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## RESEARCH ARTICLE

### PSYCHOLOGICAL STRESS AFFECTING THE TEMPOROMANDIBULAR JOINT AMONG DENTAL STUDENTS IN COIMBATORE CITY- A CROSS SECTIONAL STUDY

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#### ABSTRACT

**Background:** Temporomandibular joint (TMJ) disorders represent a group of functional and pain-related conditions involving the masticatory system. Increasing evidence suggests that psychological stress may precipitate or exacerbate TMJ dysfunction by promoting muscle hyperactivity, clenching, and bruxism. **Objectives:** To assess the relationship between psychological stress, sleep pattern, and temporomandibular joint (TMJ) symptoms among dental students. **Methods:** A cross-sectional study was conducted among 233 dental students using a structured questionnaire assessing stress (academic, family, or other), sleep duration, nap habits, presence of jaw pain or stiffness after waking, clicking/popping sounds, chewing discomfort, headache, and night grinding. Data were analyzed using statistical analysis. Chi-square tests were applied to determine associations between stress and TMJ-related variables. **Results:** Among 233 respondents, 77.3% were females and 22.7% males. A majority (56%) reported experiencing some form of stress during the preceding 30 days, primarily academic stress. Significant associations were found between stress and TMJ pain/stiffness after waking ( $p = 0.000$ ), stress and clicking/popping sounds ( $p = 0.023$ ), and stress and discomfort during chewing or yawning ( $p = 0.141$ , not significant). Additionally, sleep disturbance ( $p = 0.005$ ) and night grinding ( $p = 0.004$ ) were significantly correlated with stress and TMJ symptoms. The number of fingers that could be inserted between the incisors (an indicator of limited mouth opening) also showed a mild association ( $p = 0.05$ ). **Conclusion:** Psychological stress exerts a notable influence on TMJ health, particularly by increasing the risk of joint pain, clicking sounds, and parafunctional habits such as bruxism. Early identification of stress-related TMJ manifestations and lifestyle modification may prevent progression to chronic dysfunction.

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## INTRODUCTION

The temporomandibular joint (TMJ) is a pair of joints that allow essential jaw movements needed for chewing, speaking, and swallowing. Its proper function relies on the coordinated action of the mandibular condyle, the articular disc, and the surrounding muscles. When this delicate balance is disturbed, it can result in a group of conditions known as temporomandibular disorders (TMDs). These disorders commonly present as jaw pain, clicking or popping sounds, and restricted mouth opening. The causes of TMDs are varied, involving structural, muscular, and psychological factors. Among these, psychosocial stress has been increasingly identified as a key contributing factor (1,2). Stress triggers physiological changes in the body, particularly through activation of the hypothalamic-pituitary-adrenal (HPA) axis, which leads to increased cortisol levels and muscle tension. These stress-related changes can worsen or even

initiate TMD symptoms by encouraging habits such as teeth clenching and grinding (bruxism) (3,4). Over time, ongoing stress can alter how pain is perceived, disturb sleep quality, and affect daily coping behavior. Together, these effects create a cycle of discomfort and limited jaw function (5). Research consistently supports the link between stress, anxiety, and TMDs, although the exact nature of this relationship remains complex and likely works in both directions (6,7). Dental students are particularly prone to stress-related TMJ issues. Their rigorous academic schedules, long hours of study, clinical workloads, and constant performance pressure make them vulnerable to physical and psychological strain. These stressors can disrupt sleep, increase muscle activity, and promote poor posture—factors that may collectively affect TMJ health. Previous studies have shown that academic stress contributes significantly to muscle fatigue and pain among dental undergraduates (8,9). However, there is still limited evidence exploring the combined impact of psychological

stress, sleep quality, and TMJ symptoms in Indian dental students. Recognizing early signs of stress-related TMJ problems is crucial to prevent long-term pain and degenerative changes. Understanding how stress and sleep interact to influence TMJ function can help in developing practical preventive strategies such as stress management programs, mindfulness training, and behavioral interventions. Therefore, this cross-sectional study was conducted to explore the relationship between psychological stress, sleep patterns, and TMJ symptoms among dental students. The findings are intended to provide insight into the psychosomatic aspects of TMJ dysfunction and emphasize the importance of mental health awareness within dental education.

## MATERIALS AND METHODS

**Study Design and Population:** A cross-sectional questionnaire-based study was carried out among undergraduate dental students at a dental teaching institution. Ethical clearance was obtained from the Institutional Ethical Review Board prior to data collection.

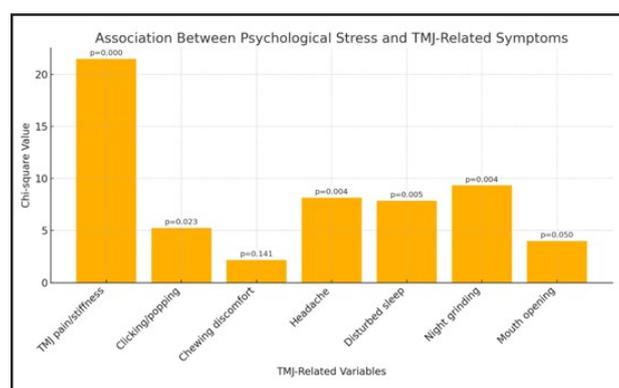
**Sample Size:** A total of 233 students participated voluntarily after informed consent.

### Questionnaire

**A prevalidated, structured questionnaire collected data on:**

- **Demographics:** age, gender, and year of study.
- **Stress variables:** academic/exam stress, family stress, others, or none.
- **Sleep habits:** average night sleep, nap duration, and sleep disturbance.
- **TMJ symptoms:** pain or stiffness after waking, clicking/popping sounds, discomfort while chewing or yawning, night grinding, and mouth-opening limitation (assessed using the “three-finger test”).
- **Associated symptoms:** headache and aggravation of pain during stress events.

**Statistical Analysis:** Data were entered and analyzed using **Statistical analysis**. Descriptive statistics summarized frequencies and percentages. **Chi-square tests** were employed to assess associations between stress (independent variable) and TMJ-related symptoms (dependent variables). A  $p$  value  $\leq 0.05$  was considered statistically significant.



## RESULTS

**Demographic Characteristics:** A total of 233 dental students participated in the study. Among them, 180 (77.3%) were females and 53 (22.7%) were males, reflecting the typical gender distribution of dental colleges. The participants ranged in age from 18 to 25 years, with a mean age of  $21.2 \pm 1.4$  years. Distribution by academic year revealed that 40.8% were final-year students, 35.2% were interns, 15.5% were third-year students, and 4.3% each from first and second years.

**Prevalence of Psychological Stress:** When asked about stress during the preceding 30 days, 56% ( $n = 131$ ) of students reported experiencing stress, primarily of academic or examination-related nature. 15% ( $n = 35$ ) cited family or personal stress, while 29% ( $n = 67$ ) reported no significant stress. The frequency of stress did not significantly differ by gender ( $p > 0.05$ ), although female students showed a slightly higher prevalence.

**Sleep Duration and Napping Patterns:** Regarding sleep duration, 49% of respondents reported sleeping 6–7 hours per night, 25% slept 7–8 hours, and 16% reported less than 5 hours of nightly sleep. Only 10% slept more than 8 hours. Approximately 40% of participants took daytime naps, most commonly for 1–2 hours. Disturbed sleep was reported by 95 students (40.8%), of whom the majority also reported stress and TMJ discomfort.

### Prevalence of TMJ-Related Symptoms

- Morning pain or stiffness in the jaws: experienced by 56 students (24%).
- Clicking or popping sounds during mouth opening or closing were reported by 132 students (56.6%).
- Pain or discomfort during chewing, talking, or yawning was common, with 176 students (75.5%) reporting such symptoms.
- Headache was present in 100 students (43%), of which 73% reported worsening during stressful periods.
- Night grinding (bruxism) was reported by 10 students (4%), and restricted mouth opening ( $\leq 2$  fingers) by 10% of the sample.

### Relationship Between Stress and TMJ Symptoms

**Stress and TMJ Pain or Stiffness (Q1  $\times$  Q10):** A strong positive association was observed between stress levels and jaw pain or stiffness after waking. Among the stressed group, 81 students (62%) reported morning jaw pain compared to 19 students (14%) in the non-stressed group. The association was highly significant ( $\chi^2 = 21.5$ ,  $p = 0.000$ ), indicating that psychological stress substantially increases the likelihood of TMJ pain.

**Stress and Clicking/Popping Sounds (Q1  $\times$  Q11):** A statistically significant relationship existed between stress and the presence of joint sounds ( $\chi^2 = 5.25$ ,  $p = 0.023$ ). Students under stress were nearly twice as likely to report clicking or popping noises as those without stress. This finding supports the role of muscular tension and parafunction in joint derangement.

**Stress and Discomfort During Chewing or Yawning (Q1  $\times$  Q12):** While a higher proportion of stressed individuals reported discomfort, the difference was not statistically significant ( $p = 0.141$ ). This may suggest that muscular fatigue rather than joint pathology causes mild discomfort during functional movement.

**Stress and Headache (Q1  $\times$  Q13):** Stress was significantly associated with recurrent headache ( $\chi^2 = 8.15$ ,  $p = 0.004$ ). More than 70% of students with stress experienced headaches, and 65% reported that headache intensity increased during stressful events.

**Sleep Disturbance and TMJ Pain (Q2  $\times$  Q10):** Disturbed sleep correlated strongly with morning TMJ stiffness ( $p = 0.005$ ). Students sleeping fewer than six hours per night were 1.8 times more likely to report jaw pain compared to those sleeping seven or more hours.

**Sleep Disturbance and Joint Sounds (Q2  $\times$  Q11):** A significant association was also seen between poor sleep and joint noises ( $p = 0.004$ ), suggesting that inadequate muscle relaxation and bruxism during restless sleep may contribute to TMJ stress.

**Sleep Pattern and Chewing Discomfort (Q2  $\times$  Q12):** No significant difference was observed between sleep pattern and discomfort during chewing ( $p = 0.05$ ), although a mild trend suggested increased discomfort among those with shorter sleep durations.

Table 1.

Variable Pair	$\chi^2$ value	p-value	Significance	Interpretation
Stress $\times$ TMJ pain/stiffness	21.5	0.000	Highly significant	Stress strongly associated with morning TMJ pain
Stress $\times$ Clicking/popping	5.25	0.023	Significant	Stress increases likelihood of joint sounds
Stress $\times$ Chewing discomfort	2.18	0.141	Not significant	Weak association
Stress $\times$ Headache	8.15	0.004	Significant	Stress exacerbates headache episodes
Stress $\times$ Disturbed sleep	7.86	0.005	Significant	Stress linked with poor sleep quality
Stress $\times$ Night grinding	9.33	0.004	Significant	Stress increases bruxism incidence
Stress $\times$ Mouth opening	4.01	0.050	Borderline	Chronic stress reduces mandibular range

**Stress and Mouth Opening Limitation (Q3  $\times$  Q13):** A borderline correlation ( $p = 0.05$ ) was noted between high stress levels and reduced mouth opening (<3 fingers). Students reporting chronic stress also exhibited limited mandibular mobility, implying prolonged muscular tension.

**Interpretation of Findings:** The data collectively indicate a strong relationship between psychological stress, sleep disturbance, and TMJ dysfunction. Students experiencing stress had markedly higher prevalence of morning stiffness, clicking sounds, and bruxism. The presence of headache and restricted mouth opening further supports muscular involvement due to sustained tension. The overall trend demonstrates that as stress increases, both subjective symptoms and objective functional limitations of the TMJ become more pronounced.

## DISCUSSION

The present study revealed a strong association between psychological stress and temporomandibular dysfunction among dental students. The results align with earlier studies by Winocur et al. (1) and Kwon et al. (2), who observed increased TMJ pain and parafunctional activities among students exposed to academic pressure. Stress-induced activation of the HPA axis elevates cortisol levels, influencing muscle tone and pain perception. Sustained muscle contraction may lead to microtrauma, ischemia, and eventual myalgia. These findings substantiate that emotional stress can translate into somatic manifestations involving the masticatory system. Sleep quality also showed a significant relationship with TMJ symptoms, consistent with Manfredini and Guarda-Nardini (5), who emphasized the link between bruxism, poor sleep, and TMJ pain. Sleep deprivation may prevent adequate muscle relaxation, leading to persistent tension and fatigue. In this study, students with disturbed sleep were nearly twice as likely to report morning stiffness or clicking sounds. Although discomfort during chewing was not statistically significant, this may indicate transient muscular strain rather than advanced joint pathology. The mild association between chronic stress and restricted mouth opening further supports the role of prolonged muscular hyperactivity. The predominance of symptoms among dental students highlights the psychosocial burden in health education environments. Incorporating regular mental wellness programs, ergonomic training, and early screening for parafunctional habits could help mitigate TMJ dysfunction.

**Limitations:** This study relied on self-reported data and did not include clinical or radiographic verification. Longitudinal studies incorporating electromyographic or imaging evaluation are recommended to establish causality.

## CONCLUSION

Psychological stress is significantly associated with TMJ pain, clicking sounds, and parafunctional habits such as night grinding among dental students.

Academic environments should prioritize mental health and ergonomic awareness to prevent progression from transient muscular tension to chronic TMJ disorders. Future longitudinal studies incorporating objective imaging and electromyographic data may further clarify the biological pathways linking stress and TMJ dysfunction.

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**Conflict of Interest:** None declared.

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