

Original Article

Correlation of Musculoskeletal Pain with Psychological Distress and Sleep Quality among Healthcare Undergraduate University Students of Lahore

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ABSTRACT

Background: Musculoskeletal symptoms, psychological distress, and disturbed sleep may coexist among undergraduate healthcare students exposed to demanding academic, clinical, and ergonomic conditions. **Objective:** To examine musculoskeletal symptoms and their relationships with depression, anxiety, stress, and sleep quality among undergraduate healthcare students in Lahore, Pakistan. **Methods:** This cross-sectional study included 196 students aged 18–30 years who were recruited through convenience sampling during a six-month period. Eligibility required self-reported musculoskeletal pain during the preceding 12 months and seven days. Musculoskeletal symptoms, psychological distress, and sleep quality were assessed using the Nordic Musculoskeletal Questionnaire, Depression Anxiety Stress Scale-21, and Pittsburgh Sleep Quality Index, respectively. Data were analyzed in IBM SPSS Statistics version 25 using descriptive and association procedures. **Results:** Lower-back symptoms were reported by 114 participants (58.2%), neck symptoms by 93 (47.4%), and shoulder symptoms by 77 (39.3%). At least mild depression, anxiety, and stress symptoms were identified in 97 (49.5%), 139 (70.9%), and 100 (51.0%) participants, respectively. Sixty-six participants (33.7%) were classified outside the good-sleep-quality category. The supplied aggregate tables did not permit reliable reconstruction of the proposed association estimates. **Conclusion:** Musculoskeletal symptoms, psychological distress, and suboptimal sleep commonly coexisted within this pain-selected student sample. Complete association data are required to determine the magnitude and independence of these relationships. **Keywords:** Musculoskeletal pain; psychological distress; sleep quality; healthcare students; cross-sectional study; Pakistan.

INTRODUCTION

Musculoskeletal pain is an important health concern among undergraduate healthcare students because their academic and clinical training may involve prolonged sitting, sustained or awkward postures, repetitive practical activities, patient-handling tasks, and extended use of computers and other digital devices. Previous studies have reported a substantial burden of musculoskeletal symptoms in this population, particularly in the lower back, neck, and shoulder regions (1,2). Prolonged static posture, insufficient ergonomic awareness, high screen exposure, and reduced physical activity have also been identified as potentially modifiable factors associated with musculoskeletal symptoms among university students (3,4). These symptoms may interfere with concentration, attendance, clinical training, daily activities, and students' overall academic experience.

The health implications of musculoskeletal pain may extend beyond physical discomfort. Undergraduate healthcare education is frequently accompanied by demanding academic workloads, examinations, clinical responsibilities, and concerns about professional performance, which may contribute to symptoms of depression, anxiety, and stress (5). Psychological distress may be associated with increased pain perception through heightened physiological arousal, altered pain processing, muscle tension, and maladaptive responses to stress (6,7). Conversely, persistent musculoskeletal symptoms may restrict activity, disturb concentration, and contribute to emotional distress. Because these relationships may operate in either direction, cross-sectional evidence can establish associations but cannot determine whether psychological distress precedes or results from musculoskeletal pain.

Sleep quality represents another potentially important correlate of musculoskeletal health. Insufficient or disturbed sleep may be associated with impaired recovery, fatigue, increased pain sensitivity, and reduced ability to cope with physical and psychological demands (8). Musculoskeletal discomfort may also disrupt sleep onset, sleep continuity, and daytime functioning, producing a potentially reciprocal relationship between pain and sleep disturbance (6,9). Previous observational research has reported associations among musculoskeletal symptoms, psychological distress, and poor sleep; however, variations in participant characteristics, pain definitions, assessment periods, and measurement instruments make direct comparisons across studies difficult (6,10).

Standardized instruments can facilitate a more consistent examination of these interconnected outcomes. The Nordic Musculoskeletal Questionnaire assesses self-reported musculoskeletal symptoms across defined anatomical regions (11), whereas the Depression Anxiety Stress Scale-21 measures symptoms of depression, anxiety, and stress (12). The Pittsburgh Sleep Quality Index evaluates multiple components of sleep and provides a global measure of self-reported sleep quality (13). Nevertheless, evidence examining these three domains concurrently among undergraduate healthcare students in Pakistan remains limited. Findings from other populations may not be directly generalizable to students in Lahore because academic structures, clinical responsibilities, ergonomic conditions, help-seeking practices, and sociocultural circumstances may differ.

Accordingly, this cross-sectional study aimed to examine the associations of self-reported musculoskeletal symptoms, assessed using the Nordic Musculoskeletal Questionnaire, with depression, anxiety, and stress measured using the Depression Anxiety Stress Scale-21 and sleep quality measured using the Pittsburgh Sleep Quality Index among undergraduate healthcare students in Lahore, Pakistan.

MATERIAL AND METHODS

A cross-sectional study was conducted to examine the associations of musculoskeletal symptoms with psychological distress and sleep quality among undergraduate healthcare students in Lahore, Pakistan. The cross-sectional design permitted the concurrent assessment of musculoskeletal symptoms, depression, anxiety, stress, and sleep quality within the recruited student sample. Data were collected over a six-month period from students attending participating universities in Lahore. The target population included students enrolled in medicine, nursing, physiotherapy, dentistry, pharmacy, nutrition, and medical laboratory technology programs.

A convenience sampling method was used to recruit 196 participants between 18 and 30 years of age. Students were eligible if they were enrolled in an undergraduate healthcare program and reported musculoskeletal pain during both the previous 12 months and the previous seven days. Individuals with severe medical conditions, recent trauma

or surgery, pregnancy, or an inability to complete the assessment instruments were excluded. Eligible students were informed about the study procedures, and written informed consent was obtained before participation.

Data were collected during supervised sessions using a demographic form and three self-reported assessment instruments administered in English and Urdu. The demographic form recorded age, gender, academic discipline, socioeconomic status, and year of study. The questionnaires were reported to have been culturally adapted and pretested before data collection. Trained research assistants facilitated questionnaire administration, provided procedural guidance when required, and reviewed responses during the sessions to improve completeness and reduce errors resulting from misunderstood or unintentionally omitted items.

Musculoskeletal symptoms were assessed using the Nordic Musculoskeletal Questionnaire, which records symptoms involving nine anatomical regions and distinguishes symptoms experienced during specified recall periods (11). In the present study, the questionnaire was used to identify musculoskeletal symptoms reported during the previous 12 months and the previous seven days. Psychological distress was assessed using the 21-item Depression Anxiety Stress Scale, which comprises separate depression, anxiety, and stress subscales (12). Participants were classified into the corresponding normal, mild, moderate, severe, and extremely severe categories according to the scoring thresholds applied to each subscale. Sleep quality was assessed using the Pittsburgh Sleep Quality Index, which evaluates multiple components of sleep and generates a global sleep-quality score (13). For the categorical analyses, global PSQI scores were classified as good sleep quality from 0 to 4, poor sleep quality from 5 to 10, and possible sleep disturbance above 10.

All completed questionnaires were reviewed by the research team before data entry. Data were analyzed using IBM SPSS Statistics version 25. Continuous variables were summarized using means and standard deviations, while categorical variables were reported as frequencies and percentages. Pearson's chi-square test was used to examine associations involving categorical variables, including associations of categorized musculoskeletal symptoms with depression, anxiety, stress, and sleep-quality categories. Linear-by-linear association tests were used to examine ordinal trends across symptom categories where reported, while Phi coefficients were reported as measures of association. Pearson's correlation coefficient was specified for examining relationships among numerical musculoskeletal, psychological-distress, and sleep-quality scores. All tests were two-tailed, statistical significance was established at $p < .05$, and reporting of 95% confidence intervals was planned.

Ethical approval was obtained before participant recruitment. Participation was voluntary, and written informed consent was obtained from every participant before questionnaire administration. The supervised data-collection process was conducted with attention to participant comprehension and response completeness.

RESULTS

A total of 196 undergraduate healthcare students were included in the analysis. As shown in Table 1, 117 participants (59.7%) were female and 79 (40.3%) were male. Physiotherapy students represented the largest disciplinary group, accounting for 106 participants (54.1%). Most participants belonged to the middle socioeconomic category (143, 73.0%), while 103 (52.6%) were enrolled in their fifth year of study.

The lower back was the most frequently reported anatomical region affected by musculoskeletal symptoms, involving 114 participants (58.2%; 95% CI: 51.2–64.8%). Neck symptoms were reported by 93 participants (47.4%; 95% CI: 40.6–54.4%), and shoulder symptoms were reported by 77 (39.3%; 95% CI: 32.7–46.3%), as presented in Table 2.

Table 1. Sociodemographic Characteristics of Participants

Variable	Category	n (%)
Gender	Male	79 (40.3)
Gender	Female	117 (59.7)
Academic discipline	Medicine	19 (9.7)
Academic discipline	Nursing	23 (11.7)
Academic discipline	Physiotherapy	106 (54.1)
Academic discipline	Dentistry	19 (9.7)
Academic discipline	Pharmacy	13 (6.6)
Academic discipline	Nutrition	8 (4.1)

Variable	Category	n (%)
Academic discipline	Medical laboratory technology	8 (4.1)
Socioeconomic status	Upper	41 (20.9)
Socioeconomic status	Middle	143 (73.0)
Socioeconomic status	Lower	12 (6.1)
Year of study	First	3 (1.5)
Year of study	Second	16 (8.2)
Year of study	Third	31 (15.8)
Year of study	Fourth	43 (21.9)
Year of study	Fifth	103 (52.6)

Percentages are based on N = 196 and may not total exactly 100.0% because of rounding.

Table 2. Distribution of Musculoskeletal Symptoms by Anatomical Region

Anatomical region	n/N (%)	95% CI (%)
Lower back	114/196 (58.2)	51.2–64.8
Neck	93/196 (47.4)	40.6–54.4
Shoulder	77/196 (39.3)	32.7–46.3

CI: confidence interval. Numerators were derived from the reported percentages and total sample. Confidence intervals were calculated using the Wilson method.

Table 3. Distribution of Depression, Anxiety, and Stress Categories According to DASS-21

DASS-21 subscale	Category	Score range	n (%)
Depression	Normal	0–9	99 (50.5)
Depression	Mild	10–13	48 (24.5)
Depression	Moderate	14–20	40 (20.4)
Depression	Severe	21–27	6 (3.1)
Depression	Extremely severe	≥28	3 (1.5)
Anxiety	Normal	0–7	57 (29.1)
Anxiety	Mild	8–9	25 (12.8)
Anxiety	Moderate	10–14	52 (26.5)
Anxiety	Severe	15–19	42 (21.4)
Anxiety	Extremely severe	≥20	20 (10.2)
Stress	Normal	0–14	96 (49.0)
Stress	Mild	15–18	59 (30.1)
Stress	Moderate	19–25	29 (14.8)
Stress	Severe	26–33	12 (6.1)

DASS-21: 21-item Depression Anxiety Stress Scale. Percentages are based on N = 196.

Table 4. Distribution of Sleep-Quality Categories According to PSQI

Sleep-quality category	PSQI global score	n (%)
Good sleep quality	0–4	130 (66.3)
Poor sleep quality	5–10	62 (31.6)
Possible sleep disturbance	>10	4 (2.0)

PSQI: Pittsburgh Sleep Quality Index. Percentages are based on N = 196 and may not total exactly 100.0% because of rounding.

According to the DASS-21 classifications applied in the study, 97 participants (49.5%) had at least mild depressive symptoms, including 49 (25.0%) with moderate-to-extremely severe symptoms. Anxiety symptoms of at least mild severity were identified in 139 participants (70.9%), with 114 (58.2%) classified as having moderate-to-extremely severe anxiety. One hundred participants (51.0%) had at least mild stress symptoms, including 41 (20.9%) with moderate or severe stress (Table 3).

Based on the PSQI categories applied in the manuscript, 130 participants (66.3%) had good sleep quality, 62 (31.6%) had poor sleep quality, and four (2.0%) were classified as having possible sleep disturbance. Overall, 66 participants (33.7%) fell outside the good-sleep-quality category (Table 4).

DISCUSSION

In this pain-selected sample of undergraduate healthcare students, musculoskeletal symptoms occurred most frequently in the lower back, neck, and shoulders, while symptoms of psychological distress and suboptimal sleep were also common. These findings indicate that physical discomfort, emotional symptoms, and sleep problems coexist within the surveyed population. However, the available aggregate results do not permit reliable estimation of the magnitude or independence of the proposed relationships because complete cross-tabulations, correlation coefficients, confidence intervals, and adjusted analyses were not reported.

The predominance of lower-back, neck, and shoulder symptoms is broadly consistent with studies of health-professions students, in whom prolonged sitting, sustained neck flexion, repetitive practical activities, and demanding clinical postures have been associated with musculoskeletal complaints (1,2). Extended digital-device use and prolonged online or classroom learning may further increase exposure to static and ergonomically unfavorable positions (3,4). The particularly large proportion of physiotherapy students in the present sample may have influenced the observed anatomical pattern because their training can include manual techniques, patient handling, and prolonged practical sessions. Nevertheless, no discipline-stratified analysis was available to determine whether symptom distributions differed between physiotherapy and other healthcare programs.

Psychological symptoms were also frequent, particularly anxiety, although the reported marginal distributions alone cannot establish whether psychological distress increased with the presence, number, or severity of musculoskeletal symptoms. Psychological distress has previously been documented among university students and may coincide with demanding academic workloads, examinations, clinical responsibilities, and concerns about professional performance (5). Previous observational studies have also reported relationships between musculoskeletal symptoms and psychological distress (6,7). Potential explanations include heightened physiological arousal, muscle tension, reduced activity, altered pain processing, and diminished coping capacity. These mechanisms remain plausible rather than demonstrated in the present study because psychological distress and musculoskeletal symptoms were assessed at the same time.

Approximately one-third of participants were classified outside the good-sleep-quality category. Previous studies have linked poor sleep with musculoskeletal symptoms across student and working populations (6,8,10). Occupational research has similarly described relationships among work-related stress, sleep quality, and musculoskeletal complaints, although the populations and exposures differ from those of university students (14–16). Sleep disruption may increase fatigue and pain sensitivity, while musculoskeletal discomfort may interfere with sleep initiation and continuity. The direction of this relationship cannot be established from cross-sectional observations, and prospective studies are required to determine whether sleep disturbance precedes, follows, or develops concurrently with musculoskeletal symptoms.

Research involving dental and other healthcare students has emphasized the possible contribution of sustained clinical postures, repetitive tasks, and insufficient ergonomic awareness to musculoskeletal complaints (17,18). Nevertheless, previous findings regarding psychological factors have not been uniform. Some studies have reported limited or nonsignificant relationships between stress and musculoskeletal symptoms after considering demographic or academic characteristics (19). Differences across studies may reflect variation in academic disciplines, sex distribution, year of study, sampling methods, symptom recall periods, pain definitions, psychological measures, and adjustment for confounding. Evidence from younger student populations also suggests that musculoskeletal symptoms should be interpreted in relation to broader physical, psychological, and lifestyle characteristics rather than as an isolated condition (20).

A biopsychosocial interpretation may therefore be appropriate, with physical workload and posture interacting with emotional distress, sleep, activity, and individual coping factors (21). From a public-health perspective, universities may consider integrated student-health assessment that includes ergonomic exposure, musculoskeletal symptoms, psychological well-being, and sleep quality. Multicomponent preventive approaches incorporating ergonomic education, opportunities for movement, mental-health support, and sleep-health education have been proposed in the existing literature (22). The present findings support the relevance of evaluating these domains together, but they do not establish that any specific intervention would reduce pain or psychological distress in this population.

The study has several strengths, including the concurrent assessment of musculoskeletal symptoms, psychological distress, and sleep quality using established instruments; inclusion of students from several healthcare disciplines; supervised questionnaire administration; and availability of questionnaires in English and Urdu. Its findings must nevertheless be interpreted in light of important limitations. Convenience sampling, overrepresentation of physiotherapy and fifth-year students, and incomplete description of the participating universities restrict generalizability. Requiring participants to report musculoskeletal pain during both the preceding 12 months and seven days created a pain-selected sample and prevented estimation of population-level musculoskeletal-pain prevalence. The cross-sectional design precluded evaluation of temporality or causality, while self-reported measures were susceptible to recall and reporting bias. The absence of a reproducible definition of overall pain severity, complete contingency tables, adjusted estimates, missing-data information, and correction for multiple comparisons further limits interpretation of the reported relationships. Future analyses should define the primary musculoskeletal variable, present complete association data, evaluate statistical assumptions, and account for relevant demographic, academic, ergonomic, and lifestyle factors.

CONCLUSION

Among the pain-selected undergraduate healthcare students surveyed in Lahore, musculoskeletal symptoms were most frequently reported in the lower back, neck, and shoulders, and substantial proportions of participants experienced psychological symptoms or suboptimal sleep quality. These findings demonstrate the coexistence of physical, psychological, and sleep-related concerns within the sample, but the available results do not permit definitive quantification of their associations. The findings support the importance of integrated assessment of musculoskeletal health, psychological well-being, and sleep among healthcare students while indicating the need for more representative and analytically complete studies.

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