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ASSOCIATION BETWEEN ACADEMIC STRESS, SITTING AND STANDING DURATION WITH LOWER BACK PAIN AMONG STUDENTS OF HEALTH PROFESSIONS- A CROSS-SECTIONAL ANALYSIS

Physiotherapy

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ABSTRACT

Background: Lower back pain (LBP) is an unpleasant sensory and emotional experience related to actual or potential tissue damage in the lumbar region. It may be mechanical or non-mechanical. Medical students may be particularly vulnerable due to prolonged sitting during classes and extended standing during clinical activities, both of which increase spinal load, muscle fatigue, and postural stresses at the lower back. Medical students experience high stress levels owing to their academic demands, which may further aggravate the symptoms of pain. **Methodology:** Following ethical approval, a cross-sectional study was conducted among 100 eligible medical students with a self-reported history of LBP. Information regarding pain intensity (NPRS), disability (Oswestry Disability Index), and academic stress levels was collected. In addition, the students' sitting and standing duration during college hours was recorded as hours per day. **Results:** 73% of participants reported moderate lower back pain, while 57% demonstrated moderate functional disability. Spearman correlation analysis revealed a statistically significant correlation between pain intensity and standing duration ($p = 0.028$), academic stress and standing duration ($p = 0.023$), academic stress and disability ($p < 0.001$), standing duration and disability ($p = 0.001$), and sitting duration and disability ($p = 0.005$). These findings indicate that increased academic stress and extended standing contribute to higher levels of pain and disability. **Conclusion:** This study concludes that academic stress and prolonged static postures are major contributors to LBP among health professional students. Implementing ergonomic education, regular movement breaks, and stress-management strategies within academic settings may help reduce pain burden.

KEYWORDS

Academic Stress, Sitting Duration, Standing Duration, Lower Back Pain, Health Professional Students.

INTRODUCTION

Lower back pain (LBP) can be described as pain and stiffness in the area below the costal margins and above the gluteal folds; it can be associated with leg pain in some cases.[1] The worldwide estimated incidence of LBP is 245.9 million cases in a year, with a prevalence of 577 million, indicating 50% increase in the cases of LBP in the past 20 years.[1] Lower back pain is associated with significant amount of disability along with reduction in quality of life.[2] Although commonly associated with older adults, LBP is increasingly reported among the younger population, particularly university students, raising concerns about chronicity and long-term disability,[3] and, in addition to physical discomfort, lower back pain affects academic performance among students.[4]

Etiologically, LBP may be mechanical, involving muscles, ligaments, the intervertebral disc, and the facet joint. Occasionally, non-mechanical causes related to infection, tumors, or systemic conditions may be the cause.[5,6] Among students, LBP is multifactorial and explained by the biopsychological model that emphasizes the interaction of biological, psychological and behavioral factors resulting in pain.[7,8] Prolonged sitting during lectures and study sessions, combined with poor ergonomic practices, increase static spinal loading and muscle fatigue. [9,10] Sustained sitting weakens postural muscles and increases strain on lumbar spine, while prolonged standing leads to muscle fatigue, venous pooling, and increased compressive forces. Studies have shown that even short periods of uninterrupted standing can induce neuromuscular fatigue and postural changes associated with LBP.[11,12] Simultaneously, academic stress contributes to increase in muscle tension, postural changes, and lower tolerance to pain, thereby exacerbating musculoskeletal symptoms.[12]

Students of the health care profession constitute a distinct population of medicine, physiotherapy, nursing and other allied health sciences, characterized by substantial academic demands that affect both musculoskeletal and psychological health.[13] The program demands an intensive academic schedule, early clinical engagements and frequent examinations, which are recognised to elevate academic stress. involves intensive academic schedules, high examination frequency, and early clinical engagement, which are recognized determinants of elevated academic stress. The academic demand also subjects the students to prolonged sedentary behaviour during didactic lecture sessions and extended periods of standing during lab and clinical placements.[14]

Oswestry Disability Index (ODI) is a commonly used objective measurement tool to evaluate the extent of disability associated with lower back pain. It has good psychometric properties with an internal consistency of 0.71 to 0.87, Cronbach α ranges,[14,15] 0.83 to 0.99, and test-retest reliability.[15,16,17] It is a self-reported questionnaire with a total of 10 components, and each question is scored on 0 (no disability) to 5 (maximum disability). A score of 0-20% is indicative of minimal disability, 21-40% indicates moderate disability, severe disability with a score of 41-60%, 61-80% crippled and 81-100% bed bound.[18] The academic stress scale is a self-reporting questionnaire containing 40 items developed to measure the stress experienced by a student in relation to academic demands, classes, examinations, peer interaction and learning environment. Each question has a response in a Likert scale of 1(no stress) to 5 (extreme stress). The scale includes multiple dimensions of stress associated with academia, with satisfactory internal consistency.[19,20]

A study by Fahad Abdullah AlShayhan et al on the prevalence of LBP among health sciences profession students found a high prevalence of 56.6% among students of the health care profession in Riyadh, Saudi Arabia.[21] Students of health professions represent a unique population at increased risk of lower back pain due to the combined influence of academic, physical and psychological demand. Unlike the general population, these students are exposed to prolonged sitting during lectures and study sessions, as well as extended periods of standing during clinical posting, often without adequate ergonomic awareness or structured movement breaks.

Each county has different methods of teaching, class hours, coursework loads, clinical posting duration and academic stress. Given this variation, it is important to understand the associations between academic stress, sitting and standing durations, and LBP among students in the health professions in India. In countries such as India, where enrollment in health professional courses is rapidly increasing, LBP among students poses significant academic and occupational concerns. Resource constraints, limited emphasis on ergonomics, and high academic pressure may further increase vulnerability to low back pain among students. Persistent pain may impair concentration, reduce attendance, and negatively affect future professional performance. Despite this, local data examining the combined influence of academic stress and prolonged sitting and standing on LBP remain limited. Most available data originates from the western population, which may not accurately reflect the education

system, lifestyle patterns, and stressors experienced by Indian students. Therefore, there is a need for context-specific research that explores the combined influence of academic stress and postural factors on low back pain among health professional students in India.

METHODOLOGY

Ethical clearance for the study was obtained from Sri Devaraj Urs Academy of Higher Education and Research (SDUAHER/R&D/CEC/RLJCOPT-UG/36/NF/-2025-2026). The cross-sectional study conducted at Sri Devaraj Urs Academy of Higher Education and Research, including the College of Medicine, the College of Physiotherapy, the College of nursing and the faculty of allied health professional from August 2025 to October 2025. The sample size was estimated using G*Power 3.1 software for a two-tailed Pearson correlation analysis. Based on a medium effect size ($r = 0.30$), with a significance level (α) of 0.05 and 80% power ($1 - \beta = 0.80$), the required minimum sample size was calculated as 84 participants. The effect size was chosen based on previous literature reporting moderate correlations between postural behavior and musculoskeletal discomfort in student populations.[22]

The study included medical, physiotherapy and nursing students currently attending clinical postings for at least 4 weeks continuously, with a self-reported history of lower back pain. Exclusion Criteria were students with a history of trauma, fall, spine surgeries and surgeries of the lower limb, known cases of structural deformity like scoliosis and known cases of any neurological conditions affecting posture. Consent was taken from students meeting the inclusion and exclusion criteria, who were requested to fill out the paper based academic stress scale, Oswestry disability index and data on sitting and standing duration were collected in hours.

Statistical Analysis

All data were analyzed using SPSS (version 24.0). Descriptive statistics were used to summaries demographic and study variables of age, gender and student program distribution. (Table 1) The Shapiro–Wilk test was used to assess the normality of data distribution of pain intensity on Numerical Pain Rating Scale (NPRS), disability, academic stress levels, and sitting and standing duration, as some of the data were not normally distributed, median, interquartile range and Spearman's rank test were used for statistical analysis.

Table 1: Demographic Data

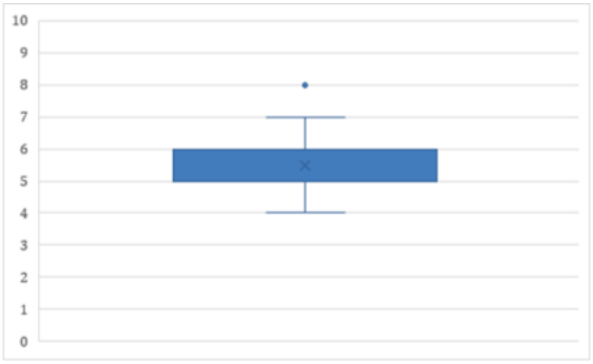
Sl.no	Variables	Mean ± SD
1	Age I) <19 yrs ii) 19-23 yrs iii) >23 yrs	 4 82 14
2	Gender i) Male ii) Female	 45 55
3	Course i) BPT ii) Nursing iii) MBBS	 52 15 33

RESULT

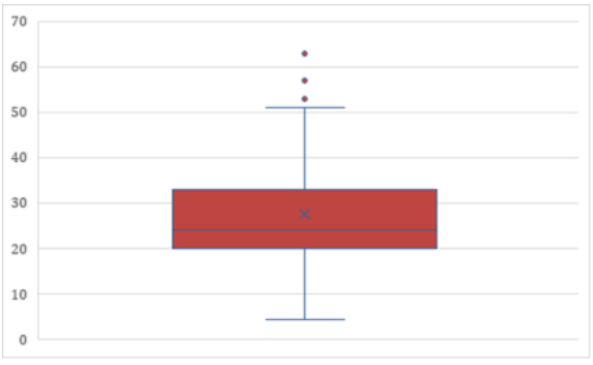
Data from a total of 100 students was collected. The median(IQR) pain intensity on NPRS was 5.50 (1.0) (Graph1) with disability level of 24.0 (13.0)(Graph 2). The academic stress levels among the students were found to be 118 (37.3)(Graph 3). The sitting duration was 4 (1) hours, and the standing duration was 4(1) in college. (Table 2). Spearman correlation test (Table 3) showed a weak to moderate positive correlation between academic stress and disability percentage ($r=0.388$, $p<0.001$), indicating that higher academic stress levels were associated with increased disability scores. Similarly, standing duration showed a weak positive correlation with pain intensity ($r=0.220$, $p<0.028$) and disability ($r=0.322$, $p=0.001$), suggesting that prolonged standing may increase the risk of LBP and functional limitation. Conversely, sitting duration was weakly negatively correlated with disability ($r=-0.279$, $p =<0.005$). No significant correlation was identified between academic stress and pain intensity ($r=0.108$, $p=0.285$).

Table 2: Pain Intensity, Disability, Academic Stress and Sitting Duration and Standing Duration

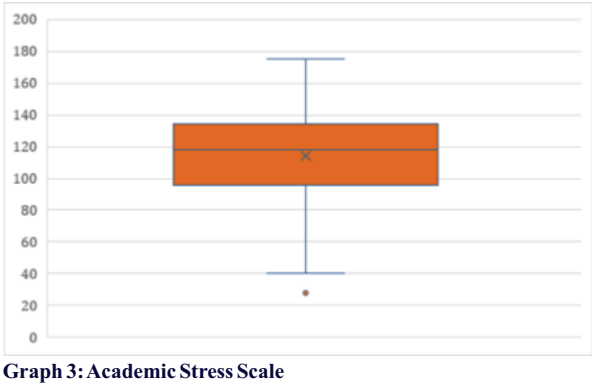
Parameters	Median (IQR)
Pain intensity (NPRS)	5.50 (1.0)
Oswestry disability index	24.0 (13.0)
Academic stress	118 (37.3)
Sitting duration (hours)	4.0 (1.0)
Standing duration	4.0(1.0)



Graph 1: Pain Intensity (NPRS)



Graph 2: Oswestry Disability Index



Graph 3: Academic Stress Scale

Table 3: Correlation Between Academic Stress, Sitting and Standing Duration with Lower Back Pain

Parameters	Correlation	Academic stress	Sitting duration	Standing duration
Pain intensity (NPRS)	Spearman rho	0.108	-0.182	0.220
	df	98	98	98
	p value	0.285	0.070	0.028*
Oswestry Disability Index	Spearman rho	0.388	-0.279	0.322
	df	98	98	98
	p value	<0.001*	0.005*	0.001*

DISCUSSION

This study investigated the association between academic stress, sitting and standing duration with LBP among healthcare professional students. The study included 100 students of various health care professional programs. Out of the 100 students assessed, 73 students reported that they had a history of moderate intensity of lower back pain, resulting in most of them having mild to moderate disability. Most participants were aged 19-23 years, with a slightly higher proportion of females, which aligns with previous evidence reporting greater musculoskeletal pain among female students.

The study identified a positive association between academic stress and both pain intensity and disability, indicating that high academic demands can adversely affect lumbar health even in young, otherwise

healthy individuals. Increased stress has been known to elevate muscle tension, impaired postural control, and heightened pain perception,[23] which may discourage physical activity and healthy posture, possibly affecting the students academics. The findings indicate that the majority of participants experienced high academic stress (44%), followed by low to moderate academic stress (37%). A smaller portion of students had very low academic stress(14%), while only 5% of them experienced very high academic stress.

The current study also identifies that prolonged standing was significantly associated with higher pain intensity and disability, likely due to increased spinal load and muscle fatigue. [24] Majority of the participants (57%) experienced moderate disability scores (21-40), while 29% had minimum disability (score 0-20). These results suggest that most students faced a moderate degree of functional limitation related to LBP, indicating a noticeable impact on their daily and academic activity. These findings are consistent with previous studies identifying prolonged standing as a major ergonomic risk factor for LBP.[24] The study also found a negative association between sitting duration and disability, which may be due to the rest given to muscles.

Prolonged standing can increase low back pain through a combination of biomechanical and physiological mechanisms. During standing, the lumbar spine is subjected to continuous axial loading, which increases compressive forces on the intervertebral disc and facet joint. At the same time, postural muscles such as the erector spinae and multifidus must remain in a sustained isometric contraction to maintain upright posture, leading to muscle fatigue, reduced blood flow, and accumulation of metabolic by-products that contribute to pain. Unlike dynamic activities, prolonged standing limits movement variability, resulting in tissue creep and ligamentous strain.

Circulatory factors, including venous pooling in the lower limb, may also contribute to fatigue and discomfort. Over time, these factors impair neuromuscular control and may increase pain sensitivity, thereby exacerbating low back pain.[25,26,27]

Factors such as postural habits, muscle endurance, and physiological differences may contribute to this trend. The presence of moderate pain in a young individual highlights the need for early preventive interventions during academic training. Although standing may offset the effects of prolonged sitting, extended static standing without movement can still result in muscle fatigue and lumbar discomfort. Overall, the findings suggest that academic stress and sedentary behavior interact to increase the risk of LBP and disability associated with it. Preventive strategies focusing on ergonomic education, regular movement breaks, physical activity and stress management are essential to reduce pain and prevent long-term disability among health professional students.

CONCLUSION

This study found that academic stress, prolonged standing and sitting duration are important factors associated with LBP among students of health professions. Most participants experienced moderate pain and disability, showing that even young adults are affected by prolonged standing. Academic stress and prolonged standing were significantly associated with increased disability among health professional students.

Limitation

Data were obtained using self- reported questionnaires, which may introduce recall or response bias. The cross-sectional nature of the study reduces the ability to establish cause and effect relationship. Important influencing factors such as quality of sleep, physical activity levels, and ergonomic study environment were not explored.

Future Research Recommendation

Future studies should incorporate objective measurement such as posture analysis tools, wearable activity trackers, and physiological stress indicators can enhance precision.

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