EVALUATION OF FREQUENCY OF TEMPOROMANDIBULAR DISORDER AND ITS ASSOCIATION WITH STRESS IN PAKISTANI DENTAL STUDENTS

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Abstract

Objective: *To determine the frequency of Temporomandibular Disorder and its association with stress in Pakistani Dental Students.*

Study design: *Cross-sectional Study.*

Place and duration of study: *July 2024-December 2024 and was conducted in Combined Military Hospital, Lahore.*

Methodology: *A total of 387 dental students from CMH were included in this study and were given questionnaires to fill. The first part of which included the demographic details of the respondents, the second part consisted of Fonseca anamnestic index (FAI) to estimate the symptoms and the severity of Temporomandibular Disorder (TMD). The third and the last part of the questionnaire consisted of perceived stress scale-10 (PSS10) for measuring stress levels.*

Results: *Out of 341completely filled questionnaires, the mean age of the participants was 40.45 ± 14.1 years with 183 (53.67%) males and 158 (46.33%) females. The prevalence of TMD was 65.10%, 45.45% having mild TMD, 16.42% moderate TMD, and 3.23% severe TMD. The remaining participants (34.90%) had no signs or symptoms of TMD. There was no significant difference in stress levels between the sexes (p = 0.086), but there was a significant difference in TMD severity between the sexes (p < 0.001). The individuals' stress levels and the severity of their TMD were strongly correlated (correlation coefficient r = 0.696, p < 0.001).*

Conclusion: *The considerable prevalence of TMD in Pakistani dental students in CMH signifies a strong correlation with high levels of stress, especially during examination periods. The effects are more pronounced for women.*

INTRODUCTION

Temporomandibular joint (TMJ) is a hinge type synovial joint that connects the mandible to the skull and facilitates numerous functions, such as speech, mastication, swallowing, and smiling.[1] The joint consists of bony articulating surfaces, a disc, and neurovascular supply, and moves with the help of a

group of masticatory muscles.[2] Temporomandibular disorders (TMD) are various conditions that limit jaw movements and induce pain, swelling, and tenderness of the TMJ, associated musculature, and structures secondary to infection and inflammation.[3] The prevalence of TMJ disorders is reported to be high in the general population, which according to some studies, ranges from 10% to 15% worldwide.[4] A patient suffering from TMD not only undergoes physical pain but is also at risk of psychological stress and performance impairment, specifically when chronic pain is associated with TMD.[5,6]

Mubeen et al. documented that 60% of medical and dental students showed symptoms of TMD during examination periods, confirming the association between stress and TMD.[7] Khawar et al. identified a 62% prevalence of TMD among BDS students at Rawalpindi/Islamabad, with a statistically significant correlation between stress levels and TMD symptoms.[8] Martins et al. found 71.9% of Brazilian students in universities with TMD symptoms, and 73.3% with elevated stress levels, with high correlation between TMD and stress as well as anxiety.[9] Yap et al. also established the validity of the Fonseca Anamnestic Index (FAI) in diagnosing TMDs associated with pain, with 85% sensitivity and 72% specificity.[10] These results reveal the significance of measuring TMD frequency and its relation to stress in Pakistani dental students.

Despite various studies examining the correlation between stress and TMD, there is still a gap in comprehensive knowledge expediting a precise relationship between these two variables in dental students, especially in different ethnical and educational contexts. Therefore, the aim of this study is to address this gap by studying the prevalence of TMD among dental students of Pakistan in Lahore and investigating its association with stress levels.

Methodology
This study employed a cross-sectional design and was carried out from July 2024 to December 2024. It was approved by the institutional review board (IRB) of CMH Lahore Medical College and Institute of Dentistry vide letter no. case #.696/ERC/CMH/LMC. The minimum sample size was estimated by using the OpenEpi online calculator of sample size (version 3.01) in which a two-sided 95% confidence level, a power of 90%, and a ratio of exposed (stressed students) to unexposed (non-stressed students) of 1:1 was considered. An expected TMD prevalence of 60% among stressed students and 40% among non-stressed students was assumed according to Mubeen et al. (2024). The minimum sample size determined was 332. The participants were recruited using convenience sampling technique for those that fulfilled the inclusion criteria and provided informed consent.

Inclusion criteria: students enrolled in BDS program of the dental college (enrolled in their first, second, third and final year of studies) with at least 85% attendance in academic and clinical rotations were made part of the study.

Exclusion criteria: students who did not consent to participate, having less than 85% attendance and diagnosed patients of depression/anxiety before seeking admission in BDS program were excluded from the study.
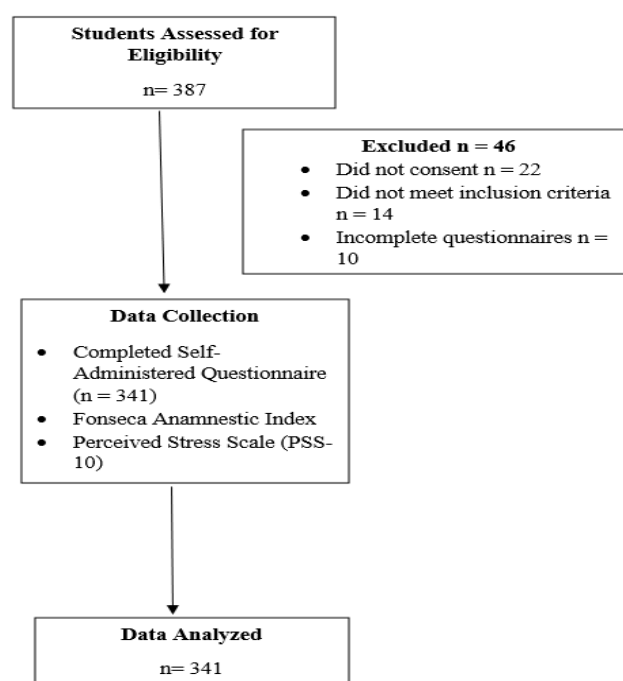
Figure 1. Patient flow diagram

All the agreeing participants completed a self-administered questionnaire. Before the commencement of study, all the participants were guided in detail regarding the motive behind the study, anonymity of the participants was ensured and all the data collected was kept confidential. Their informed consent was duly signed and obtained from each participant. In this study, a total of 387 students of class first- to final-year dental school participated. All the participating students were given the questionnaires during their examinations, immediately after leaving the exam hall. The questionnaire consisted of 3 major components:

1- 1st Component: Demographic details, medical and dental evaluation, and history of trauma.

2- Second component: consisted of Fonseca questionnaire, which has a total of 10 questions, including occurrence of tenderness/pain in the temporomandibular joint (TMJ), head, back and at the time of mastication, parafunctional habits, rattling of the joint, limitations/hindrance in jaw movements, perception of malocclusion and emotional stress. The participants were advised to answer these 10 questions with "yes", "no" or "sometimes" and to choose only one of the options as their answer. The valuation of the responses was marked in values of 10, 5, and 0 for each of the answers "yes", "sometimes", and "no" respectively. According to the criteria mentioned in the table, the values of all 10 responses were added to evaluate and rank each subject.

3- 3rd component: It consisted of the Moroccan version of the perceived stress scale, having a 5-point Likert scale which ranges from 0 (never) to 4 (very often). This evaluated the perceived stress level in the previous month.

Total Score	TMD Class
Total score between 0 and 15	No
Total score between 20 and 40	Mild
Total score between 45 and 65	Moderate

Total score between 70 and 100	Severe

PSS10 (Perceived Stress Scale) consisted of 10 items, and was divided in two sections in which the first 6 items are negatively recorded and evaluate the perceived stress. The remaining 4 items are positively recorded and evaluate the coping ability. Total score for stress is calculated by different item responses. The sum varied between 0 to 40, where high score reflects high stress level.

Data acquired from the responses was analyzed for descriptive statistics. Statistical Package for the Social Sciences (SPSS) version 20 was used to determine significant differences between TMD severity and stress levels in both sexes. Quantitative variables were presented in the form of number and percentage. Association between TMD and stress was assessed using Spearman correlation. Level of significance was determined at p value < 0.05.

Results

A total of 365 respondents completely filled the questionnaires, of which 341 had given informed consent and included in the final analysis. The mean age of the respondents was 40.45 ± 14.1 years and included 183 (53.67%) males and 158 (46.33%) females. Table I shows the types of responses obtained on the Fonseca questionnaire (FQ) from the participants.

Table I. Responses of participants to the Fonseca's questionnaire (N = 341).

Questions	Yes	Sometimes	No
	n (%)	n (%)	n (%)
1. Do you find it hard to open your mouth?	34 (9.97)	50 (14.66)	257 (75.37)
2. Do you find it hard to move your mandible to different sides?	21 (6.16)	60 (17.59)	260 (76.25)
3. Do you feel muscular pain/tired while chewing?	67 (19.65)	58 (17.01)	216 (63.34)
4. Do you experience headaches frequently?	104 (30.49)	103 (30.21)	134 (39.29)
5. Do you have stiff neck or pain on the nape?	72 (21.11)	91 (26.69)	178 (52.19)
6. Do you have pain in craniomandibular joints or earaches?	46 (13.49)	87 (25.51)	208 (60.99)
7. When opening your mouth or while chewing, do you feel any TMJ clicking?	34 (9.97)	92 (26.98)	215 (63.05)
8. Do you grind or clench your teeth?	79 (23.17)	55 (16.13)	207 (60.70)
9. Do you think your teeth do not articulate well?	51 (14.96)	102 (29.91)	188 (55.13)
10. Do you get nervous quite often?	105 (30.79)	32 (9.38)	204 (59.82)

The frequency of TMD classification of the participants showed that 11 (3.23%) had severe TMD, 56 (16.42%) had moderate TMD, 155 (45.45%) had mild TMD and 119 (34.90%) did not have TMD. The mean TMD severity was also higher in females (34.81 ± 19.2) than males (23.39 ± 12.8). Figure 1 shows the percentage of positive answers from males and females to the 10 questions of the Fonseca Questionnaire (FQ).
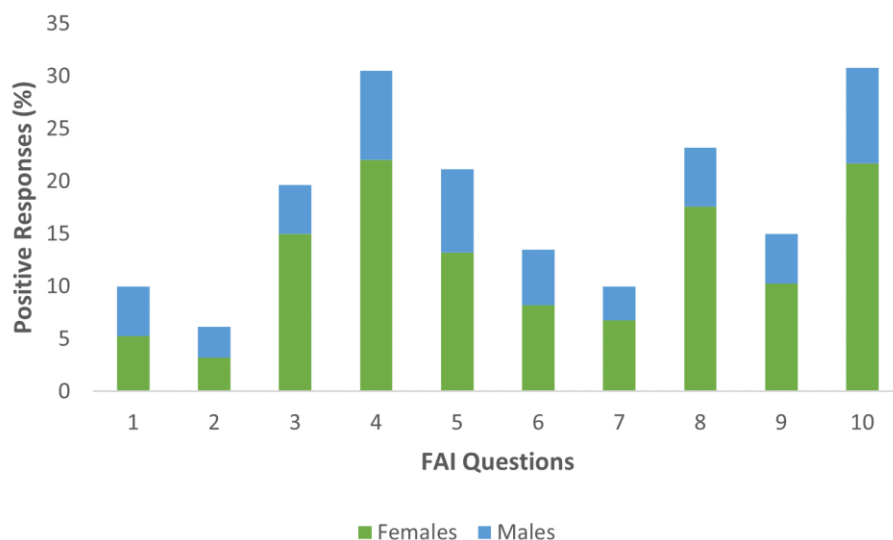
Figure 2. percentage of positive answers (yes) from both genders to all questions of the Fonseca Questionnaire (FQ).

The mean stress levels of all respondents were 16.54 ± 6.9 with females experiencing higher stress levels (17.77 ± 8.5) compared to males (15.48 ± 5.1). The mean stress levels varied depending upon the severity of TMD. Those suffering from severe TMD had stress levels 34.36 ± 2.6, participants with moderate TMD had 23.16 ± 6.5 stress levels, participants with mild TMD had 17.67 ± 3.7 and those with no TMD had lower stress levels of 10.30 ± 3.1. Table II depicts that TMD severity among both genders was significantly different (p < 0.001), while no significant difference was found among stress levels across both genders (p = 0.103).

Table II. TMD severity and stress levels across both genders.

Variable	Females Median (IQR)	Males Median (IQR)	p - value
TMD Severity	35 (25)	20 (20)	<0.001
Stress levels	18 (16)	16 (8)	0.103

TMD severity was significantly associated with stress levels among the participants (correlation coefficient r = 0.696, p < 0.001) as shown in Figure 3.
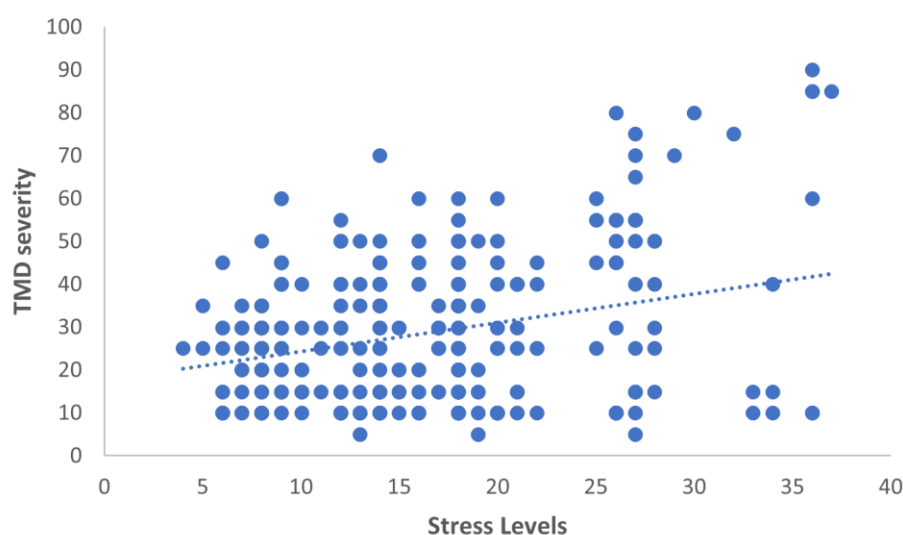
Figure 3. Correlation between TMD severity and stress

Discussion

The study indicated a considerably high prevalence of TMD among the dental students of CMH, Lahore, Pakistan where 45.45% had mild TMD, 16.42% had moderate TMD and 3.23% had severe TMD and only 34.90% had no TMD. A significant positive correlation was observed between stress and the severityy of TMD (p<0.05), thus suggesting that higher levels of psychological stress may adversely affect the development or exacerbation of TMD among students, especially at examination periods.

The high prevalence (65.1%) of TMD among dental students reported in this study in comparison with Nazir et al. (2023) is somewhat lower who reported that 70.9% prevalence of TMD was present in the dental students in Pakistan[11] and higher compared to 41.6% among the undergraduate dental students of Karachi as reported by Rehman et al.[12] These repeated observations from within Pakistan highlight an ominous trend in TMD among students of health sciences, who are commonly subjected to academic pressures and parafunctional habits like bruxism. In comparison, international studies have also documented somewhat lower rates; for example, Pedroni et al. (2003) found a prevalence rate of 53.2% for TMD in Brazilian university students, and infer that socio-cultural and educational variations, together with differences in diagnostic strategies, can impact reported TMD rates.[13]

The results of this study with respect to the distribution of TMD severity coincide with those of Nazir et al. (2023), with the dental students having 48.8% with mild TMD, 16.1% with moderate TMD, and 6.0% with severe TMD. The consistency in distribution of severity between studies also indicates that while TMD is common, most cases are mild and can be controlled, particularly in student environments where early warning signs could be identified. The patient-reported symptoms in the present study are also similar to their reports of headaches being the most common symptom, reported by 41.8% of students. They also noted neck pain at 39.4% and nervousness at 37.3%.[11] These similarities suggest that psychological and muscle-related symptoms like headaches and nervousness tend to be important signs of TMD, especially in stressed students. Comparing these findings, Costa et al. (2020) found that about 36% of TMD patients often experience headaches, showing that this symptom is quite consistent worldwide.[14] In another example, the frequency of stress or nervousness (54.84%) indicated in the results of this study is also consistent with findings reported by Manfredini et al. which highlighted the psychosocial components of TMD, including stress and anxiety as important etiological factors.[15] La Touche et al. also confirmed that musculoskeletal issues like jaw pain and tension are very common among people with TMD.[16] These

comparisons between studies suggest that though specific frequencies might differ, symptom nature is essentially consistent. Clenching or grinding teeth (42.52%) and joint clicking (40.1%) as indicated in the results of this study is also comparable to Yadav et al. (2018), who reported similar rates, linking these symptoms to parafunctional habits and disc displacement within the temporomandibular joint.[17]

Our research identified a statistically significant gender disparity in the severity of TMD, with females having more severe symptoms of TMD than males (p < 0.001). More precisely, 33.6% of females had severe to moderate TMD compared with 20.2% of males. This is consistent with Ali et al., who found a greater percentage of females (66.3%) with TMD compared with 33.7% of males in dental students at Lahore.[18] The higher susceptibility of women can be explained by hormonal effects, increased emotional sensitivity, and increased reporting or awareness of symptoms. While in the present research the average stress score was slightly elevated in women (17.77 ± 8.5) compared with men (15.48 ± 5.1), the difference was not significant (p = 0.103). Comparable results were indicated by Balasubramaniam et al. as women showed greater perceptions of stress, but statistical significance was not consistently attained, highlighting that despite the possibility that stress might be equally distributed between both sexes, its manifestation via TMD can be more severe in females owing to psychosocial and physiological differences.[19]

More importantly, the current research found a high and statistically significant positive correlation between stress level and severity of TMD (r = 0.696, p < 0.001). This is consistent with the findings of Barreto Aranha et al., who similarly found a significant association between occupational stress and TMD among health professionals, with correlation coefficient of r = 0.61.[20] In like manner, Fillingim et al. (2013) also highlighted that psychological distress was a robust predictor of the developing TMD and its slow progression, as it was observed that those with high levels of perceived stress were 2.3 times more likely to develop TMD.[21] The similarities support the biopsychosocial model of TMD and confirm that psychological stress is not only a causative factor but also the key determinant in the onset and worsening of TMD symptoms.

Limitations of the Study

Stress levels and TMD-related symptoms were primarily assessed through self-reported questionnaires, which may introduce recall bias or subjective variability in responses. Objective clinical examinations and stress biomarkers were not included, which could have enhanced the accuracy of the findings. Potential comorbid conditions like anxiety, depression, or other psychological disorders, which might influence both stress levels and TMD symptoms, were not thoroughly examined or adjusted for in the analysis.

Conclusion

The findings of this study indicated a high prevalence of TMD in 341 CMH students, with women being affected more severely. The severity of TMD was significantly associated with stress. Thus, the findings indicate that stress management programs and early screening procedures are necessary within dental colleges to reduce the risk and burden of temporomandibular disorders.

Acknowledgement

Conflict of Interest

There is none to declare.

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