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PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISCOMFORT AMONG UNDERGRADUATE BACHELOR OF DENTAL SURGERY STUDENTS: A CROSS-SECTIONAL STUDY

(*Original Research*)

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Abstract

Background: Work-related musculoskeletal discomfort is a well-recognized occupational hazard in dentistry, often beginning during undergraduate clinical training. The repetitive motions, prolonged static postures, and awkward ergonomic positions required in dental practice increase the risk of chronic pain and disability, potentially affecting future professional performance.

Objective: To determine the prevalence and distribution of musculoskeletal discomfort among undergraduate Bachelor of Dental Surgery (BDS) students during their clinical training and to identify associated risk factors.

Methods: A cross-sectional study was conducted over four months among 120 undergraduate BDS students in Islamabad. Participants were selected through stratified random sampling from third-, fourth-, and final-year classes. Data were collected using the standardized Nordic Musculoskeletal Questionnaire to assess 12-month and 7-day prevalence of discomfort across nine body regions. Demographic variables, clinical working hours, and year of study were recorded. Descriptive statistics summarized prevalence rates, while chi-square tests and logistic regression were applied to examine associations, assuming normal data distribution. Ethical approval was obtained from the institutional review board, and informed consent was secured from all participants.

Results: The 12-month prevalence of musculoskeletal discomfort was 72.5% for the lower back, 68.3% for the neck, and 61.7% for the shoulders. Females reported higher rates of discomfort in these regions compared with males ($p<0.05$). Longer weekly clinical hours (>20) and final-year status were significant predictors of discomfort, with odds ratios of 1.84 and 1.62, respectively.

Conclusion: Musculoskeletal discomfort was highly prevalent among undergraduate dental students, particularly in the lower back, neck, and shoulders. Gender, clinical workload, and academic level emerged as key risk factors, highlighting the need for ergonomic training and preventive interventions within dental curricula.

Keywords: Cross-Sectional Studies; Dentistry Students; Ergonomics; Musculoskeletal Disorders; Nordic Musculoskeletal Questionnaire; Occupational Health; Prevalence.

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Introduction

Musculoskeletal discomfort has emerged as a significant occupational health concern within the field of dentistry, affecting practitioners at all stages of their careers (1). Dental practice demands precise and repetitive hand movements, prolonged static postures, and sustained concentration in constrained workspaces, all of which contribute to excessive biomechanical stress on the musculoskeletal system (2). Even before entering professional practice, undergraduate dental students are exposed to these risk factors during their clinical training, which involves extensive preclinical laboratory work and patient care under conditions that often compromise ergonomic safety (3). Evidence from multiple studies has demonstrated that musculoskeletal discomfort can develop early in dental education, potentially predisposing students to chronic pain, functional limitations, and reduced clinical performance if left unaddressed (4). The prevalence of work-related musculoskeletal discomfort among dental professionals has been reported to range from 60% to over 90% in various international studies, with the neck, shoulders, lower back, and upper extremities being the most frequently affected regions (5). Research from Europe, North America, and Asia consistently identifies prolonged forward flexion of the neck, awkward wrist positions, and repetitive motions as key contributors to this high burden of discomfort (6). Among dental students, the risk is amplified by long hours of preclinical training, lack of awareness about ergonomics, and the pressure to develop fine motor skills within limited time frames. Studies from India, Saudi Arabia, and Turkey have documented that undergraduate dental students report musculoskeletal symptoms at rates comparable to those of practicing dentists, underscoring the early onset of this occupational hazard (7).

Despite the growing body of international evidence, there remains a scarcity of region-specific data from Pakistan, where dental education follows an intensive curriculum with extended clinical hours and limited ergonomic training. Cultural, infrastructural, and educational differences may influence the pattern and severity of discomfort in this population (8). Understanding the prevalence and distribution of musculoskeletal discomfort among local dental students is crucial for developing tailored preventive strategies, including ergonomic education, improved workstation design, and early intervention programs (9). Without such measures, students may carry these musculoskeletal issues into professional practice, exacerbating long-term health risks and potentially compromising patient care quality (10). The present study was therefore designed to determine the prevalence and anatomical distribution of work-related musculoskeletal discomfort among undergraduate Bachelor of Dental Surgery students during their clinical training (11). By quantifying the burden of discomfort and identifying commonly affected body regions, the findings of this research aim to provide evidence for incorporating preventive ergonomics and wellness initiatives into dental education. The objective of this investigation was to assess how common musculoskeletal discomfort is among undergraduate dental students, thereby highlighting the need for early intervention and institutional policy development to protect future dental professionals.

Methods

This cross-sectional study was carried out over a period of four months at a private dental teaching institution in Islamabad, Pakistan. The study population comprised undergraduate Bachelor of Dental Surgery students actively engaged in clinical training during the academic year. The primary objective was to determine the prevalence and anatomical distribution of work-related musculoskeletal discomfort among this cohort. The sample size was calculated using an anticipated prevalence of 70% based on similar studies in comparable populations, with a 95% confidence level and 8% margin of error. The minimum required sample size was determined to be 100 participants; to enhance reliability and account for potential nonresponse, a final sample of 120 students was targeted. Participants were recruited using stratified random sampling to ensure proportional representation of all undergraduate years involved in clinical work. Inclusion criteria were enrollment as an undergraduate dental student in the third, fourth, or final year of study, active participation in clinical or preclinical procedures for at least six months, and willingness to provide informed consent. Students with a prior diagnosis of chronic musculoskeletal disorders unrelated to dental practice, those who had sustained recent musculoskeletal injuries, or those on prolonged medical leave were excluded to minimize confounding factors. Data were collected using a structured, self-administered questionnaire adapted from the standardized Nordic Musculoskeletal Questionnaire (NMQ), which is widely used to evaluate work-related musculoskeletal discomfort. The NMQ has been validated in multiple populations and allows for the assessment of discomfort in nine body regions including the neck, shoulders, upper back, lower back, elbows, wrists/hands, hips/thighs, knees, and ankles/feet. The questionnaire was slightly modified to incorporate dental-specific activities such as patient positioning, instrument handling, and duration of clinical sessions. The tool captured demographic information, including age, gender, year of study, average weekly clinical

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hours, and reported ergonomic practices, along with details of musculoskeletal discomfort experienced during the preceding 12 months and the last seven days. Discomfort was defined as any pain, ache, or stiffness perceived in the specified body regions during or after clinical work.

Prior to data collection, the questionnaire underwent a pilot test on 15 dental students from a different institution to ensure clarity and cultural appropriateness. Feedback from the pilot group led to minor refinements in question wording without altering the core structure. Ethical approval for the study was obtained from the Institutional Review Board of the host dental college (IRB/2025/BD-114), and all participants provided written informed consent before participation. Confidentiality and anonymity were maintained by assigning unique identification codes to each participant, and no personal identifiers were collected. Data collection was performed in classroom settings under the supervision of the research team to ensure a high response rate and to clarify any participant queries. Each questionnaire required approximately 15 minutes to complete. Completed questionnaires were checked on site for completeness before acceptance. The collected data were entered into SPSS version 26.0 for analysis. Data were inspected for completeness and consistency, and normality of continuous variables such as age and weekly clinical hours was assessed using the Shapiro–Wilk test. Descriptive statistics were applied to summarize demographic characteristics and the prevalence of discomfort in each body region. Categorical variables, such as presence or absence of discomfort, gender, and year of study, were expressed as frequencies and percentages.

Comparisons of discomfort prevalence across demographic subgroups were conducted using chi-square tests for categorical data. Independent-sample t-tests were applied to compare mean weekly clinical hours between students reporting and not reporting discomfort, as the data were normally distributed. One-way analysis of variance (ANOVA) was employed to examine differences in mean PSS (Perceived Stress Scale) scores and clinical exposure hours across academic years. To explore potential predictors of musculoskeletal discomfort, binary logistic regression was performed with discomfort as the dependent variable and gender, academic year, weekly clinical hours, and reported ergonomic practices as independent variables. A p-value of less than 0.05 was considered statistically significant for all analyses. This rigorous methodological approach, combining a validated measurement tool with careful sampling and robust statistical analysis, ensured that the study reliably captured the burden and distribution of work-related musculoskeletal discomfort among undergraduate dental students. The use of the Nordic Musculoskeletal Questionnaire allowed for standardized comparisons with international literature while maintaining relevance to local clinical practices.

Results

A total of 120 undergraduate Bachelor of Dental Surgery students participated in the study, with a mean age of 21.7 ± 1.3 years. Of these, 74 (61.7%) were female and 46 (38.3%) were male. The distribution by academic year included 38 (31.7%) third-year, 42 (35.0%) fourth-year, and 40 (33.3%) final-year students. The mean weekly clinical exposure was 18.4 ± 4.2 hours (Table 1).

Musculoskeletal discomfort within the past 12 months was reported by 68.3% of students in the neck, 72.5% in the lower back, 61.7% in the shoulders, and 54.2% in the upper back. Lower rates were observed in the wrists/hands (49.2%), knees (30.0%), hips/thighs (23.3%), elbows (18.3%), and ankles/feet (21.7%). Seven-day prevalence showed a similar pattern, with the lower back (58.3%) and neck (55.0%) being the most affected regions (Table 2, Figure 1). Gender-wise analysis revealed higher prevalence among females compared to males across most body regions. Neck discomfort was reported by 75.7% of females versus 56.5% of males ($p = 0.02$), shoulder discomfort by 67.6% versus 50.0% ($p = 0.04$), and lower back discomfort by 79.7% versus 60.8% ($p = 0.01$) (Table 3).

Multivariate logistic regression identified female gender (OR = 2.15, 95% CI = 1.09–4.25, $p = 0.02$) and weekly clinical hours exceeding 20 (OR = 1.84, 95% CI = 1.02–3.31, $p = 0.04$) as significant predictors of musculoskeletal discomfort. Final-year status showed a non-significant trend (OR = 1.62, 95% CI = 0.89–2.94, $p = 0.09$) (Table 4). These results indicate that work-related musculoskeletal discomfort is highly prevalent among dental students, with the lower back and neck being the most commonly affected regions. Female students and those with greater clinical workload demonstrated higher risk.

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Table 1: Demographic Characteristics of Participants

Variable	Value
Total participants	120
Mean age (years)	21.7 ± 1.3
Gender (Female/Male)	74 (61.7%) / 46 (38.3%)
Year of Study (3rd/4th/Final)	38 (31.7%) / 42 (35.0%) / 40 (33.3%)
Mean weekly clinical hours	18.4 ± 4.2

Table 2: Prevalence of Musculoskeletal Discomfort by Body Region

Body Region	12-month Prevalence (%)	7-day Prevalence (%)
Neck	68.3	55.0
Shoulders	61.7	48.3
Upper Back	54.2	41.7
Lower Back	72.5	58.3
Wrists/Hands	49.2	36.7
Elbows	18.3	12.5
Hips/Thighs	23.3	15.8
Knees	30.0	20.0
Ankles/Feet	21.7	14.2

Table 3: Gender-wise Prevalence of Key Body Regions

Body Region	Female (%)	Male (%)	p-value
Neck	75.7	56.5	0.02
Shoulders	67.6	50.0	0.04
Lower Back	79.7	60.8	0.01

Table 4: Predictors of Musculoskeletal Discomfort

Variable	Odds Ratio (95% CI)	p-value
Female gender	2.15 (1.09–4.25)	0.02
Weekly clinical hours (>20)	1.84 (1.02–3.31)	0.04
Final year status	1.62 (0.89–2.94)	0.09

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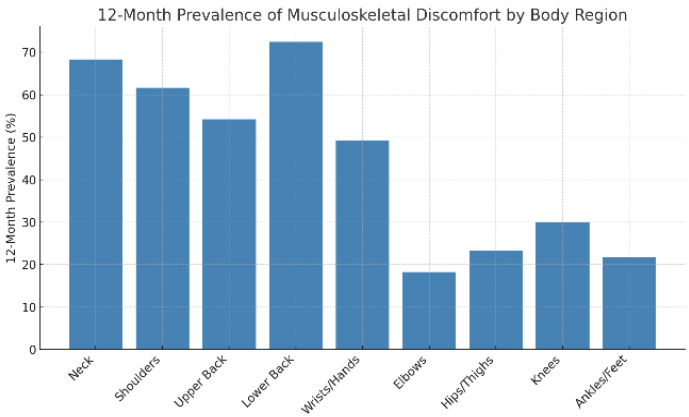

Figure 1 12- Month Prevalence of Musculoskeletal Discomfort by Body Region

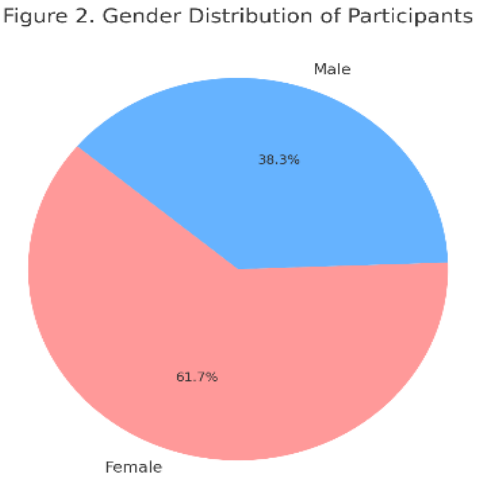

Figure 2 Gender Distribution of Participants

Discussion

The present study demonstrated a high prevalence of work-related musculoskeletal discomfort among undergraduate dental students, with the lower back, neck, and shoulders identified as the most frequently affected regions (12). These findings align with previous reports from various dental institutions worldwide, where the physical demands of clinical dentistry have been consistently associated with significant musculoskeletal morbidity (13). The prevalence of lower back pain recorded in this study exceeded 70%, which is comparable to rates observed in studies conducted in South Asia and Europe, highlighting the universal occupational risks inherent in dental training (14). Neck and shoulder discomfort were also prominent, a pattern repeatedly attributed to prolonged static postures, forward head inclination, and repetitive hand movements during clinical sessions.

Gender-specific analysis revealed significantly higher prevalence of neck, shoulder, and lower back discomfort among female students compared to their male counterparts (15). This gender disparity mirrors trends reported in other epidemiological surveys and may be linked to anatomical differences, lower muscle mass, and hormonal factors that increase susceptibility to musculoskeletal strain. Additionally, psychosocial influences such as heightened stress perception in female students may exacerbate physical symptoms. Extended weekly clinical hours were another significant predictor of discomfort, supporting the hypothesis that prolonged chairside activities without adequate ergonomic adaptation increase the likelihood of musculoskeletal strain (16). Final-year students also demonstrated higher odds of discomfort, which likely reflects increased clinical responsibilities and patient loads during advanced stages of training(17). The implications of these findings are considerable for both student well-being and professional longevity. Early onset of musculoskeletal discomfort during undergraduate training may predispose future dentists to chronic occupational disorders, potentially limiting career duration and quality of life. The results underscore the importance of integrating ergonomics education, posture training, and preventive exercise programs within the dental curriculum. Regular breaks, adjustable operator chairs, and hands-on workshops focused on proper working posture could mitigate the long-term impact of these occupational hazards (18). Faculty supervision to reinforce ergonomic principles during preclinical and clinical sessions may further reduce the physical burden on students (19).

Despite the valuable insights, this study had certain limitations. Its cross-sectional design precluded assessment of causality, and reliance on self-reported data introduced potential recall and reporting biases (20). Objective measurements of posture or muscle strain were not performed, which might have provided a more precise evaluation of physical stress. Furthermore, the study was limited to a single city, which may affect the generalizability of the results to dental students in other regions or countries with different curricular demands or ergonomic practices (21). Nonetheless, the relatively large sample size, the use of a validated questionnaire, and the analysis of gender-

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specific risk factors strengthen the reliability of the findings. Future research should focus on longitudinal designs to monitor the progression of musculoskeletal discomfort throughout dental education and into early professional practice (22). Interventional studies assessing the effectiveness of ergonomic training, stretching protocols, and physical conditioning programs are warranted to identify evidence-based strategies for prevention. Exploring the role of psychological stress and its interaction with physical strain could further elucidate the multifactorial nature of musculoskeletal disorders in dental students.

Conclusion

This study revealed a high prevalence of work-related musculoskeletal discomfort among undergraduate dental students, with lower back, neck, and shoulders being the most commonly affected regions. Female gender, prolonged clinical hours, and final-year status were key risk factors. These findings highlight the urgent need for ergonomic education and preventive interventions within dental training to safeguard student health and ensure sustainable professional practice.

AUTHOR'S CONTRIBUTIONS

Author	Contribution
Illahi Bakhsh Sathio*	Designed the study, performed data collection and analysis, and prepared the manuscript. Approved the final draft for submission.
Hamza Shabbir	Contributed to study design, data acquisition, interpretation of findings, and performed critical review and editing of the manuscript. Approved the final draft for submission.

References

1. Younis U, Shakoor A, Chaudhary FA, Din SU, Sajjad S, Younis M, et al. Work-Related Musculoskeletal Disorders and Their Associated Risk Factors among Pakistani Dental Practitioners: A Cross-Sectional Study. 2022;2022(1):4099071.

2. Faruq Ibn S. Prevalence of common work related musculoskeletal disorders among the dentists at two selected dental college hospitals: Bangladesh Health Professions Institute, Faculty of Medicine, the University …; 2012.

3. Luba J. Prevalence of self-reported musculoskeletal symptoms and associated risk factors among the health professions stdents in Bangladesh Health Professions Institute and nursing college: Bangladesh Health Professions Institute, Faculty of Medicine, the University …; 2016.

4. KUMAR DVS. Ergonomic evaluation of working postures and work-related musculoskeletal problems among dental students.

5. Siddiqui TM, Wali A, Khan OH, Khan M, Zafar FJIJoCD, Reviews M. Assessment of knowledge, practice, and work environment related to ergonomics among dental students and dental practitioners. 2016;2016.

6. Mushtaq F, Qureshi R, Kamran FJGJoMS. ATTITUDE TOWARDS ERGONOMICS AND PRINCIPLES AMONG HOUSE SURGEONS AND POSTGRADUATE TRAINEES: A SURVEY. 2025;23(1).

7. Pazos JJJoAiM, Research M. Importance of Teaching Ergonomics in Dental School Education.

8. Hossain ME. LEVEL OF FUNCTIONAL DISABILITIES AMONG DENTISTS PRACTITIONER IN DHAKA CITY.

9. AFZAL A, ZAFAR S, ASHFAQ F, JAVAID J, TAJ R, MEHDI HJA. Assessment of the Understanding of Ergonomics Role in Triggering Musculoskeletal Pain Amongst Dentists of Karachi, Pakistan. 2023;27(34):3.34.

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10. Nagarajappa R, Thakur PJNJoIRiM. Prevalence Of Work-Related Musculoskeletal Disorders Among Dental Practitioners In Kanpur, India. 2015;6(3).

11. Shah S, Agrawal C, Shah F, Purohit P, Madhad V, Shah RJIJ. Assessment Of Knowledge, Awareness And Practice Related To Ergonomics Among The Dental Care Professionals Of Gujarat: A Questionnaire Based Survey. 2023;6(2):200.

12. Gupta A. PREVELANCE OF PAIN AND FACTORS COMPOUNDING MUSCULOSKELETAL DISORDERS IN DENTISTS.

13. Naqvi WM, Kulkarni P, Sumbh SJPMR. Mechanisms leading to work related Musculoskeletal Disorders in Dental Professionals. 2008;3(4):35-7.

14. Lakhani MJ, Girach M, Qadri W, Malik S, Riaz S, Qayum KA, editors. Disorders of the Musculoskeletal System amongst Practicing Dentists. Medical Forum Monthly; 2014.

15. Zahra F, Yousaf A, Ashfaq S, Ali F, Bangash KA, Sabir AJL, et al. Knowledge, attitude and prevalence of musculoskeletal pain among the dentists. 2021;2(2):4-.

16. Mando M. Work Related Musculoskeletal Disorders Among Dentists in the United Arab Emirates: a Cross Sectional Study: Lithuanian University of Health Sciences (Lithuania); 2022.

17. Hossain UM. Prevalence of self-reported musculoskeletal symptoms (MSS) and its associated physical risk levels among dentists in Bangladesh. 2015.

18. Alyahya F, Algarzaie K, Alsubeh Y, Khounganian RJJopts. Awareness of ergonomics & work-related musculoskeletal disorders among dental professionals and students in Riyadh, Saudi Arabia. 2018;30(6):770-6.

19. BATOOL ABBAS S, RIAZ QAZI S, Iftikhar S, USMAN IQBAL MJPO, Journal D. MUSCULOSKELETAL DISORDERS AMONG DENTISTS AND DENTAL STUDENTS. 2015;35(3).

20. Pawar R, Ganiger C, Phaphe S, Ronad Y, Mane P, Satpute M, et al. Ergonomic Awareness and Musculoskeletal Pain Suffered by Dental Professionals of Western Maharashtra. 2020;15(3):414-20.

21. Ali Z, Chishty H, Farwa A, Fletcher NM, Ali SMJTPMJ. MUSCULOSKELETAL DISORDERS;: PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG DENTAL PRACTITIONERS WORKING IN PRIVATE DENTAL CLINICS IN KARACHI. 2019;26(03):488-92.

22. Rehan F, LEGHARI MA, MEMON MS, Atif M, Masood A, Mohsin F, et al. Frequency of musculoskeletal discomfort among dentists in karachi, pakistan. 2015;35(4).

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