ORIGINAL ARTICLE

Examination-related stress leads to temporomandibular joint disorders in medical and dental students - an institutional-based study

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ABSTRACT

Background and Objective: Stress-related behaviors such as challenging academic atmosphere and rigorous examinations exert a negative impact on the normal function of temporomandibular joint. This study aimed to determine the prevalence and severity of temporomandibular joint disorders (TMDs) and their association with examination-related stress among medical (Bachelor of Medicine and Bachelor of Surgery) and dental (Bachelor of Dental Surgery) students.

Methods: This cross-sectional survey was conducted at Fatima Memorial Hospital, College of Medicine and Dentistry, Lahore, Pakistan, from June 2022 to November 2022 using the Fonseca's Questionnaire. A total of 198 medical and dental students were included as study participants. They were required to select just 1 response for each of the 10 items mentioned in the adopted but customized and validated questionnaire. TMD was categorized as mild, moderate, severe, or no TMD based on the sum of these responses. The data were analysed using statistical software and a *p*-value less than or equal to 0.05 was set as significant.

Results: There were 52 (26.2%) males and 146 (73.7%) females with a mean age of 24.2 ±1.22 years. Among 198 students, 104 were dental students while 94 were medical students. The prevalence of TMD was found to be 63.6% among all students. There was no TMD in 36.4% of students while 42.9% of students had mild TMD, and moderate and severe TMD was found in 14.1% and 6.6% of students, respectively. Mild (74%) and severe (6.7%) TMD were more prevalent in dental students than in medical students while moderate TMD was found more in medical students (16%). However, these differences were statistically not significant between dental and medical students ($p > 0.005$).

Conclusion: TMD was found in both medical and dental students with no significant difference in severity between them. The study indicates the need to take on certain preventive and therapeutic strategies to address this disorder among anxiety-prone medical and dental students.

Keywords: Dental students, medical students, temporomandibular joint disorders, temporomandibular joint, stress, examination.

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Introduction

Temporomandibular disorders (TMDs) are characterized by restricted jaw movements, pain due to inflamed joints, locking, clicking, and dislocation of the temporomandibular joint (TMJ) during mastication.[1] Orofacial pain is considered as one of the most notable causes of TMD which is alleviated by relaxing the joints.[2] Regardless of this, certain psychological factors such as stress or oral parafunctions exasperate the pain.[3] TMD pain symptoms are more myogenous and associated with odontalgia, migraines, and neck discomfort may likewise be reported.[4] Literature shows that females complain of TMD more than males.[5] However, acute forms of TMD do not show any gender dominance while chronic form of TMD is more prevalent in women.[6]

In accordance with previous research, psychological factors notably stress, are observed to be instrumental in the development and advancement of TMD.[7] Stressed individuals often feel the need to alleviate their stress by adopting a variety of habits, including clenching of the jaws, tensing the muscles of mastication, and teeth grinding which can give rise to, or further progress pre-existing TMD.[8] Examination stress depicts the fear of negative repercussions associated with the inability to successfully clear one's examinations.[9]

The prevalence of TMD varies among different populations because of the diversification of study designs and a lack of a standardized technique for diagnosing TMD.[10] Self-administered Fonseca's Questionnaire and the Fonseca Anamnestic Index (FAI) proposed by Fonseca in 1992 are used to screen TMD.[11]

Studies indicate that dental students experience more stress while working in a stressful environment of their clinical training along with extensive theoretical material in a limited amount of time to compete with their peers.[12] Majority of medical students take stress during their examinations considering it as a normal part of their training.[13]

The current study aimed to determine the prevalence and severity of TMD due to examination-related stress in medical and dental students. It will help in identifying the causative factors that may contribute to the disease progression and the need for early treatment. Also, diagnosing TMD at early and mild stages will preclude their progression to advanced and devastating stages.

Methods

This cross-sectional survey was carried out at the Fatima Memorial Hospital (FMH) College of Medicine and Dentistry Lahore, Pakistan, from June 2022 to November 2022 after obtaining approval from the Institutional Review Board. A total of 198 medical and dental students enrolled in the first, second, third, fourth, and final years of Bachelor of Dental Surgery (BDS) or Bachelor of Medicine and Bachelor of Surgery (MBBS) or doing post-graduate training were asked to participate in the study. Students without any orthodontics treatment and who gave the consent were included in the study. It is pertinent to mention that the responses were collected during the examination session after getting the participants' consent and they were asked to fill out a self-administered, expert-validated questionnaire during their examination season. Students who had a history of TMJ trauma, orofacial pain disorders, rheumatoid disorders, neurological diseases, any systemic conditions, and musculoskeletal abnormalities, taking analgesics or anti-anxiety drugs on a regular basis were excluded.

The Fonseca's Questionnaire was used to collect the responses from study participants. The Fonseca's Questionnaire has proven to be a convenient substitute for screening TMD in addition to being cost-effective and FAI was used to classify TMD on the basis of its severity.[14] The questionnaire was based on the presence or absence of painful mouth opening, side-to-side movement of the mandible, muscle fatigue, frequent headaches, stiffness of TMJ muscles, craniomandibular joint pain, TMJ clicking, malocclusion, stress-related problems and clenching of teeth.

For each of the 10 questions in Fonseca's Questionnaire, the students were instructed to choose only one option. Points were assigned to each response based on whether it was "yes" (10 points), "no" (0 points), or "sometimes" (5 points). The severity of TMD was calculated using the FAI and the total of their score as mentioned in Table 1.

Statistical analysis

Data entry and analysis were conducted using version 22.0 of the Statistical Package for Social Sciences. Descriptive analysis was performed for all variables, and categorical variables were presented in the form of frequency and percentage. Bar charts and pie charts were used to visually represent the data. The chi-square test was used to explore the association between categorical variables. A *p*-value of ≤0.05 was considered as significant.

Results

A total of 198 responses were collected from the students of FMH College of Medicine and Dentistry. There were 52 males and 146 females with ages ranging from 18 to 36 years. (Mean age 24.2 ±1.22 years). One hundred and four were dental students while 94 were medical students. Among all, 150 were undergraduate students and 48 had postgraduate status. TMD was observed in 126 (63.6%) among all participants. A total of 85(42.9%) students had mild TMD while moderate and severe TMD was seen in 28 (14.1%) and 13 (6.6%) students as shown in Figure 1.

Among the dental students, mild TMD was seen in 49 (47.1%) students while severe TMD affected 7 (6.7%) students. In medical students, mild TMD was observed in 38.3% of students followed by moderate and severe TMD in 16% and 6.4% participants. TMD-free status was more predominant in 39.4% of MBBS students than in 33.7% of dental students ($p > 0.05$). Mild and severe TMD was more prevalent in dental students while moderate TMD was seen more frequently in medical students; however, these differences were statistically insignificant as shown in Table 2 and Figure 2.

Regarding, gender distribution, a significant difference was seen in the occurrence of TMD among both male and female medical and dental students ($p < 0.05$). Female dental [(48)70%] and medical [37(65%)] students were affected

Table 1. *Fonseca Anamnestic Index (FAI) 1992.*

FAI	
Total between 0-15 points	No TMD
Total between 20-40 points	Mild TMD
Total between 45-65 points	Moderate TMD
Total between 70-100 points	Severe TMD

more by TMD as compared to males [dental; (21)30% and medical 20 (35%)] (p = 0.025).

Discussion

The current study investigated the prevalence and severity of examination-related TMD in medical and dental students and found the frequency of TMD in 63.6% of all study participants.

The pathophysiology of TMD involves an increase in the levels of tumor necrosis factor (TNF-alpha) due to stress, which in turn leads to the deterioration of bone and cartilage.[15] A positive correlation of stress with increased levels of cytokines within the body has been documented.[15,16]

Studies conducted in Saudi Arabia and Brazil reported the prevalence of TMD in 64.5% of dental students and 68.3% of Brazilian university students; these findings are consistent with the present study.[17,18] A Chinese study investigated the prevalence of TMD and it was found in 31.7% of medical students.[19] A study conducted in Karachi, Pakistan, reported mild TMD in 36.3% of students followed by moderate and severe TMD in 4.8% and 0.5% of dental students.[20] Similarly, the present study showed the mild form of TMD more prevalent than moderate and severe forms. In a Turkish study, TMD in any form was reported in 47.53% of students of oral and dental health programs.[21]

Our study replicates the findings of a study conducted in Pakistan at Combined Military Hospital Lahore presenting TMD in 62% of students. Thirty-seven percent of students had no TMD, and only 1% showed severe TMD.[22]

The variation in the prevalence of TMD among different populations may be attributed to the scales used to measure TMD. Although, researchers have used variable methods including questionnaires or clinical examination to detect TMD; however, Fonseca's Questionnaire and FAI are established as valid tools in the assessment of TMD.[10,11]

Studies showed an increased prevalence of TMD in females when compared to males. [18,12] It has been suggested that this variation is due to the fact that women experience an increased amount of stress.[23,24] Likewise, the current study showed a significant association between female gender and the prevalence of TMD.

The present study did not show any significant difference in the frequency and severity of TMD in medical and dental

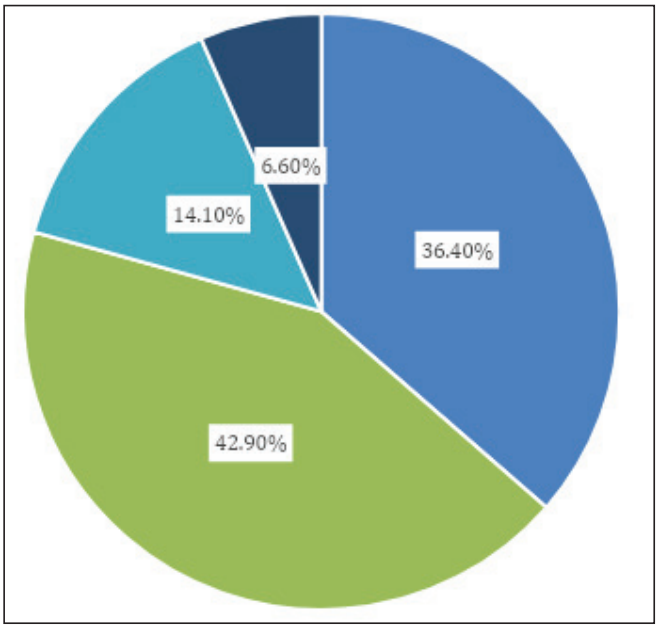

Figure 1. *Frequency of TMD among study participants.*

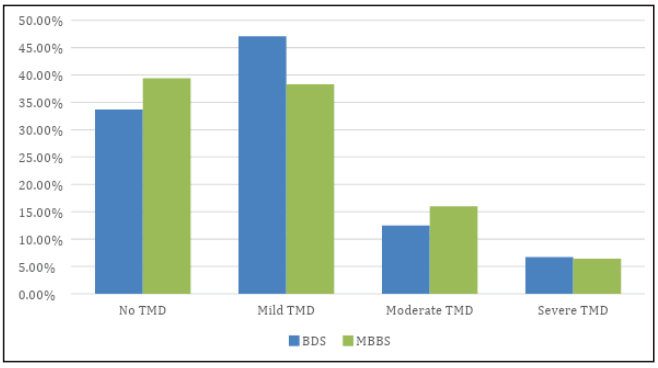

Figure 2. *The bar graph showing association of TMD with fields of study.*

Table 2. *Association of TMD with the field of study (MBBS or BDS).*

	TMD status		Field of study		Total	Chi square test (p value)
			BDS	MBBS		
Severity of TMD	No TMD	Count (%)	35 (33.7)	37 (39.4)	72 (36.4)	**0.623**
	Mild TMD	Count (%)	49 (47.1)	36 (38.3)	85 (42.9)	
	Moderate TMD	Count (%)	13 (12.5)	15 (16)	28 (14.1)	
	Severe TMD	Count (%)	7 (6.7)	6 (6.4)	13 (6.6)	
Total		**Count (%)**	**104 (52.5)**	**94 (47.4)**	**198 (100)**	

students. However, both groups are equally affected by examination-related stress and students have hectic daily routines, excessive burden of studies as well as long hours of clinical rotations. This all mounts up to produce a wide range of stressors such as examinations, assignments, class schedules clinical rotations. These stressors affect their life outside of university and disrupt their overall physical and mental health as well as their sleep schedules. Recent studies have shown poor sleep quality in medical, and dental students.[25,26] Inadequate sleep causes a wide range of problems, namely anxiety and depression.[27] A study reported poor sleep quality in 60.3% of patients suffering from TMD.[28] This highlights the relation between high levels of academic stress and the prevalence of TMD which is considered a multifactorial disorder with multiple treatment modalities to resolve the concerns. Therefore, it is a need of time to address this issue by ensuring counseling and self-discipline among students to improve their quality of life and learning experience. Both dental and medical students should be attentive to their TMJ status and should be trained in coping strategies for stress, such as mindful exercises, stress reduction physical techniques, curricular changes, and programs for health promotion can be developed to help prevent TMD from occurring or further exacerbating in medical and dental students.

Conclusion

It has been concluded that TMD is highly prevalent among dental and medical students, especially in the female gender. These findings highlight the importance of implementing focused preventive and management strategies addressing examination-related stress in academic programs.

Limitations of the study

The cross-sectional design of the current study shows a relation but could not determine the causal relationship because of the non-clarity of temporal sequence. Second, it was a single-centered study, therefore its findings cannot be generalized to the entire medical and dental student's population in Pakistan. Also, the association of TMD between undergraduate and postgraduate students was not determined.

A more accurate means of assessing TMD is by using clinical examination of the TMJ in adjunct with Fonseca's questionnaire. The students of this study were asked to fill out self-administered questionnaires during their examination season. However, a better method to assess their stress levels would be the use of the perceived stress scale before and during their examination season.

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List of Abbreviations

BDS	Bachelor of Dental Surgery
FMH	Fatima Memorial Hospital
MBBS	Bachelor of Medicine and Bachelor of Surgery
TMD	Temporomandibular Joint Disorder
TMJ	Temporomandibular Joint

Conflict of interest

None to declare.

Grant support and financial disclosure

None to disclose.

Ethical approval

The study was approved by the Institutional Ethics Review Committee of FMH College of Medicine and Dentistry Lahore, Pakistan, vide letter no: FMH-14/03/2022-IRB-1041, dated 25-04-2022.

Authors' contributions

WM: Concept and design of study, acquisition and analysis of data, drafting of manuscript.

MK, AK, SH: Acquisition and analysis of data.

FI, MT: Drafting of manuscript, critical intellectual input.

ALL AUTHORS: Approval of the final version of the manuscript to be published.

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