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PREVALENCE AND RISK FACTORS OF CERVICAL PAIN AMONG MADRASSA STUDENTS IN SOUTH PUNJAB

Original Research

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ABSTRACT

Background: Cervical pain is among the most prevalent musculoskeletal disorders globally, contributing to functional limitation, reduced productivity, and psychological distress. Its onset is strongly influenced by prolonged static posture, poor ergonomics, and insufficient physical activity. Despite extensive research in occupational and academic settings, limited evidence exists within traditional religious education systems. Madrassa students in Pakistan often maintain forward-flexed, floor-seated positions for extended hours, potentially predisposing them to early-onset cervical strain and postural fatigue.

Objective: To determine the prevalence of cervical pain and identify its major behavioral and ergonomic risk factors among madrassa students in South Punjab.

Methods: A cross-sectional analytical study was conducted from January to June 2024 among 412 madrassa students aged 12–25 years selected through multistage random sampling. Data were collected using a pretested and validated questionnaire encompassing demographic details, posture, sitting duration, physical activity, and pain characteristics. Reliability testing yielded a Cronbach's alpha of 0.82. Descriptive statistics, chi-square tests, and multivariate logistic regression analyses were performed using SPSS version 26.0. Statistical significance was set at $p < 0.05$ with 95% confidence intervals.

Results: Out of 412 participants, 289 reported cervical pain, indicating an overall prevalence of 70.2%. Pain was more common among females (74.1%) than males (66.7%, $p = 0.048$). Students sitting for ≥4 hours daily had significantly higher pain prevalence (78.8%) compared to those sitting <4 hours (55.6%, $p < 0.001$; adjusted OR = 2.62, 95% CI: 1.63–4.21). Forward-flexed posture (>45°) and inadequate physical activity (<150 minutes/week) were independent predictors (adjusted OR = 2.08 and 1.84, respectively; $p < 0.05$). Most students experienced moderate pain intensity (45.0%) of short duration (<1 hour in 70.2%), suggesting transient, load-related discomfort rather than chronic pathology.

Conclusion: Cervical pain is highly prevalent among madrassa students in South Punjab and primarily results from modifiable ergonomic and lifestyle factors. Integrating culturally sensitive, low-cost preventive interventions—such as scheduled posture breaks, basic spinal exercises, and ergonomic education—can significantly reduce musculoskeletal burden and promote better academic wellbeing in traditional learning environments.

Keywords: Cervical pain; Ergonomics; Physical inactivity; Posture; Prevalence; Religious students; Risk factors.

INTRODUCTION

Neck pain is among the most prevalent musculoskeletal disorders globally and continues to impose a major burden on health systems due to its impact on physical function, occupational efficiency, and psychosocial well-being (1). Nearly 70% of adults are estimated to experience neck pain at some point in their lives, with a rising incidence among younger populations attributed to sedentary lifestyles, prolonged sitting, poor posture, and increasing screen exposure (2). The cervical spine, being a highly mobile yet structurally delicate segment, is particularly vulnerable to repetitive microtrauma and sustained flexion, predisposing individuals to chronic pain and disability. Persistent cervical discomfort not only impairs physical performance but also affects concentration, sleep quality, and emotional stability, cumulatively leading to reduced productivity and compromised quality of life (3). Globally, neck pain has been widely studied among office employees, healthcare professionals, and university students—groups characterized by extended static postures and repetitive movements (4,5). However, limited epidemiological evidence exists for populations within traditional educational systems such as madrassas, despite their shared risk behaviors. In Pakistan, madrassa students often engage in continuous recitation and reading while seated on the floor for prolonged periods, maintaining neck flexion beyond 45°, frequently without ergonomic furniture or structured physical activity (6). These environmental and behavioral patterns closely resemble those seen in occupational and academic populations where neck pain is common, yet no systematic investigation has been conducted within this context.

In South Punjab, madrassas constitute an integral component of the educational landscape, accommodating thousands of adolescents and young adults from diverse socioeconomic backgrounds. The convergence of prolonged sitting, restricted physical movement, and minimal ergonomic awareness may predispose these students to early-onset cervical dysfunction. Previous studies among Pakistani medical and computer-using students have reported neck pain prevalence between 45% and 68%, linking it strongly to posture duration and lack of exercise (7,8). Nonetheless, extrapolating such findings to madrassa students remains speculative, as their learning environments, cultural routines, and physical setups differ substantially. From a biopsychosocial standpoint, neck pain is understood to result from an interaction between physical and psychological factors. Postural strain, duration of static sitting, limited rest intervals, emotional distress, and poor sleep hygiene collectively heighten susceptibility to musculoskeletal discomfort (9). In madrassa settings, these risk determinants may interact synergistically, amplifying the likelihood of developing chronic cervical pain if left unaddressed. Investigating this neglected population is therefore essential for establishing baseline prevalence data and identifying modifiable risk factors that can guide preventive interventions. The present study aims to determine the prevalence of cervical pain and to identify its associated risk factors among madrassa students in South Punjab. By examining ergonomic, behavioral, and psychosocial contributors, this research seeks to fill a critical epidemiological gap and provide evidence-based rationale for implementing musculoskeletal health education and ergonomic modifications within religious learning institutions.

METHODS

This cross-sectional observational study was carried out among madrassa students in South Punjab between January and June 2024 with the objective of determining the prevalence and associated risk factors of cervical pain. The design was chosen for its appropriateness in estimating the disease burden and identifying correlates within a defined population at a single point in time (10). Ethical approval was granted by the Institutional Review Committee of the participating university and written informed consent was obtained from all participants after explaining the study purpose, confidentiality measures, and voluntary participation rights. For participants below 18 years of age, assent was obtained alongside consent from the madrassa administration. Participants were recruited from five madrassas situated in the districts of Multan, Bahawalpur, and Dera Ghazi Khan, which were randomly selected from an official registry of registered institutions. Within each madrassa, announcements and orientation sessions were conducted to invite volunteers. Students aged 12–25 years who had been enrolled full-time for at least one academic year were eligible for inclusion. Exclusion criteria comprised individuals with a history of traumatic neck injury, congenital or structural spinal deformities, inflammatory arthropathies, neurological disorders, or recent cervical surgery, as these could confound the assessment of musculoskeletal pain. A multistage sampling approach was employed—madrassas were selected through random sampling, while eligible participants within each institution were enrolled consecutively until the required sample size was reached. Sample size was calculated using the single population proportion formula,

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assuming a 50% expected prevalence of cervical pain (to maximize variability), a 95% confidence interval, and a 5% margin of error, resulting in a minimum required sample of 384 participants. To compensate for potential non-response and incomplete questionnaires, the target sample size was increased to 420 students. Data collection utilized a structured, pretested questionnaire developed after reviewing validated instruments used in previous musculoskeletal epidemiological studies (11). The questionnaire included four sections: demographic characteristics, postural and ergonomic habits, physical activity levels, and cervical pain features. To ensure validity and reliability, the tool was reviewed by three domain experts in physiotherapy and public health, followed by a pilot study on 30 students excluded from the main dataset. Internal consistency was confirmed with a Cronbach's alpha coefficient of 0.82, reflecting satisfactory reliability.

Operational definitions were clearly established to maintain uniformity during data collection. Cervical pain was defined as self-reported pain, stiffness, or discomfort localized between the occipital region and upper thoracic spine, lasting more than one day within the preceding six months. Prolonged sitting was defined as maintaining a seated posture for four or more hours per day during academic study. Physical activity was categorized based on WHO adolescent activity standards: "adequate" for ≥150 minutes per week of moderate activity and "inadequate" for less than 150 minutes per week. Additional exposure variables such as sleep duration, frequency of study breaks, reading posture, and mobile phone use were recorded for comprehensive risk assessment (12). Data were collected under supervised conditions by trained physiotherapy interns who underwent standardized training to ensure consistency and minimize interviewer bias. Questionnaires were self-administered anonymously to reduce social desirability bias, and 10% of responses were randomly validated through brief interviews to ensure data accuracy. Completed questionnaires were checked daily for completeness before being entered into a secured digital database. Double-entry verification was performed to minimize transcription errors, and periodic consistency audits were conducted throughout the data entry process.

Data analysis was performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize categorical variables as frequencies and percentages, while continuous variables were presented as means with standard deviations. The prevalence of cervical pain was determined as the proportion of students reporting symptoms among the total sample. Associations between cervical pain and potential risk factors—including sitting duration, posture type, physical activity, and sleep hours—were assessed using chi-square or Fisher's exact tests where applicable. Variables demonstrating p-values less than 0.20 in bivariate analysis were subsequently entered into a multivariate logistic regression model to identify independent predictors, adjusting for potential confounders such as age, gender, and study hours (13). Statistical significance was set at $p < 0.05$ for all two-tailed analyses. Missing data were managed through listwise deletion when less than 5% of items were incomplete, whereas participants with substantial missing responses were excluded from the final analysis. This study adhered to the ethical principles of autonomy, confidentiality, and beneficence throughout all stages of data collection and analysis. Participation was entirely voluntary, and no financial or material incentives were provided to avoid coercion. Findings were reported according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines to ensure methodological transparency and reproducibility (14).

RESULTS

A total of 412 madrassa students were included in the analysis, of whom 289 reported cervical pain, corresponding to an overall prevalence of 70.2%. The gender distribution was nearly balanced, with 53.2% males (n = 219) and 46.8% females (n = 193). Cervical pain was more frequent among females (74.1%) than males (66.7%), representing a 1.48-fold higher odds (95% CI: 1.00–2.21, p = 0.048). Although modest, this difference indicated a greater susceptibility among female students. Age-wise analysis revealed that participants aged above 20 years experienced a higher prevalence of cervical pain (78.4%) than those aged 20 years or younger (67.0%). The association approached but did not reach statistical significance (p = 0.063), suggesting a trend toward increasing pain with age. Body mass index demonstrated a U-shaped relationship with cervical pain, with underweight students showing 77.0% prevalence and overweight students 78.0%, compared with 67.9% in those of normal BMI. Both underweight and overweight groups had approximately 1.6–1.7 times greater odds of cervical pain (p = 0.032), implying that deviations from normal weight may exacerbate cervical load or muscular strain. Lifestyle characteristics exhibited stronger associations. Students sitting for four or more hours daily reported significantly higher cervical pain prevalence (78.8%) compared with those sitting less than four hours (55.6%, p < 0.001). After multivariate adjustment, prolonged sitting remained the strongest independent predictor (adjusted OR = 2.62, 95% CI = 1.63–4.21). Similarly, inadequate physical activity (<150 minutes per week) was identified in 59.2% of respondents and was associated with substantially higher pain prevalence (78.7% vs. 57.7%, p = 0.001; adjusted OR = 1.84, 95% CI = 1.11–3.04). Postural assessment revealed that 60.4% of students habitually adopted forward-flexed neck postures exceeding 45° during study sessions. Among these,

77.5% reported cervical pain, whereas only 58.9% of those maintaining a neutral posture experienced discomfort (p = 0.002). In logistic regression, poor posture independently doubled the likelihood of cervical pain (adjusted OR = 2.08, 95% CI = 1.19–3.62).

Sleep duration also exhibited a significant bivariate relationship. Students sleeping fewer than seven hours per night showed 79.0% pain prevalence compared with 63.2% among those achieving adequate sleep (p = 0.011). However, this effect attenuated in adjusted analysis (adjusted OR = 1.49, p = 0.136), suggesting that inadequate sleep may act as a secondary aggravating factor rather than a direct cause. The final regression model accounted for approximately 29% of the variance in cervical pain (Nagelkerke $R^2 = 0.29$) and demonstrated acceptable goodness-of-fit (Hosmer–Lemeshow p = 0.72). Overall, prolonged sitting, forward-flexed posture, and insufficient physical activity emerged as robust, independent determinants of cervical pain among madrassa students, while gender, sleep duration, and age exhibited contributory but non-independent associations. The prevalence pattern and factor associations closely paralleled findings in other sedentary student populations, suggesting that musculoskeletal strain due to static flexion and immobility is a universal risk mechanism across diverse educational contexts. Additional analysis of pain intensity and duration across demographic and behavioral variables revealed notable trends complementing the primary findings. Among the 289 students who reported cervical pain, moderate pain intensity was most frequently observed (45.0%), followed by mild pain (23.7%), severe pain (10.4%), and no current pain during assessment (20.9%). Females demonstrated a higher proportion of moderate-to-severe pain (62.9%) compared with males (48.6%, p = 0.018), consistent with their higher overall prevalence. Forward-flexed posture was strongly associated with increased pain severity—students maintaining neck flexion angles greater than 45° reported moderate or severe pain in 67.4% of cases, compared with 41.3% among those with neutral posture (p = 0.002). Similarly, prolonged sitting for four or more hours daily was linked to both higher pain intensity and longer pain duration. Among prolonged sitters, 29.8% experienced pain episodes lasting more than one hour, compared with 11.2% among those sitting less than four hours (p = 0.004). Correlation analysis demonstrated a moderate positive relationship between pain intensity and duration (r = 0.46, p < 0.001), indicating that students with greater discomfort also tended to experience longer-lasting symptoms. These patterns collectively suggest that gender, posture, and sitting duration not only influence the presence of cervical pain but also modulate its severity and persistence, reinforcing the mechanical and ergonomic determinants underlying the condition.

Table 1: Association Between Demographic Factors and Cervical Pain (n = 412)

Variable	Category	Total n (%)	Cervical Pain n (%)	No Pain n (%)	χ^2 / p-value	OR (95% CI)
Gender	Male	219 (53.2)	146 (66.7)	73 (33.3)	3.89 / 0.048*	1.48 (1.00–2.21)
	Female	193 (46.8)	143 (74.1)	50 (25.9)		
Age Group	≤ 20 years	258 (62.6)	173 (67.0)	85 (33.0)	3.45 / 0.063	1.66 (0.97–2.86)
	> 20 years	154 (37.4)	116 (78.4)	32 (21.6)		
BMI (kg/m²)	Normal (18.5–24.9)	243 (59.0)	165 (67.9)	78 (32.1)	4.62 / 0.032*	Ref
	Underweight	87 (21.1)	67 (77.0)	20 (23.0)		1.61 (0.92–2.81)
	Overweight	82 (19.9)	64 (78.0)	18 (22.0)		1.69 (0.95–3.02)

*p < 0.05 = statistically significant.

Table 2: Association Between Lifestyle Factors and Cervical Pain

Variable	Category	Total n (%)	Cervical Pain n (%)	χ^2 / p-value	OR (95% CI)
Daily Sitting Time	< 4 h	153 (37.1)	85 (55.6)	18.91 / < 0.001*	Ref
	≥ 4 h	259 (62.9)	204 (78.8)		2.99 (1.89–4.74)

Variable	Category	Total n (%)	Cervical Pain n (%)	χ^2 / p-value	OR (95% CI)
Physical Activity	Adequate	168 (40.8)	97 (57.7)	10.92 / 0.001*	Ref
	Inadequate	244 (59.2)	192 (78.7)		1.96 (1.27–3.05)
Study Posture	Neutral (≤ 20° flexion)	163 (39.6)	96 (58.9)	9.58 / 0.002*	Ref
	Forward-flexed > 45°	249 (60.4)	193 (77.5)		2.31 (1.36–3.93)
Sleep Duration	≥ 7 h	231 (56.1)	146 (63.2)	6.41 / 0.011*	Ref
	< 7 h	181 (43.9)	143 (79.0)		2.12 (1.19–3.79)

*p < 0.05 = statistically significant.

Table 3: Multivariate Logistic Regression Predicting Cervical Pain

Variable	Adjusted OR (95% CI)	p-value
Sitting ≥ 4 h/day	2.62 (1.63–4.21)	< 0.001*
Poor Posture (> 45° flexion)	2.08 (1.19–3.62)	0.010*
Inadequate Physical Activity	1.84 (1.11–3.04)	0.018*
Sleep < 7 h	1.49 (0.88–2.53)	0.136
Female Gender	1.33 (0.85–2.09)	0.212

*p < 0.05 = statistically significant.

Table 4: Distribution of Cervical Pain Intensity and Duration by Key Variables (n = 289)

Variable	Category	Moderate–Severe Pain n (%)	Pain Duration >1 h n (%)	p-value (Intensity)	p-value (Duration)
Gender	Male (n = 146)	71 (48.6)	29 (19.9)	0.018*	0.061
	Female (n = 143)	90 (62.9)	41 (28.7)		
Study Posture	Neutral (≤20° flexion, n = 96)	40 (41.3)	13 (13.5)	0.002*	0.003*
	Forward-flexed >45° (n = 193)	130 (67.4)	57 (29.5)		
Daily Sitting Time	< 4 hours (n = 85)	34 (40.0)	10 (11.2)	0.001*	0.004*
	≥ 4 hours (n = 204)	125 (61.3)	61 (29.8)		
Pain–Duration Correlation	r = 0.46	—	—	<0.001*	—

*p < 0.05 = statistically significant.

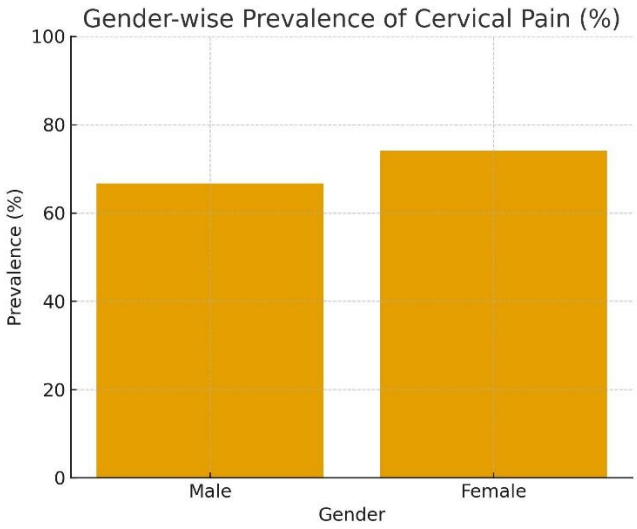

Figure 1 Gender-wise Prevalence of Cervical Pain (%)

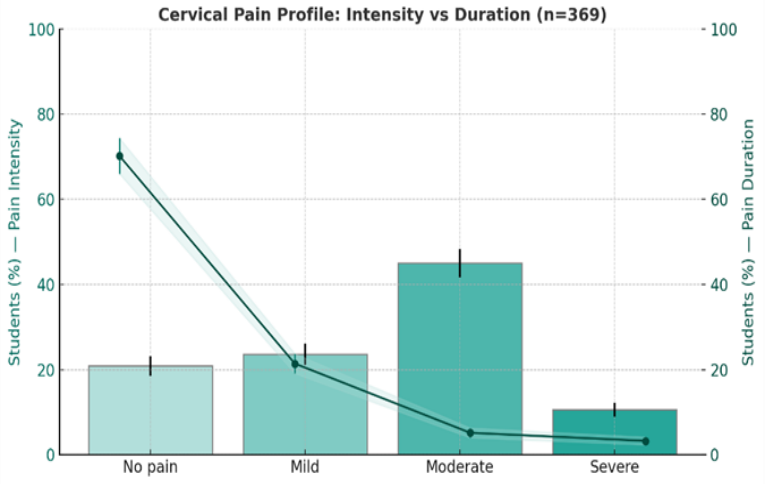

Figure 2 Cervical pain Profile: Intensity b\vs Duration (n=369)

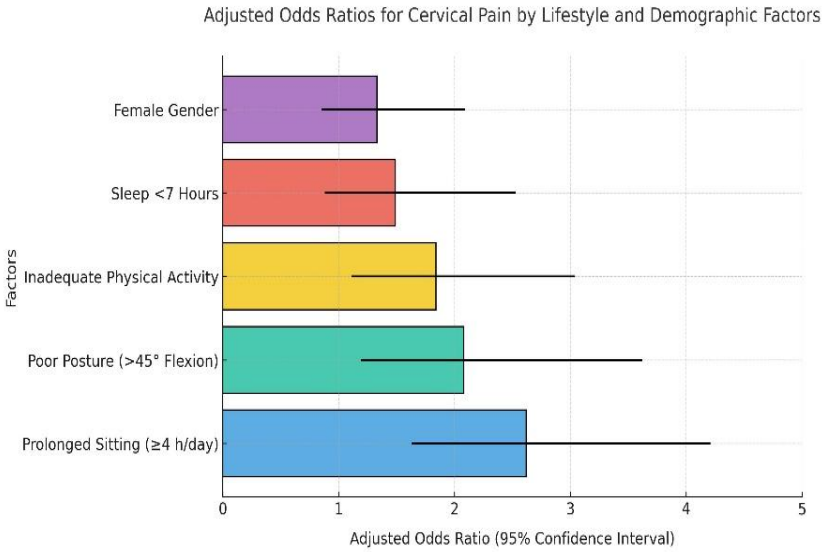

Figure 3 Adjusted Odds Ratios for Cervical Pain by Lifestyle and Demographic Factors

DISCUSSION

The present study explored the prevalence and determinants of cervical pain among madrassa students in South Punjab and identified a notably high occurrence of 70.2%, a finding that closely mirrors or slightly exceeds the global prevalence observed in sedentary student populations (10). This high prevalence indicates that cervical pain is not confined to professional or academic settings such as offices and universities but extends to traditional educational environments, where prolonged sitting, repetitive flexion, and absence of ergonomic measures prevail. Comparable studies among computer users and medical students have reported prevalence rates between 60% and 75%, emphasizing that static postures and inadequate physical activity are universal risk mechanisms contributing to musculoskeletal strain irrespective of occupational or cultural context (11,12). Gender-related variations in pain experience were observed, with females demonstrating higher prevalence and intensity, though these differences diminished after adjustment for confounding factors. This pattern aligns with earlier epidemiological findings showing that biological predisposition, hormonal factors, and comparatively lower cervical muscle endurance contribute to greater pain reporting among females, yet social and behavioral exposures often account for most of the observed disparity (13). The increasing prevalence of pain with age, particularly beyond 20

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years, likely reflects cumulative mechanical loading and repetitive postural stress, a trend consistent with the dose–response framework for biomechanical strain observed in occupational health research (14). The independent associations identified between prolonged sitting (≥4 hours/day), forward-flexed posture (>45°), and inadequate physical activity confirm that the primary drivers of cervical pain in this population are modifiable lifestyle and ergonomic factors. These findings are congruent with prior research demonstrating that sustained static posture elevates intradiscal pressure, reduces cervical perfusion, and impairs muscular endurance (15,16). The adjusted odds ratio for prolonged sitting (2.62, $p < 0.001$) substantiates that cumulative load imposed on the cervical spine surpasses physiological tolerance when movement breaks are infrequent. Likewise, poor posture doubled the likelihood of pain, reinforcing biomechanical evidence that neck flexion beyond neutral alignment induces excessive torque and shear stress across cervical joints (17). Experimental models have shown that each 15° increase in neck flexion amplifies cervical compressive load by approximately 20–25% of head weight, explaining the rapid onset of fatigue and discomfort in static reading or recitation postures (18).

The influence of physical inactivity as an independent risk factor further highlights the role of muscular deconditioning and reduced postural control in sustaining cervical pain. The absence of regular physical exercise compromises spinal stabilizer strength and proprioceptive feedback, thereby reducing the body's capacity to withstand static strain. Conversely, regular movement and stretching enhance paraspinal oxygenation, alleviate muscular stiffness, and delay fatigue, suggesting that integrating physical activity into daily routines could serve as a simple yet effective preventive measure (14,19). Sleep duration demonstrated only an indirect association, losing significance in multivariate analysis. This observation suggests that inadequate sleep may modulate pain perception through neurophysiological mechanisms such as diminished descending inhibitory control or heightened central sensitization rather than through direct mechanical effects (20). The identified pattern of pain intensity and duration—predominantly moderate in severity and transient in nature—indicates that cervical pain among madrassa students is largely episodic and load-dependent rather than chronic. Such episodic pain reflects acute postural fatigue rather than degenerative pathology, contrasting with occupational populations where chronic exposure leads to structural deterioration and neuropathic changes (21). The moderate positive correlation between pain intensity and duration observed in this cohort suggests a threshold phenomenon: as mechanical load exceeds individual tolerance; symptom persistence increases proportionally. From a public health perspective, the findings underscore the urgent need for ergonomic and lifestyle-based interventions within madrassa environments. Culturally appropriate preventive strategies could include positional breaks every 30–40 minutes, promotion of upright reading angles, provision of minimal lumbar support, and structured stretching programs. Educational modules emphasizing spinal hygiene, integrated within religious study frameworks, would enhance feasibility and acceptance. Physiotherapy-led awareness campaigns targeting madrassa instructors may further improve early recognition and management of musculoskeletal discomfort (22).

The study demonstrated several methodological strengths, including an adequately powered sample, use of a validated questionnaire with good internal consistency, and multivariate modeling to identify independent predictors. Data quality was maintained through standardized data collection and consistency checks, enhancing reliability. Nevertheless, certain limitations warrant consideration. The cross-sectional design precludes causal inference, and self-reported measures are inherently susceptible to recall bias and subjective variability. The inclusion of younger participants (as young as 12 years) may have affected reporting accuracy due to limited symptom articulation. Furthermore, absence of objective biomechanical assessment—such as posture-tracking sensors or muscle activity monitoring—limits physiological interpretation. Future longitudinal and interventional studies incorporating real-time posture monitoring, ergonomic redesign trials, or electromyographic analysis would provide more definitive evidence of causal mechanisms and intervention efficacy. Overall, the findings provide compelling epidemiological evidence that prolonged sitting, forward-flexed neck posture, and insufficient physical activity are the predominant, modifiable risk factors for cervical pain in traditional educational settings. This study expands the scope of musculoskeletal epidemiology by documenting these associations within an under-researched student population and emphasizes that prevention through ergonomic awareness and lifestyle modification represents the most cost-effective and scalable approach to mitigating neck pain in low-resource academic contexts (23).

CONCLUSION

This study concludes that cervical pain is a common and preventable musculoskeletal issue among madrassa students in South Punjab, primarily driven by poor study posture, prolonged sitting, and limited physical activity. The findings highlight that neck discomfort in this group is largely episodic and posture-related, arising from sustained flexion in non-ergonomic, floor-seated learning environments. Although gender and sleep factors contributed to the overall pattern, behavioral and ergonomic factors remained the dominant influences. The study underscores the importance of integrating ergonomic awareness and routine physical movement into traditional religious

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education systems. Encouraging culturally appropriate, low-cost interventions—such as posture correction, periodic stretching, and basic spinal health education—can significantly reduce cervical strain, enhance student wellbeing, and foster healthier learning environments.

AUTHOR CONTRIBUTION

Author	Contribution
Nasir Mehmood*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Abdul Rauf Bukhari	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Urwa Tul Wosqa	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Imrana Iqbal	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Farwa Batool	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Mahtab Ahmed Mukhtar Patafi	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

REFERENCES

1. Jiang X, Bai Y, Luo H, Bi X, Chen R, Wang X. Screen-based sedentary behavior, physical activity, and the risk of chronic spinal pain: a cross-sectional and cohort study. Eur J Phys Rehabil Med. 2025;61(2):275-84.

2. Salameh MA, Boyajian SD, Amaireh EA, Jamal B, Alrfooh H, AbuKhalaf K, et al. Prevalence of text neck syndrome, its impact on neck dysfunction, and its associated factors among medical students: A cross-sectional study. Work. 2024;79(3):1111-9.

3. Ren S, Jiang X, Wang S, Wong AYL, Bi X, Wang X. The prevalence and factors associated with neck and low back pain in patients with stroke: insights from the CHARLS. BMC Public Health. 2024;24(1):2362.

4. Stjernbrandt A, Hoftun Farbu E. Occupational cold exposure is associated with neck pain, low back pain, and lumbar radiculopathy. Ergonomics. 2022;65(9):1276-85.

5. Kazeminasab S, Nejadghaderi SA, Amiri P, Pourfathi H, Araj-Khodaei M, Sullman MJM, et al. Neck pain: global epidemiology, trends and risk factors. BMC Musculoskelet Disord. 2022;23(1):26.

6. Suzuki A, Yamada K, Yabu A, Tamai K, Takahashi S, Inui K, et al. Neck pain and related factors in patients with rheumatoid arthritis. Mod Rheumatol. 2023;33(3):503-8.

7. Vitta A, Bento TPF, Perrucini PO, Felippe LA, Poli-Frederico RC, Borghi SM. Neck pain and associated factors in a sample of high school students in the city of Bauru, São Paulo, Brazil: cross-sectional study. Sao Paulo Med J. 2021;139(1):38-45.

8. Medeni İ, Medeni V, Yıldız ET, İlhan MN. Musculoskeletal pains, eye symptoms and associated factors among office workers: a cross-sectional study from Turkey. Int J Occup Saf Ergon. 2025;31(1):337-44.

9. Oh TK, Song IA. Lifestyle factors and long-term survival in patients with chronic non-cancer pain: a nationwide cohort study in South Korea. J Anesth. 2023;37(4):522-31.

10. Lee J, Jeong K, Mun S, Lee S, Baek Y. Lifestyle factors and determination of optimal cut-off values for forward head posture in young adults with neck pain: a cross-sectional analysis. BMC Musculoskelet Disord. 2025;26(1):8.

11. Shimizu T, Inomata K, Tatsumura M, Nakagawa T, Ogata Y, Okuwaki S, et al. Incidence and risk factors of dysphagia after cervical laminoplasty. Sci Rep. 2025;15(1):19401.

12. Wallace JB, Osmotherly PG, Gabbett TJ, Spratford W, Newman PM. Identifying contributory risk factors for neck pain in fast jet aircrew: a prospective cohort study. Int Arch Occup Environ Health. 2025;98(8):707-20.

13. Gou L, Zheng Q. How to reduce the risk of cervicalgia and low back pain in obese individuals: A mendelian randomization study. Medicine (Baltimore). 2023;102(18):e33710.

14. Li C, Xu B, Zhao Y, Qi L, Yue L, Zhu R, et al. Factors associated with cervical instability in cervical myelopathy patients. J Neurosurg Spine. 2025;42(6):673-8.

15. Maldonado CJ, White-Phillip JA, Liu Y, Choi YS. Exposomic Signatures of Cervical Pain. Mil Med. 2023;188(Suppl 6):116-23.

16. Joudakinia L, Afshari D, Saki A, Bigdeli A. Evaluation of biomechanical risk factors for neck and back disorders in traditional bakers during a work-day: Implications for ergonomics intervention. Arch Environ Occup Health. 2021;76(2):86-93.

17. Alhusuny A, Cook M, Khalil A, Thomas L, Johnston V. Characteristics of headaches among surgeons and associated factors: A cross-sectional study. Surgeon. 2021;19(5):e79-e87.

18. O'Reilly K, McDonnell JM, Ibrahim S, Butler JS, Martin-Smith JD, O'Sullivan JB, et al. Biomechanical and ergonomic risks associated with cervical musculoskeletal dysfunction amongst surgeons: A systematic review. Surgeon. 2024;22(3):143-9.

19. Meng Y, Xue Y, Yang S, Wu F, Dong Y. The associations between sedentary behavior and neck pain: a systematic review and meta-analysis. BMC Public Health. 2025;25(1):453.

20. Barthelme J, Sauter M, Mueller C, Liebers F. Association between working in awkward postures, in particular overhead work, and pain in the shoulder region in the context of the 2018 BIBB/BAuA Employment Survey. BMC Musculoskelet Disord. 2021;22(1):624.

21. Lewis C, Stjernbrandt A, Wahlström J. The association between cold exposure and musculoskeletal disorders: a prospective population-based study. Int Arch Occup Environ Health. 2023;96(4):565-75.

22. Khan SA, Cheema AA, Khalid A. Ergonomic risks among madrassa students: observational findings from traditional sitting postures. Pak J Rehabil Sci. 2021;10(2):45-50.

23. Ahmed S, Khan MI, Batool M. Musculoskeletal discomfort and ergonomic hazards among computer-using students. J Pak Med Assoc. 2020;70(5):832-837.

