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Original Research Article

Are physiotherapy students meeting their professional demands? A cross-sectional correlational study

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ABSTRACT

Background: The physiotherapy profession demands strength, endurance, and flexibility, yet the preparedness of students is uncertain. This study assessed the relationship between self-perceived and measured fitness and described exercise behaviours and musculoskeletal complaints among physiotherapy students.
Methods: A cross-sectional correlational study of 127 students at the Government Physiotherapy College, Surat (October-November 2018). Self-perceived fitness was measured with a modified five-factor questionnaire (general fitness, endurance, muscular strength, flexibility, body composition). Objective fitness was assessed using the push-up and wall squat tests, toe touch and shoulder flexibility tests, and body mass index. Correlations were analyzed in SPSS 23.
Results: Body mass index correlated inversely with perceived body composition ($r=-0.295$, $p<0.01$). Flexibility tests correlated with perceived flexibility (toe touch $r=0.449$; shoulder flexibility $r=0.218$, $p<0.05$). No significant correlation existed between perceived muscular strength and push-up ($r=0.016$) or wall squat ($r=0.145$) performance. One third of students reported musculoskeletal pain, often in the neck, lower back, and shoulder while over half reported end-of-day fatigue. Most students rated their fitness as average. Among participants, 67.2% reported daily exercise, mainly walking, while only 32.7% engaged in organised sports; barriers were lack of time (33.6%) and low motivation (43.0%).
Conclusions: Students accurately judge body composition and flexibility but overestimate muscular strength. Given prevalent pain and limited strength-building activity, fitness and ergonomics training should be incorporated into undergraduate physiotherapy curricula.

Keywords: Self-perceived fitness; Muscular strength, Musculoskeletal pain, Occupational demands, Physical fitness, Physiotherapy students

INTRODUCTION

The physiotherapy profession is physically demanding, requiring sustained muscular strength, cardiovascular endurance, and joint flexibility to safely execute routine clinical tasks such as patient transfers, gait training, and manual therapy.[1] Physiotherapists are additionally expected to serve as community role models for health and physical fitness.[1] However, despite this professional emphasis on health optimization, practicing physiotherapists experience a disproportionately high prevalence of work-related musculoskeletal disorders (WMSDs), which predominantly affect the lower back, neck, and shoulders.[2-4] These occupational injuries are frequently attributed to physical underpreparedness for repetitive movements, heavy manual lifting, and sustained awkward postures.[2,4]

To mitigate these occupational hazards, it is crucial to examine the physical preparedness of physiotherapy

students before they enter full-time clinical practice. Physical fitness comprises objectively measurable domains-such as cardiorespiratory endurance, muscular strength and endurance, joint flexibility, and body composition -alongside an individual's subjective self-perception of these capabilities.[1,5] Previous research reveals conflicting evidence regarding the alignment between perceived and actual fitness levels.[1,6] Accurate self-appraisal is critical for aspiring clinicians, as overestimating one's physical capabilities may directly increase vulnerability to overstrain and musculoskeletal injury during demanding clinical activities.[6]

Furthermore, while undergraduate physiotherapy curriculum heavily emphasize exercise as a therapeutic modality, structured physical conditioning is rarely integrated into the student's own training regimens.[7] Consequently, engagement in regular, strength-building physical activity among students remains inconsistent, often hindered by perceived barriers such as a lack of time.[7]

Given the high occupational prevalence of WMSDs and ambiguous prior findings regarding fitness self-awareness, this study aimed to: assess the exercise habits and perceptions of physiotherapy students regarding their professional physical demands. Evaluate the correlation between self-perceived and objectively measured fitness across body composition, muscular strength, and joint flexibility. Determine the prevalence of exercise-induced musculoskeletal pain and end-of-day fatigue within this student population.

METHODS

A cross-sectional correlational study was conducted at the Government Physiotherapy College, Surat, Gujarat, India, between October and November 2018. The source population comprised all 194 students enrolled at the institution during the study period. Out of these, 127 students were included through convenience sampling. The inclusion criteria comprised all students who were physically present on the scheduled day of data collection and provided their voluntary informed consent to participate. Conversely, students who were absent during the collection period or those who exercised their right to decline participation in the research are excluded.

Data collection was conducted using a semi-structured questionnaire and a series of objective clinical assessments organized across four key domains. The questionnaire captured sociodemographic characteristics-such as age, sex, and residential status-alongside a comprehensive health and lifestyle profile (medical/surgical illness history, sleep duration, meal frequency, daily exercise habits, sports participation, barriers to exercise) and a musculoskeletal pain screening (presence, location, and duration of pain following strenuous activity). A modified version of the self-perceived fitness questionnaire developed by Delignieres et al was employed.[5] While the original instrument includes a general "fitness" factor alongside the four-factor model described by Abadie-comprising endurance, muscular strength, joint flexibility, and body composition.[8] This study excluded cardiorespiratory endurance to focus strictly on the remaining four domains. Consequently, participants rated their perceived fitness on a seven-point scale across four specific dimensions: muscular strength, joint flexibility, body composition, and general fitness.

To objectively measure physical fitness, several clinical tests were used across four key domains. Muscular strength was assessed through push-up and wall squat tests. Flexibility was measured for both the lower and upper limbs using the toe touch and shoulder flexibility tests, respectively. Finally, body composition was determined by calculating each participant's body mass index (BMI).

Push-up and wall squat tests were used as practical measures of upper and lower limb strength and endurance that can be administered in a classroom setting without specialized equipment. The toe touch and shoulder flexibility tests capture lower limb and shoulder girdle flexibility, respectively, which are commonly assessed in physiotherapy practice. BMI was used as a pragmatic indicator of body composition, acknowledging that it does not distinguish lean mass from fat mass but provides a standardised metric for population-level comparison.

For the self-perceived questionnaire, higher scores indicated better perceived fitness within each domain. These ratings were treated as ordinal measures and analysed in relation to objective test results to examine the accuracy of self-appraisal rather than absolute performance level.

Data were analysed using the Statistical Package for the Social Sciences (SPSS) version 23. Descriptive statistics (proportions, means, and standard deviations) were computed for sociodemographic, lifestyle, and fitness variables. Pearson or Spearman correlation coefficients were calculated for direction and magnitude to evaluate the degree of alignment between perceived and measured fitness in each domain. Statistical significance was set at $p<0.05$. Responses to lifestyle and barrier items were summarized as proportions to describe common exercise patterns and constraints within the physiotherapy students.

Voluntary informed consent was obtained from all participants prior to data collection and confidentiality was maintained.

RESULTS

The mean age of participants was 19.4±1.17 years. The sample was predominantly female (78.9%), with males comprising 21.1%. The majority of participants (96.8%) identified as Hindu. Approximately 7% of students

reported a pre-existing medical or surgical illness (Table 1).

Table 1: Distribution of study subjects based on socio-demographic characteristics.

Socio-demographic characteristics	Frequency	Percent
Age in years		
<20	88	69.3
>20	39	30.7
Gender		
Female	100	78.9
Male	27	21.1
Religion		
Hindu	123	96.9
Muslim	3	2.3
Sikh	0	0.0
Other	1	0.8
pre-existing medical or surgical illness	9	7

The study population had a mean BMI of 20.93±2.95 kg/m^2. When categorized by weight status, the vast majority of the group fell within the Normal weight range, accounting for 72-75% of the distribution. The underweight category represented 18% of the population, while the remaining individuals were classified as overweight (approximately 10%) or obese (approximately 1%). Overall, these proportions indicate a population that leans heavily toward the lower to normal end of the BMI scale.

The lifestyle behaviours of the surveyed students reveal a population with relatively consistent daily habits but significant barriers to more intense physical activity. While a strong majority of students maintained healthy routines-with 80% sleeping 6-8 hours and 78% consuming more than three meals daily-their physical activity was often incidental or low-impact. Although 67.2% reported exercising daily, the primary mode was walking, likely influenced by the fact that 66.8% were non-hostel residents and over half commuted via personal vehicles. Engagement in organised sports remained low at 32.7%, a trend further explained by the primary self-reported barriers to exercise: a lazy attitude (43.0%) and a lack of time (33.6%).

Among the study participants, 33.6% reported experiencing musculoskeletal pain following strenuous exercise. In the majority of cases, the pain resolved within one week. The most commonly affected anatomical areas were the neck, lower back, and shoulder. Additionally, while only 25.8% of students reported feeling fatigued during their daily routine, more than 50% experienced tiredness at the end of the day.

Table 2: Self-perceived levels of fitness.

Scores	Fitness	Endurance	Muscle strength	Joint flexibility	Body composition
1	1	1	0	0	1
2	4	3	2	4	2
3	29	29	24	16	27
4	65	57	69	67	85
5	16	15	27	16	8
6	11	18	4	23	4
7	1	4	1	1	0
Total	127	127	127	127	127

Table 3: Correlation between self-perceived and measured fitness.

Measured tests	Self-perceived domain	Correlation coefficient	Significance
BMI	Body composition	−0.295	P<0.01**
Push-up test	Muscular strength	0.016	Not significant
Wall squat test	Muscular strength	0.145	Not significant
Shoulder flexibility test	Joint flexibility	0.218	P<0.05*
Toe touch test	Joint flexibility	0.449	P<0.05*

*Significant at 95% significance level. **Significant at 99% significance level.

Across all five self-perception domains-general fitness, endurance, muscular strength, joint flexibility, and body composition-the majority of students rated themselves at a level of 4 on a seven-point scale, indicating a perception of average capability. Body composition exhibited the highest concentration at this neutral level, with nearly 70% of respondents selecting a score of 4. Scores of 1 or 2 (indicating very poor perceived fitness) were selected by fewer than 5% of respondents in any category, while a score of 7 (excellent) was virtually never endorsed (Figure 1).

Endurance and joint flexibility displayed slightly higher proportions of students rating themselves at score 6, while muscular strength exhibited a modest secondary peak at score 5, suggesting a marginally higher confidence in self-perceived strength relative to general fitness or body composition (Figure 1).

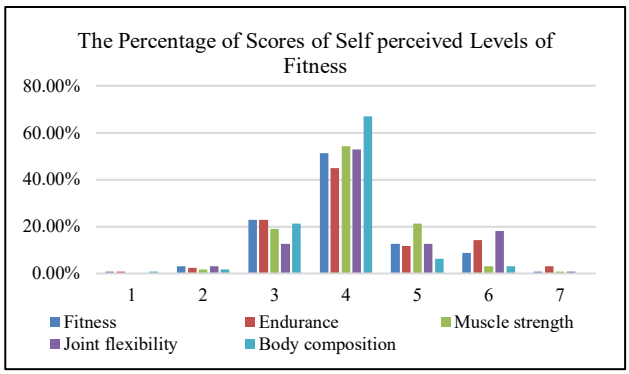

Figure 1: Comparison of self-perceived fitness scores in percentage.

Analysis of the study's key findings reveals varying levels of self-awareness among students regarding their physical fitness components. The correlation between BMI and self-perceived body composition was statistically significant ($r=-0.295$, $p<0.01$), indicating that students possess a reasonably accurate understanding of their own body composition. The negative direction reflects the inverse nature of the BMI scale relative to self-perceived fitness. Both objective flexibility tests demonstrated significant positive correlations with self-perceived flexibility, with the toe touch test yielding the strongest association ($r=0.449$). Neither the push-up test ($r=0.016$) nor the wall squat test ($r=0.145$) demonstrated a statistically significant association with self-perceived muscular strength, revealing a substantial disconnect between students' perceptions and their actual strength performance (Table 3).

The distribution of self-perceived scores suggests that most students viewed their overall fitness as moderate rather than poor or excellent. This mid-range clustering may reflect cautious self-rating or limited exposure to objective benchmarks. The pattern was more optimistic in endurance and flexibility than in general fitness, while muscular strength showed slightly higher confidence than overall fitness, despite the lack of measured association.

Across domains, the strongest concordance was seen in flexibility, especially the toe touch test, while strength showed the weakest agreement. This contrast indicates that students may rely on subjective cues that are more available for flexibility (such as perceived range of motion) than for strength, which often requires deliberate testing to assess accurately.

Pain reports were largely short term, with most episodes resolving within a week, but the recurrence of pain in common WMSD regions suggests repeated exposure to stressors. The combination of local pain and end-of-day fatigue may signal cumulative load that is not fully mitigated by current activity patterns.

Overall, the descriptive pattern indicates a generally healthy cohort with specific deficits in strength awareness and strength-focused activity, rather than a uniformly low fitness profile.

DISCUSSION

While the majority of students fell within the normal weight range, the 18% prevalence of underweight status is noteworthy given the strength and endurance demands inherent to the profession. The similar finding (20% prevalence of underweight students) also reported by Multani at al Al-Khlaifat et al reported only 12% prevalence of underweight in physiotherapy students.[1,10] Low body mass may reflect lower muscle reserves, which could reduce the ability to sustain repetitive lifting or prolonged postures. While BMI is a limited proxy for body composition, a sizable underweight subgroup may warrant targeted strength and conditioning support during training.

The result show that there is a statistically significant correlation between BMI and self-perceived body composition ($r=-0.295$, $p<0.01$) suggests that physiotherapy students possess a realistic understanding of their own body habitus. This finding is consistent with the study by Multani et al, Al-Khlaifat et al, Delignieres et al and Abadie et al reported that body composition is generally among the most accurately self-perceived domains of fitness because of constant visual and social feedback such as body weight, clothing fit, and visual appearance.[1,5,8,10]

Similarly, the significant correlations observed for joint flexibility-particularly the toe touch test ($r=0.449$)-align with earlier findings reported by Multani et al, who noted that physiotherapy students displayed higher self-awareness in domains where their academic training provides direct experiential knowledge.[1] Al-Khlaifat et al also reported comparatively better flexibility profiles and greater self-awareness regarding flexibility than other fitness domain.[10] As flexibility assessment forms a core component of the physiotherapy curriculum, students are routinely exposed to both the theory and practice of flexibility evaluation, which likely enhances the accuracy of their self-perception in this domain.

However, the most important finding of the present study was the absence of significant association between self-perceived muscular strength and objectively measured strength using push-up and wall squat tests. Al-Khlaifat et al also observed inadequate muscular strength and endurance among physiotherapy students despite acceptable self-ratings in certain fitness domains.[10] Similar discrepancies have been reported by Kukić et al among police students.[6] Overestimation of strength may increase

susceptibility to fatigue, poor biomechanics, and occupational musculoskeletal injuries.

The equivocal nature of the prior literature; with some investigators reporting significant associations between self-perceived and measured fitness, and others finding none; may be partially explained by these domain-specific differences.[1] When examined in aggregate, the relationship between perception and performance may appear weak, but decomposition by fitness domain reveals a more complex picture: self-assessment accuracy varies substantially depending on the availability of external feedback and the individual's experiential familiarity with each domain.

Approximately 33% of the students in the present study reported musculoskeletal pain following strenuous activity, most commonly involving the neck, lower back, and shoulder. Buczaj et al, Tsuji et al and Kovacevic et al all identified the lower back, neck, and shoulders as the most commonly affected anatomical regions among physiotherapists.[3,4,11] Tišlar et al further demonstrated that physiotherapy students with lower physical fitness had greater prevalence of musculoskeletal complaints.[2] Nyland and Grimmer also suggested that undergraduate physiotherapy training itself may act as a risk factor for low back pain because of repetitive practical sessions and poor ergonomics during patient handling activities.[12] A substantial proportion of students-who have not yet entered full-time clinical practice-are already experiencing pain in the same anatomical regions affected by WMSDs in working physiotherapists suggests that the seeds of occupational injury may be sown during the undergraduate years. The combination of inadequate muscular strength and high rates of exercise-induced pain shows a troubling portrait of physical under-preparedness.

The fact that over 50% of students report fatigue at the end of each day. Similar findings have been discussed in occupational health literature by Tišlar et al where chronic fatigue has been identified by way of a risk factor for impaired biomechanical compensatory strategies and consequently for musculoskeletal injury.[2] Gorce et al identified repetitive movement, prolonged standing, awkward posture, and physical exhaustion as important contributors to work-related musculoskeletal disorders among physiotherapists.[13] The coexistence of fatigue and musculoskeletal pain observed in the present study may therefore reflect inadequate physical conditioning for the routine demands encountered during physiotherapy training and clinical practice.

Although a majority of students reported daily exercise, walking was the most commonly performed activity, while participation in organised sports and structured strength-building activities remained low. Comparable findings have been reported by Kgokong et al observed that physiotherapy students often engage in low-intensity physical activity despite possessing theoretical knowledge regarding exercise and fitness.[7] Walking may contribute to general health and cardiovascular well-being, but it may not sufficiently improve muscular strength and endurance required for clinical physiotherapy tasks. The low participation in strength-focused activities observed in the present study may partly explain the mismatch between perceived and measured muscular strength.

The two most commonly cited barriers to exercise- "lazy attitude" (43.0%) and "lack of time" (33.6%)- are consistent with findings reported in other physiotherapy student populations. Kgokong et al similarly identified competing academic responsibilities as a significant barrier to regular exercise among physiotherapy students.[7] Comparable barriers have been reported by Blake et al among nursing and medical students, where academic workload and stress were major contributors to reduced physical activity.[14] This reflects a persistent gap between knowledge and personal health behaviour among healthcare students. Despite understanding the benefits of exercise, many students fail to incorporate structured physical activity into their own lifestyles.

The study prioritized feasible, low-cost assessments that can be replicated across physiotherapy programmes with limited resources. This pragmatic approach supports broader adoption of fitness screening within educational settings.

The reliance on self-report for variables such as exercise frequency, pain prevalence, and dietary habits introduces the possibility of social desirability bias. The sample was predominantly female, which may influence the strength-related outcomes. The lack of data on clinical placement hours prevented an analysis of how hands-on workload correlates with musculoskeletal pain. Future studies should include year of study or clinical placement exposure to assess whether risk increases as hands-on workloads rise. The field tests do not explore all components of occupational performance, such as task-specific lifting technique, balance, or endurance during prolonged patient handling. Daily physical activity was not objectively measured, which limits the ability to link exercise dose or intensity to perceived fitness or musculoskeletal outcomes.

CONCLUSION

Students accurately assess their body composition and joint flexibility but significantly overestimate their muscular strength. This lack of physical preparedness is already causing negative impacts, contributing to widespread post-exercise musculoskeletal pain and daily exhaustion. Furthermore, despite recognizing the importance of fitness, actual engagement in physical activity remains low due to poor motivation and time constraints.

Recommendations

Undergraduate programmes should embed structured strength and endurance training within the curriculum, complemented by periodic objective fitness testing to

recalibrate self-perception. Early practical instruction in ergonomics and safe patient handling should be paired with protected time for exercise and organised sports to address the most common barriers to participation.

Workplace interventions such as structured micro-break activities have been shown to mitigate musculoskeletal complaints in employees with physically demanding or sedentary roles.[9] The translation of such strategies into the academic setting, where students could engage in brief targeted physical conditioning during the academic day merits serious consideration.

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