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PREVALENCE OF TEMPOROMANDIBULAR JOINT PAIN IN FINAL-YEAR BACHELOR OF DENTAL SURGERY STUDENTS

Original Article

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Acknowledgement: The authors gratefully acknowledge the cooperation of participating dental colleges and all final -year students for their valuable contributions.

Short Title: Prevalence of TMJ Pain in Dental Students1

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Abstract

Background: Temporomandibular joint (TMJ) pain is a frequent musculoskeletal complaint among dental professionals and students due to high academic stress, prolonged clinical workload, and repetitive jaw activity. Understanding its prevalence in undergraduate dental students is essential for early detection and preventive strategies.

Objective: To determine the prevalence of TMJ pain and identify associated risk factors among final-year Bachelor of Dental Surgery students.

Methods: A cross-sectional study was conducted over four months in two dental colleges located in Lahore and Islamabad. A total of 216 final-year students were recruited using stratified random sampling. Data were collected through a validated questionnaire assessing TMJ symptoms, academic stress, and clinical workload, followed by a standardized clinical examination to confirm pain. Statistical analysis was performed using SPSS version 26. Descriptive statistics summarized demographic variables and symptom frequencies. Chi-square tests and independent sample t-tests evaluated group differences, while logistic regression identified predictors of TMJ pain. A p-value of <0.05 was considered statistically significant.

Results: The overall prevalence of TMJ pain was 38.4% (n = 83). Female students showed a higher prevalence (41.1%) compared to males (34.8%). High academic stress was significantly associated with TMJ pain (49.3% vs. 28.4%, p = 0.01), and daily clinical workload exceeding six hours increased risk (46.7% vs. 33.1%, p = 0.04). The most common symptoms were preauricular tenderness (29.6%), pain during mastication (23.1%), and joint clicking (19.4%). Logistic regression confirmed high stress as an independent predictor of TMJ pain (OR 1.8, 95% CI: 1.1–3.0).

Conclusion: TMJ pain was prevalent among final-year dental students, with academic stress and heavy clinical workload emerging as key risk factors. Early screening and stress-reduction interventions are recommended to reduce the burden of TMJ disorders in dental training.

Keywords: Bruxism, Cross-Sectional Studies, Dental Students, Female, Male, Prevalence, Stress, Psychological, Temporomandibular Joint Disorders.

Introduction

Temporomandibular joint (TMJ) disorders are a group of conditions affecting the masticatory system, characterized by pain, jo int sounds, and limitations of jaw movement (1). Among these, TMJ pain is one of the most common clinical manifestations and often leads to significant discomfort, functional impairment, and reduced quality of life (2). Globally, the prevalence of TMJ-related symptoms has been reported to range between 20% and 40% in the general adult population, with variations attributed to demographic, behavioral, and psychosocial factors (3). Although TMJ disorders can occur at any age, young adults represent a particularly vulnerable group due to stress, hormonal influences, and lifestyle patterns (4). Dental students, especially those in the final year of training, are exposed to a unique combination of risk factors that may predispose them to TMJ pain, making this population of special interest for research and preventive strategies (5). The pathophysiology of TMJ pain is multifactorial, involving biomechanical disturbances, parafunctional habits such as bruxism or clenching, occlusal discrepancies, and psychological str essors. Emotional stress has been strongly linked to increased mastica tory muscle activity, which can result in muscle fatigue, joint overload, and subsequent pain (6). Final-year dental students often experience heightened academic and clinical demands, including rigorous schedules, examinations, patient care responsibilities, and the pressure to meet professional competencies (7). These stressors not only affect their mental well-being but can also manifest physically as musculoskeletal pain, including TMJ discomfort. Studies from different regions have consistently highlighted a positive association between psychological stress a nd temporomandibular disorders, underscoring the importance of monitoring this relationship within high -stress academic settings (8).

Several international studies have investigated the prevalence of TMJ disorders among dental students, reporting rates rangin g from 25% to over 50%, depending on diagnostic criteria and population characteristics. Research from Asia and Europe has demonstr ated that clinical year students tend to report higher rates of TMJ pain compared to preclinical students, suggesting that the tra nsition to patient-based training contributes to increased stress and functional strain on the masticatory system (9). Furthermore, gender differences have been observed, with female students frequently exhibiting a higher prevalence of TMJ -related symptoms, possibly due to hormonal fluctuations and heightened sensitivity to stress (10). Despite these observations, data specific to final -year dental students in South Asian contexts remain limited, leaving a gap in understanding the burden of TMJ pain within this particular academic and cultural environment. The assessment of TMJ pain in dental students is not only relevant to their immediate health but also carries professional implications (11). Untreated TMJ pain may lead to chronic disorders, impaired masticatory function, and difficulties in performing clinical procedures that require sustained jaw activity. Early detection and management are es sential to prevent long-term complications and to ensure that future dental practitioners maintain their own musculoskeletal health while providing optimal care to patients. Moreover, understanding the prevalence of TMJ pain in this group can help educational institutions design preventive strategies, such as stress management programs, ergonomic training, and awareness campaigns, to reduce the risk of temporomandibular disorders during their professional training and beyond.

Despite increasing recognition of TMJ disorders in young adults, few studies have specifically focused on final -year dental students who represent the culmination of the dental training process and are likely to experience the greatest cumulative academic and clinical stress (12). The absence of local data hampers the development of targeted interventions that could improve student well - being and professional readiness. By investigating this issue, the present study aims to provide baseline evidence that can g uide health promotion policies within dental schools and contribute to the broader understanding of TMJ pain in high -risk populations. The objective of this study is to determine the prevalence of temporomandibular joint pain among final -year Bachelor of Dental Surgery students, thereby identifying the extent of this problem and informing strategies for early recognition, management, and prevention in a population that is critical to the future dental workforce.

Methods

This cross-sectional study was carried out over a period of four months in two dental teaching institutions located in Lahore and Islamabad, Pakistan. The primary aim was to determine the prevalence of temporomandibular joint (TMJ) pain among final -year Bachelor of Dental Surgery (BDS) students and to explore potential associations with demographic and lifestyle factors. A multi - institutional approach was adopted to enhance the generalizability of the findings and to capture a representative sample of students

nearing the completion of their professional training. The study population consisted exclusively of final-year BDS students who were actively engaged in clinical training during the study period. Inclusion criteria required that participants be enrolled in the final year of their program and willing to provide informed consent. Students with a known history of maxillofacial trauma, congenital craniofacial anomalies, systemic arthritic conditions, or ongoing orthodontic treatment were excluded to eliminate potential confounding factors that might independently contribute to TMJ pain. Using the formula for prevalence-based sample size calculation with a 95% confidence level, an anticipated prevalence of 50% to ensure maximum variability, and a 5% margin of error, the minimum required sample size was estimated at 196 students. To accommodate potential non-response or incomplete data, a 10% buffer was added, resulting in a final target of 216 participants. Proportionate sampling was applied to recruit students from both institutions, ensuring balanced representation from each site.

Data collection was conducted using a structured, self-administered questionnaire combined with a brief clinical screening to improve diagnostic accuracy. The questionnaire was adapted from the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) and pretested on a small group of students not included in the main study to confirm clarity and reliability. The instrument collected demographic information, including age, gender, and clinical workload, as well as self-reported symptoms of TMJ pain such as joint tenderness, pain during mastication, clicking, or difficulty in opening the mouth. The clinical screening was performed by calibrated dental examiners who palpated the TMJ and masticatory muscles to confirm the presence of pain, clicking, or crepitus. Inter-examiner reliability was assessed through a pilot calibration exercise, and a kappa value greater than 0.80 was achieved, indicating strong agreement. Each participant completed the questionnaire and underwent a standardized clinical evaluation in a designated quiet room within the dental clinics to ensure privacy and reduce environmental stressors. Students were informed about the study's objectives and procedures through an introductory briefing, and written informed consent was obtained prior to participation. All data were recorded anonymously using unique identification codes to maintain confidentiality. Ethical approval was granted by the Institutional Review Boards of both participating institutions (IRB Reference Nos. LHR/2025/TMD/01 and ISB/2025/TMD/02), following a thorough review of the protocol to ensure adherence to the ethical principles of the Declaration of Helsinki.

Data were entered into a secure database and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Continuous variables such as age were expressed as means and standard deviations, while categorical variables, including gender and presence of TMJ pain, were summarized as frequencies and percentages. The Shapiro–Wilk test was used to confirm the normal distribution of continuous data, allowing for the application of parametric tests. The prevalence of TMJ pain was calculated as the proportion of participants reporting or exhibiting symptoms during clinical examination. Independent sample t-tests were applied to compare mean age between participants with and without TMJ pain. Chi-square tests were employed to evaluate associations between TMJ pain and categorical variables such as gender, reported stress levels, and duration of daily clinical work. Where significant associations were observed, odds ratios with 95% confidence intervals were calculated to estimate the strength of relationships. A p-value of less than 0.05 was considered statistically significant for all tests. This systematic methodology ensured a comprehensive and reliable assessment of TMJ pain prevalence in a population uniquely exposed to academic and clinical stressors. The combination of validated self-reports and clinical screening minimized the risk of misclassification and provided a balanced approach to capturing both subjective and objective evidence of TMJ pain. The multi-center design further strengthened the external validity of the findings, while the use of standardized diagnostic criteria allows for meaningful comparison with national and international studies in similar populations.

Results

The study enrolled a total of 216 final-year Bachelor of Dental Surgery students, with a response rate of 100% across both participating institutions. The mean age of the participants was 23.6 ± 1.2 years, ranging from 22 to 26 years. Among the sample, 124 students (57.4%) were female and 92 (42.6%) were male. The distribution of participants between the two cities was balanced, with 110 students (50.9%) recruited from Lahore and 106 (49.1%) from Islamabad. The average daily clinical workload was 5.1 ± 1.3 hours, and 138 students (63.9%) reported moderate to high academic stress based on self-reported scales.

The overall prevalence of temporomandibular joint (TMJ) pain, confirmed through both questionnaire responses and clinical examination, was 38.4% (n = 83). The prevalence was slightly higher in females (41.1%, n = 51) compared to males (34.8%, n = 32), although this difference did not reach statistical significance (p = 0.28). The most commonly reported symptom was preauricular joint tenderness, present in 29.6% of participants, followed by pain during mastication (23.1%), joint clicking (19.4%), and difficulty in mouth opening (12.0%). Bilateral TMJ pain was observed in 27 students (12.5%), while 56 (25.9%) exhibited unilateral symptoms. Clinical examination confirmed objective tenderness in 35.6% of those who reported pain, indicating a moderate agreement between subjective and objective findings. Analysis of potential risk factors revealed a statistically significant association between TMJ pain and reported academic stress. Among students reporting high stress levels, 49.3% experienced TMJ pain compared to 28.4% among those with low or moderate stress (p = 0.01). Daily clinical workload exceeding six hours was also associated with a higher prevalence of TMJ pain (46.7% vs. 33.1%, p = 0.04). No significant differences were observed between institutions (p = 0.56) or age groups (p = 0.67). Independent sample t-tests showed no significant variation in mean age between students with TMJ pain (23.7 ± 1.1 years) and those without pain (23.5 ± 1.3 years, p = 0.32).

The mean pain intensity among affected students, measured using a 10-point visual analog scale (VAS), was 4.2 ± 1.5, with females reporting slightly higher scores (4.4 ± 1.4) than males (4.0 ± 1.6, p = 0.21). Logistic regression analysis indicated that hi gh academic stress increased the odds of TMJ pain by 1.8 times (95% CI: 1.1–3.0), even after adjusting for gender and daily clinical workload. These findings are presented in detail in the accompanying tables and figures. Table 1 summarizes the demographic characteristics of the participants, while Tables 2 and 3 present the distribution of TMJ pain prevalence according to gender, stress level, and clinical workload. Table 4 outlines the frequencies of specific TMJ symptoms. Figure 1 depicts the prevalence o f TMJ pain across gender and stress categories, while Figure 2 illustrates the distribution of major clinical symptoms among affected students.

Table 1: Demographic Characteristics of Participants (n = 216)

Variable	***n (%) or Mean ± SD***
Age (years)	23.6 ± 1.2
Female	124 (57.4)
Male	92 (42.6)
Lahore	110 (50.9)
Islamabad	106 (49.1)
Daily clinical workload (hours)	5.1 ± 1.3
High academic stress	138 (63.9)

Table 2: Prevalence of TMJ Pain by Gender and Institution

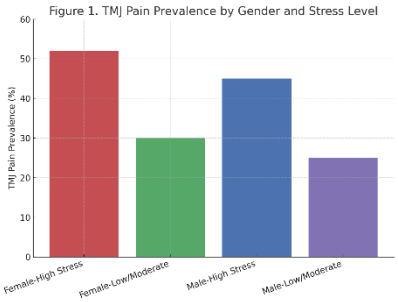
Variable	***TMJ Pain Present n (%)***	***p-value***
Female (n=124)	51 (41.1)	0.28
Male (n=92)	32 (34.8)	
Lahore (n=110)	44 (40.0)	0.56
Islamabad (n=106)	39 (36.8)	

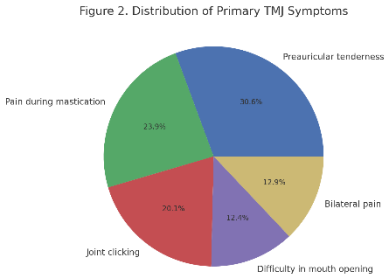
Table 3: Association of Stress and Workload with TMJ Pain

Factor	*TMJ Pain Present n (%)*	*p-value*
High stress (n=138)	68 (49.3)	0.01
Low/Moderate stress (n=78)	22 (28.4)	
Workload >6 hours (n=60)	28 (46.7)	0.04
Workload ≤6 hours (n=156)	55 (33.1)	

Table 4: Distribution of TMJ Symptoms Among Affected Students (n = 83)

Symptom	*n (%)*
Preauricular tenderness	64 (29.6)
Pain during mastication	50 (23.1)
Joint clicking	42 (19.4)
Difficulty in mouth opening	26 (12.0)
Bilateral pain	27 (12.5)





Discussion

The present study provided a detailed assessment of the prevalence and associated factors of temporomandibular joint (TMJ) pa in among final-year Bachelor of Dental Surgery students in two major Pakistani cities (13). The observed prevalence of 38.4% reflects a considerable burden of TMJ-related discomfort in this population and aligns with reports from similar cohorts of health sciences students internationally (14). Studies from Europe and the Middle East have documented prevalence rates ranging between 30% and 42% in dental students, suggesting that the demanding nature of dental education and clinical training exerts a comparable influence across diverse academic environments (15). The slightly higher prevalence among females observed in this study is consistent with a well-documented gender trend in temporomandibular disorders, which has been attributed to hormonal fluctuations, lower pain thresholds, and greater susceptibility to musculoskeletal strain (15). Although the difference between genders did not reach statistical significance, the pattern reinforces the need for gender-sensitive preventive strategies within dental curricula (16). The significant association between high academic stress and TMJ pain underscores the psychosocial component of temporomandibular disorders. Elevated stress levels can trigger parafunctional habits such as clenching or bruxism, leading t o microtrauma of the joint structures and subsequent pain (17). Similar associations have been reported in medical and dental students

in Brazil, Japan, and Saudi Arabia, supporting the notion that academic pressure serves as a modifiable risk factor (18). The additional association with extended daily clinical workload further indicates that repetitive jaw use, prolonged occlusal engagement, and muscular fatigue contribute to the development of symptoms. These findings collectively suggest that both psychological and physical demands of dental education interact to exacerbate TMJ dysfunction (19). Despite these findings, the absence of significant differences between institutions indicates that the underlying risk factors are not confined to a single educational environment but rather reflect a systemic challenge inherent in the structure of dental training. This observation strengthens the external validity of the results and highlights the importance of curriculum-wide interventions, such as stress management workshops, ergonomic training, and early screening programs.

The study demonstrated several methodological strengths, including a robust sample size, multi-institutional participation, and the combined use of validated self-report questionnaires with clinical examination to confirm TMJ pain (20). These measures reduced the likelihood of misclassification and enhanced the reliability of the prevalence estimates. The use of multivariable analysis to adjust for potential confounders such as gender and workload further strengthened the credibility of the findings. However, certain limitations must be acknowledged (21). The cross-sectional design precludes the establishment of causal relationships between academic stress, clinical workload, and TMJ pain. The reliance on self-reported stress levels may have introduced recall or reporting bias, despite the use of validated scales (22). The exclusive focus on final-year students, while ensuring homogeneity of clinical exposure, limits the generalizability of the results to earlier stages of dental training or other healthcare disciplines. Additionally, the lack of longitudinal follow-up prevents assessment of the persistence of symptoms beyond the academic setting.

Future research should incorporate prospective designs to explore temporal associations between stress levels, parafunctional habits, and TMJ symptoms. Interventional studies evaluating the efficacy of targeted stress-reduction programs, ergonomic modifications, and jaw relaxation exercises could provide valuable evidence for preventive strategies. Inclusion of objective measures such as electromyographic monitoring of masticatory muscles or imaging studies of the joint could further refine diagnostic accuracy. The implications of these findings extend beyond individual discomfort to encompass academic performance, clinical efficiency, and long-term professional health. Early recognition and management of TMJ pain in dental students may reduce absenteeism, improve quality of life, and prevent progression to chronic temporomandibular disorders that could compromise clinical careers. Integration of mental health support and musculoskeletal wellness into dental curricula should therefore be prioritized by academic institutions.

Conclusion

This study demonstrated a high prevalence of TMJ pain among final-year dental students, with significant associations to academic stress and extended clinical workload. The findings highlight the combined influence of psychological and physical factors on temporomandibular health and emphasize the need for early screening, stress management, and ergonomic interventions within dental education to mitigate risk and enhance student well-being.

AUTHOR CONTRIBUTIONS

Author	Contribution
Haq Nawaz Hasni[1]	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Mehak Rani[2]*	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
Aqsa Qasim[3]	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published

References

1. Khawar S, Bari N, Rao AH, Malik AA, Nasir S, Kayani AJPJoHS. Association between Temporomandibular Joint dysfunction and Stress in Undergraduate BDS Students of Rawalpindi/Islamabad: Temporomandibular Joint Dysfunction and Stress. 2025:67-71.

2. Miettinen O. Temporomandibular disorders: prevalence of symptoms and association with health behaviors and oral health-related quality of life. 2023.

3. Alshamery HJBUoB. Impact of occlusion efficiency on temporomandibular joint after implant rehabilitation in partially edentulous patients [thesis on the internet]. 2024.

4. Singer SR, Mupparapu MJDCNA. Temporomandibular joint imaging. 2023;67(2):227-41.

5. Déadach na hÉireann IC. JIDA Volume 67 Number 3 June/July 2021.

6. Sessle BJ. Orofacial pain: Lippincott Williams & Wilkins; 2015.

7. Ahmad I. Prosthodontics at a Glance: John Wiley & Sons; 2021.

8. Verma M, Nanda A. Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-Supported Prostheses-EBK: 1st South Asia Edition: Elsevier Health Sciences; 2017.

9. Hobrink J, Zarb GA, Bolender CL, Eckert S, Jacob R, Fenton A, et al. Prosthodontic treatment for edentulous patients: complete dentures and implant-supported prostheses: Elsevier Health Sciences; 2003.

10. Carlsson GE, Omar RJMP, Practice. Trends in prosthodontics. 2006;15(3):167-79.

11. Jacob RF, Chang T-LJPTfEPSAR-E-b. Maxillofacial prosthodontics for the edentulous patient. 2012:351.

12. Nallaswamy D. Textbook of prosthodontics: JP Medical Ltd; 2017.

13. Nilsson I-M, Drangsholt M, List TJJoop. Impact of temporomandibular disorder pain in adolescents: differences by age and gender. 2009;23(2).

14. Ilyas T, Wadood A, Jawa R, Ali S, Ayub R, Maqbool S, et al. Frequency of Temporomandibular Joint Dysfunction among Undergraduate University Students: A Cross Sectional Study: Frequency of Temporomandibular Joint Dysfunction. 2023:194-7.

15. Al-Khotani AAM. Orofacial pain and jaw function in children and adolescents: epidemiology, biopsychosocial implications and caregivers' approach: Karolinska Institutet (Sweden); 2016.

16. Al-Khotani A, Naimi-Akbar A, Björnsson O, Christidis N, Alstergren PJJoOR. Professional knowledge among Swedish and Saudi healthcare practitioners regarding oro-facial pain in children and adolescents. 2016;43(1):1-9.

17. Sangalli L, Gibler R, Boggero IJFiPR. Pediatric chronic orofacial pain: a narrative review of biopsychosocial associations and treatment approaches. 2021;2:790420.

18. Sawicki CM, Sangalli LJC. Pediatric Dentists' Practice Patterns in the Screening, Diagnosis, and Management of Temporomandibular Disorders. 2024;11(10):1168.

19. Widmalm SE, Christiansen RL, Gunn SMJC. Oral parafunctions as temporomandibular disorder risk factors in children. 1995;13(4):242-6.

20. KARIBE H, SHIMAZU K, KATO Y, WARITA-NAOI S, KAWAKAMI TJIJoPD. Factors affecting symptoms of temporomandibular disorders in adolescents: P12-347. 2013;23:158.

21. List T, Wahlund K, Larsson BJJoop. Psychosocial functioning and dental factors in adolescents with temporomandibular disorders: a case-control study. 2001;15(3).

22. Karibe H, Goddard G, Aoyagi K, Kawakami T, Warita S, Shimazu K, et al. Comparison of subjective symptoms of temporomandibular disorders in young patients by age and gender. 2012;30(2):114-20.