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ORIGINAL ARTICLE

Self-perceived vs. Actual physical fitness levels in undergraduate physiotherapy students: a cross-sectional analysis of gender, BMI, and fitness component disparities

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Author`s Contribution

[1 2 3 4] Substantial contributions to the conception or design of the work for the acquisition, analysis or interpretation of data for the work, [1 2] Drafting the work or reviewing it critically for important intellectual content, [1]Final approval of the version to be published, [1] Agreement 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 investigated and resolved.

Article Info.

Received: October 03, 2024
Acceptance: February 10, 2025

Conflict of Interest: None
Funding Sources: None

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Cite this article as: Adil A, Mansoor R, Qaiser M, Shahid A, Self-perceived vs. Actual physical fitness levels in undergraduate physiotherapy students: a cross-sectional analysis of gender, bmi, and fitness component disparities. JRCRS.2025:13(1):55-59.
https://dx.doi.org/10.53389/JRCRS.2025130110

A B S T R A C T

Background: Physical fitness refers to a state that enables a human being to perform daily activities of living without undue fatigue. Cardiorespiratory fitness, muscular strength and endurance, flexibility and body composition are components that are associated with physical fitness. Evaluating the physical fitness of undergraduate physiotherapy students is essential because they are going to play a key role in health promotion. A sedentary lifestyle contributes to a decline in their physical fitness, making it crucial to assess their fitness levels.

Objective: To determine the self-perceived and actual level of physical fitness of undergraduate physiotherapy students and the components that are associated with it.

Methodology: A cross-sectional survey using purposive sampling technique was conducted in Riphah College of Rehabilitation Sciences Rawalpindi. A total of 400 subjects were included in the study. Sample size was calculated through Epitool which was 186. After obtaining consent from participants, data was collected using a structured questionnaire, which consist of 5 sections. Which Includes Demographic section, body mass index, International Fitness Scale, PAR Q+ and Fitness gram test. Data was entered and analysed by SPSS 21 by using descriptive analysis.

Results: Mean age of participants in the study was 20.62 ± 1.95. IFIS results showed most students rated their fitness as average across all domains. Only 0.8% met the Healthy Fitness Zone (HFZ) for aerobic capacity, while 99.3% fell below it. HFZ rates were 52.8% for BMI, 35.8% for abdominal strength, 67.0% for flexibility, 67.0% for trunk strength, and 63.2% for upper body strength. Gender was significantly associated with most fitness components ($p < 0.05$), while BMI showed selective associations, particularly with abdominal strength ($p = 0.01$) and overall fitness ($p = 0.03$).

Conclusion: The study revealed a significant disparity between self-perceived and actual physical fitness levels among undergraduate physiotherapy students. While flexibility and upper body strength were satisfactory, cardiorespiratory endurance was critically low. Males outperform females in abdominal strength, flexibility, and upper body endurance. BMI was significantly associated with abdominal strength and flexibility.

Keywords: BMI, Fitness Gram, Physical fitness, Physiotherapy.

Introduction

For decades physiotherapists have been identified as key role players for health promotion and prevention and treatment of non-communicable diseases of communities by functioning both as a role model and facilitator of behaviour change consistent with public health priorities.[1] Moreover, physiotherapy practice demands an optimal level of physical fitness as it involves diverse patient care such as bed mobility, lifting patients, gait training, safe handling,

resistance and strength training.[2] It is assumed that physiotherapy students have generous information about importance of physical fitness and benefits of physical activity because they will have an influence on their patient's attitude towards physical fitness and have a moral commitment to recommend individualized exercise plan.[3] Accurate perception of physical fitness will also help our future physiotherapist' to yield effective outcome right from beginning of their career.[4] A cross sectional study by Belim Zishan Khan et al. in India published in Sep 2019 to determine the level of physical activity and fitness parameters by evaluating aerobic capacity, endurance and body mass index. The study concluded that physiotherapy students who were active in their daily life have good physical fitness as compared to those having low physical fitness.[5] A survey involving 168 countries with 1.9 million participants conclude that the global prevalence of insufficient physical activity in 2016 was 27·5%. Levels of insufficient activity did not improve (28.5% in 2001; 27.5% in 2016) over the past 15 years.[6]

Physical fitness is divided into health and skill-related components. Health-related physical fitness implies a state of wellbeing in which activities are performed without undue fatigue and with less exertion.[2] Endurance of heart and lungs also called as cardiopulmonary endurance, strength of peripheral and central muscles, muscular endurance, flexibility and body composition are health-related components that affect physical fitness.[1]

The factors that are firmly related to physical fitness include a student's gender and BMI. There is no significant contribution of marital status on physical fitness. The way these determinants affect physical fitness depend on the particular component of health related physical fitness that we are assessing. Literature pointed out the weightiness of student BMI as a strong predictor of physical fitness above to the student physical activity level.[7]

Ayfer dayi et al. conducted a cross-sectional study in Turkey published in January 2017. The study determines the main factors affecting the physical activity of students in the health science campus. On concluding the study highlight the need of establishing the awareness regarding physical activity as well as to provide students a healthy pro-environment so that they can enhance their physical activity levels [8] As future healthcare advocates, physiotherapy students must embody fitness to credibly promote wellness and mitigate work-related musculoskeletal disorders (WRMSDs). However, emerging evidence reveals alarming gaps: while global studies report low cardiorespiratory endurance and muscular strength among students [9] data from regions like Pakistan remain scarce. Therefore, this study determined the frequency of self-perceived and actual level of physical fitness of undergraduate physiotherapy students and components that are associated with it.

Methodology

With approval from the Riphah College of Rehabilitation Sciences, Rawalpindi, Ethical Review Committee (Ref No: Riphah/RAHS/Letter-00732), N=400 students participated in this cross-sectional study, which was conducted from September 2020 to January 2021. Sample size was calculated using Epitool, which yielded a minimum requirement of 186 participants. However, to enhance the statistical power and generalizability of the study, data were collected from 400 participants.[10]

A non-probability purposive sampling strategy was employed. Students of Age between "17-23" enrolled in the Doctor of Physical Therapy Program met the inclusion criteria. Students were excluded based on prior history cardiovascular, musculoskeletal problems, any history of recent surgery, any symptoms of chest pain, any complaint of dizziness, or any condition that prevents physical activity. After informing the students about the study, Consent was taken verbally. There was no collection of personal information about students who participated in the research. Data was collected using a self-structured questionnaire which was divided into three main categories. The first section includes demographics and BMI, in the second section the participants need to choose the desired option based on their physical fitness including the international fitness scale and PAR Q. Last section was based on the objective measures of fitness through fitness gram test which included the PACER test (to assess aerobic capacity), Curl-Up (abdominal strength/endurance), Push-Up (upper body strength/endurance), Trunk Lift (trunk extensor strength/flexibility), and Shoulder Stretch (flexibility). Participants' results were compared to the Healthy Fitness Zone (HFZ) thresholds established by the FitnessGram test, which provides age- and gender-specific norms for each fitness component. SPSS Version 21 was used for data compilation and analysis. To conduct a descriptive analysis, the mean and standard deviation of each variable were calculated. For categorical data, percentages and frequencies were utilized.

Results

Out of All 400 participants 78% were female and 22% were male students, with average age of 20.62 ± 1.951 years The International Fitness Scale (IFIS) results showed that most students perceived their fitness as average across all domains. General fitness (49.5%, 3.49 ± 0.72), cardio-respiratory fitness (41.5%, 3.38 ± 0.81), muscular strength (49%, 3.39 ± 0.73), speed/agility (43.5%, 3.46 ± 0.75), and flexibility (42.3%, 3.46 ± 0.75) were predominantly rated as average, with fewer students classifying themselves at the extremes. The gathered data indicates that out of 400 students, only 3 (0.8%) fell into the healthy fitness zone (HFZ) for aerobic capacity, while 397 (99.3%) were in the non-HFZ. BMI analysis showed 52.8% (211 students) in HFZ and 47.3% (189) in non-HFZ. In the curl-up test, which assessed abdominal strength and endurance, 35.8% (143) reached HFZ, while 64.3% (257) did not. The shoulder stretch test showed 67.0% (271) in HFZ and 33.0% (129) in non-HFZ.

Similarly, the trunk lift test had 67.0% (268) in HFZ and 33.0% (132) in non-HFZ, with an average score of 12 cm. For upper body strength, the push up test revealed that 63.2% (253) were in HFZ, while 36.7% (147) were in non-HFZ as illustrated in table 2. The association of physical fitness with gender and BMI revealed varying levels of significance across different fitness components. In terms of gender, a non-significant association was found for aerobic capacity ($p > 0.05$), whereas BMI ($p < 0.05$), abdominal strength/endurance ($p < 0.05$), flexibility ($p = 0.01$), trunk extensor strength/flexibility ($p = 0.02$), and upper body strength/endurance ($p = 0.01$) all showed significant associations with gender. Regarding BMI, no significant association was found with aerobic capacity ($p > 0.05$), trunk extensor Strength/flexibility ($p > 0.05$), or upper body strength/endurance ($p > 0.05$). However, significant associations were observed for abdominal strength/endurance ($p = 0.01$) and overall physical fitness ($p = 0.03$). These findings highlight that while gender significantly influences most physical fitness components, BMI plays a more selective role in determining fitness outcomes as illustrated in table 2.

Table 1: Factors in healthy fitness zone

Factors	Healthy fitness zone	
	Yes %	NO %
Aerobic Capacity	0.8	99.3
Upper body strength and Endurance	63.2	36.7
Body composition	52.8	47.3
Abdominal strength and Endurance	35.8	54.3
Flexibility	67.0	33.0
Trunk extensor strength	67.0	33.0

Table 2: Association between Gender and fitness levels

Fitness test	Gender	Yes	No	P value
Aerobic capacity	Female	3	309	0.356
	Male	0	88	
Abdominal strength and endurance	Female	100	212	0.004**
	Male	43	45	
Trunk extensor strength and flexibility	Female	200	112	0.020*
	Male	68	20	
Upper body Strength and endurance	Female	188	124	0.01**
	Male	65	23	
Body mass index	Female	149	16	<0.001***
	Male	62	26	

Significance level: p<0.05*, p<0.01**, p<0.001***

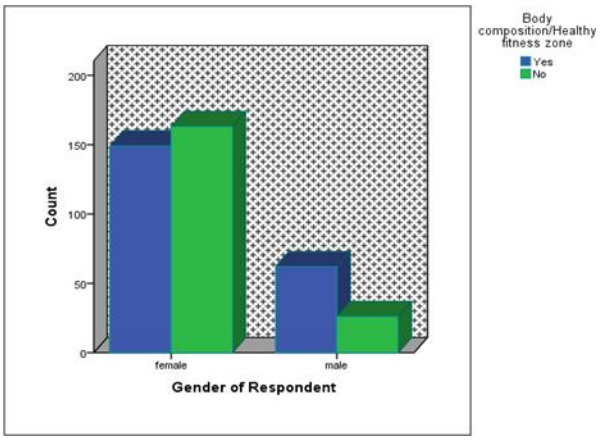

Figure 1: Association between BMI and Gender

Discussion

Physiotherapy Students require the highest level of physical fitness as they will have a key role in promoting physical activity. It was essential to expose students to their level of fitness. Regarding objective to determine the frequency of self-perceived level of physical fitness among physiotherapy students, this study found that general physical fitness in 198 (49.5%), Cardio-respiratory endurance in 166 (41.5%), muscular strength in (49%), speed and agility in 174 (43.5%) and flexibility in 169 (42.3%) was average according to participants perception. A total of 400 participants were selected using a non-probability purposive sampling technique. The results of the present study were in line with past research. The study was conducted in Lahore, Pakistan by Tahir Mahmood et al. in March 2019. It was a cross-sectional study and the objective of the study was to assess estimated and measured physical fitness level of 3rd year undergraduate physiotherapy students. The article concluded that general physical fitness in 52 (45.21%), muscular strength in 49 (42.6%), Endurance in 54 (46.9%),

Flexibility in 44 (38.2%) was on average.[11] Secondary objective of the study was to measure the actual physical fitness level of undergraduate physiotherapy students. In the present study student fitness level was assessed by FitnessGram tests and students were labelled into HFZ and Non HFZ In another similar study was conducted in Malaysia by Fatim Tahirah mirza et al. in 2020. This was a cross-sectional study which was undertaken to determine the physical fitness its association with WRMSDs in undergraduate physiotherapy students the study concluded that 75(60.5%) in body composition 94(81.7%) in flexibility, 70(60.8%) in abdominal strength 63(54.7%) in upper body strength 18(15.6%) in cardio respiratory endurance were present healthy fitness zone.[9]

Another objective of the study was to determine the association of factors that are associated with level of physical fitness. In a study by Darmesh Parmar et al. Published in 2015 in India, this cross-sectional study determined the physical fitness and its association with gender in undergraduate physical therapy students. The study found that there was a significant association of gender with physical fitness (p=0.03).[4] In the present study association of Body mass index with level of physical fitness was determined and it was found that there was a significant association between abdominal strength and endurance (p=0.01) flexibility (p=0.03) and there was non-significant relationship aerobic capacity, upper body strength (p>0.05).

A study conducted in Portugal in 2008 in P. Saliva. This was a cross-sectional study and the aim of the study was to determine the physical fitness of youth and factors that are associated with it. An objective assessment was carried out by using six FitnessGram tests. The study concluded that students with high BMI values had low physical fitness. There was a significant association between BMI and abdominal strength and Endurance (P >0.05).[12]

In an article of Vivek et al., published in Sep 2019 in Gujarat, India. It was a cross-sectional study whose objective was to evaluate the cardio respiratory fitness of physiotherapy students along with its correlation with BMI and performance of 6MWT. The study shows a non-significant association between BMI and cardio-respiratory fitness (p>0.05). This result pointed out that it is necessary to change the teaching methodologies, avoidance of sedentary lifestyle, and obesity control.[13]

Another study was published in Estonia conducted by Edward Juhkam et al. in 2019. This was a cross-sectional study and the aim of the study was to determine the physical Fitness of physiotherapy students. The results of the study pointed out that student's cardiorespiratory endurance is unsatisfactory according to norms existing for physiotherapy students.[14]

Another article got printed in January 2013 by Narinder Kaur Multani et al in Punjab, India. It was a cross-sectional study. The aim of the study was to assess the perception of physiotherapy students regarding physical fitness and exercise along with actual assessment of physical fitness. The study concluded that average level of flexibility (48.5%), Muscular strength in 52%, muscular endurance in 52%, body composition in 45.2%and general physical fitness in 54% according to perception of physiotherapy students.[15]

Limitations of study: Our sample size for this survey might not have been a true reflection of the population under study as we had only taken data from our institute because of health concerns in a pandemic. The study was conducted for a specific time period or cross-sectional study which did not record the overall or yearly level of physical fitness of participants because few studies show that it's a temporary state which could be changed with different environmental conditions so time lapse and longitudinal study should be done. Based on findings, policies promoting structured physical activity and long-term fitness monitoring in universities could enhance student well-being.

Conclusion

It was concluded that physical fitness levels of undergraduate physiotherapy students, revealing a concerning disparity between their self-perceived fitness and actual fitness test results. While components such as flexibility (67% in HFZ) and upper body strength (63.2% in HFZ) showed satisfactory levels, cardiorespiratory endurance was alarmingly low, with only 0.8% of students meeting the Healthy Fitness Zone (HFZ) criteria. Key associations emerged between gender and fitness components, with males outperforming females in abdominal strength, flexibility, and upper body endurance. BMI also played a selective role, showing significant links to abdominal strength and flexibility but not to aerobic capacity.

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