiotherapy students. Therefore, being students of physiotherapy it is more crucial that they take into account the chief demands of profession and their physical well-being.

The need of time is the fitness level of physiotherapy students for upcoming professional demands. Due to lack of such study addressing the fitness as a component of the physical therapy students' evaluation, the basic aim was to measure out the fitness level and its association to BMI as both of these can affect the performance of Physiotherapist. This will help to develop education, awareness, and self–management strategies among the students after selecting this profession as career.

Methods:

This cross sectional study was conducted after thorough evaluation of risk benefits and standards of research conduction set by Ethical Review Committee (Ref#SU/ANCRD/IERC/19). The sample size was 164 calculated using Raosoft, keeping 5% margin of error, confidence level 95%, 500 population size in both institutes 80% response distribution. However, due to missing data, study was carried out in Lahore on 156 Students in Azra Naheed Medical College and Children Hospital Lahore, from February 2018 to July 2018 after approval from Ethical Review committee of Research. Non probability convenient sampling technique was used. After signing informed consent, the researchers included willing students of undergraduate program, both males and females, between 20 to 30 years from 3rd to 5th year of physiotherapy program.

Participants with any injury in last six months, systemic disease, muscular disease of hereditary nature and any surgery in last six months were excluded. Calculation of BMI was used to categorize research participants as underweight, normal, over-weight and obese.(14) Harvard step index was used as measure of fitness assessment. It has correlation r=0.64 which can be used to assess functional status.(15) The fitness test was explained to the participants to make sure that it is being performed in efficient way. The subjects performed test with step up and down for at least five minutes or until exhaustion at heighten stool of 33 cm. The participants were advised to step up and down, at the rate of 30 steps per minute for 5 minutes, with total of 150 steps or until exhaustion. Rest was given to the subjects for 5 minutes after the step test. Then after one, three and five minutes (in sequence) pulse was measured in resting position. Then their fitness Index was calculated.

Figure 1: Harvard Step -Test

In order to measure physical fitness index (PFI%), the researchers used Formula, PFI = Exercise duration in seconds x 100 / 2 (Resting pulse 1+2+3). According to Arnot and Gaines, criteria subjects were classified into categories. The male gender was classified as excellent if they have scoring >47, good 39-47, above average 30-39, average 17-29, below average 10-16 and poor 4-9 and very poor<4 similarly, females were categorized separately because there exists a difference between gender as excellent if they have scores>36, good 30-36, above average 23-29, average 12-22, below average 7-11 and Poor 0-1.(16) All the data had confidentiality with an independent assessor and subjects' names were not disclosed to anyone .The data from females were also collected by female physiotherapist after her

training from researcher (for their comfort). The researchers used SPSS version 22.0 for data entry and analysis. The data is presented in form of frequency tables and graph. The association between fitness index and BMI of the participants was measured using chi square test.

Results:

In our study 85 (54.4%) females and 71 (45.51%) males' students with mean age of 25.4 ± 4.6 participated. While the researchers measured fitness levels, results show that male physiotherapy students were less in poor category than females. While in female physiotherapy students more in poor than in good category and rest were in above average and average**.** Only 17 (22.54%) students were in excellent category of fitness index, while 94 (60%) of the students were in poor category of fitness index**.** (Table No. I)

Table.No 1:Comparison of Fitness Level & Association between BMI and Fitness Level

Variables		Poor	Average	Above Average	Good	Excellent	Chi square*/ p-value
Gender X Harvard Step Index Results (N=156)	Male	35 (49.29%)	2 (2.81%)	5(7.04%)	18(25.35%)	11(15.49%)	0.002
	Females	59 (69.41%)	04(4.70)	04(4.70)	12(14.11%)	06 (7.05%)	
BMI X Fitness Index(N=156)	Underweight	37(23.17%**)	03(1.92%)	01(.64%)	01(.64%)	01(.64%)	0.001
	Normal	47(30.12%)	0	2(1.28%)	28(17.94%)	14(8.94%)	
	Overweight	08(5.12%)	02(1.28%)	6(3.84%)	01(.64%)	2(1.28%)	
	Obese	2(1.28%)	01(.64%)	0	0	0	
	Total	94(60.25%)	6(3.84%)	9(5.76%)	30(19.23%)	17(10.89%)	

*= Asymp. Sig. (2 sided) at df. = 4
**=%age is according to BMI categories

Discussion:

The cross-sectional study was aimed to find out fitness index and its association with BMI among the undergraduate students of physiotherapy in Lahore. There were 11 males out of 64 and 6 females out of 91 were excellent in physical fitness. More females were present in overweight and underweight category as compared to males. In the current study, students were not having optimum fitness level related to their BMI. P value was found (0.001) predicting an association between BMI and physical fitness. Results of recent study concluded that fitness was less among undergraduate students. 2 out of 19 were in excellent, while only 1 was in good category of fitness index, in contrast to normal BMI category students. Comparing it's CFS (Children Fitness Screening), the prevalence of overweight children increased between 20 to 30 %.

The study indicates the negative correlation between BMI and physical fitness with more projections in older children.(17) BMI was related to decrease in fitness Cardiorespiratory fitness and strongly associated with obesity, which highlights the importance of increasing CRF for a protective effect even in youth. No associations were found for Physical activity and BMI.(18) The researchers found association p <0.03 between both sexes showing that there was a positive relationship between BMI and fitness level of our participants .The average estimation of VO_{2max} as predictor of fitness index showed decline in both genders (p<.001).The observed BMI trend p=0.77 and p=0.2.25 for males and females respectively and association between body fat and VO_{2max} .The findings suggested reduction of BMI is associated to physical fitness.(19) The results of fitness index measured by Harvard step test showed that 7% male physiotherapy students were excellent in physical fitness, 5.1% were in good, while in female physiotherapy students only 2.7% were excellent, 4.6% were good. The researchers found that fitness was lacking in all domains including gender, demographic base as well as on the basis of BMI.

All the subjects were not at level that can be considered as significant level if we consider them as fit for their professional demands. In studies on BMI and cardiorespiratory fitness (CRF) by Bonney in 2018 among female students with age of 13-16, overweight girls were not having good CRF as well as musculoskeletal fitness, but p value was <0.05 . Further their BMI was negatively associated with CRF.(20) The researchers found that in normal BMI 8.94% and 17.94% were in category of good and excellent level of fitness but underweight only 2 of them were in same

category of fitness. It states that Normal BMI can be a key predictor of fitness. The obesity (body fat) and fitness is high among the students with significant gender differences. There is a dire need of awareness, education and exercise teaching is required among the students.(21)

In the current study, the over-weight and obese students were less, compared to another local study stating it as highly prevalent among physiotherapy students but this study included only female students.(22) The male physiotherapy students were having better fitness compared to females**.** Only 17 (22.54%) out of 156 students were in excellent category of fitness index, while 94 (60%) of the students were in poor category of fitness index which is very alarming for the professional demands. The current study was similar in findings with that of an international study about fitness index of physiotherapy students. They found fitness index was not optimum and further found fitness index different among the students having overweight and normal BMI of the students.(23) It is important to discuss the musculoskeletal issues due to decreasing optimum level of fitness among physical therapy students. There should be evaluation as well as fitness training of students so that they can reach optimum level of their BMI and fitness .The future of physiotherapist depends on the optimum fitness level and physical endurance. It is necessary to keep themselves involved in physical activity, weight reduction and fitness programs as well.

Conclusion:

The study concluded that physical therapy students were not having good fitness level. Despite of this male were found to be fitter compared to females, but they were also not to the optimum required level of fitness. P value calculated through chi square test, 0.001; show BMI and physical fitness was associated to each other.

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Authors Contribution:

Tahir M: Conception & Design, Final approver and guarantor of the article

Umer M: Conception & assembly of data and Drafting of the article.

Raza SZ: Critical revision of the article for important intellectual content

Hashim Z: Analysis & Interpretation

Asad A: Literature search & Statistical expertise

Nadia S: Content writing, Discussion & Critical revision of the article for important intellectual content