



Prevalence and Risk Factors of Temporomandibular Joint Disorders among Adults: A Cross-Sectional Study

Dr. Anbu*

Associate Professor, Department of Dentistry, JR Medical College and Hospital, Villupuram Tk, Tamilnadu, India.

Abstract

Temporomandibular joint disorders (TMD) represent a group of common musculoskeletal and neuromuscular conditions affecting the temporomandibular joint, masticatory muscles, and associated structures. These disorders are among the most frequent causes of chronic orofacial pain and functional impairment, often resulting in symptoms such as jaw pain, joint sounds, restricted mandibular movement, headaches, facial discomfort, and difficulties with mastication and speech. TMD can significantly affect an individual's quality of life, daily functioning, psychological well-being, and social interactions. Despite their multifactorial aetiology, factors such as psychological stress, parafunctional habits, bruxism, occlusal abnormalities, and demographic characteristics have been implicated in the development and progression of these disorders. The present cross-sectional study was conducted to determine the prevalence of temporomandibular joint disorders among adults and to identify associated risk factors that may contribute to their occurrence. A total of 300 adults were screened for TMD using the validated Fonseca Anamnestic Index in combination with a comprehensive clinical examination. The severity of TMD was categorized according to established criteria, and information regarding potential risk factors, including sex, bruxism, perceived stress levels, parafunctional habits, and malocclusion, was collected. Statistical analyses included chi-square tests to assess group differences and multivariable logistic regression to estimate adjusted odds ratios (aORs) for factors independently associated with TMD. The results revealed that TMD was present in 114 participants, corresponding to an overall prevalence of 38%, with the majority of affected individuals exhibiting mild forms of the disorder. Multivariable analyses demonstrated that female sex, bruxism, elevated perceived stress, and parafunctional habits were independently associated with a significantly increased likelihood of TMD, with all associations reaching statistical significance ($p < 0.05$). These findings support the concept that both behavioural and psychosocial factors play important roles in the development and persistence of temporomandibular disorders. The observed association between stress and TMD further emphasizes the complex interaction between psychological and physical factors in orofacial pain conditions. In conclusion, temporomandibular joint disorders were common among the adult population studied and were significantly associated with female sex, bruxism, psychological stress, and parafunctional habits. The findings highlight the importance of early identification of at-risk individuals and support the implementation of screening programs, patient education, stress management strategies, and behaviorally oriented preventive interventions to reduce the burden of TMD and improve oral health outcomes.

Keywords: *Temporomandibular disorders; Fonseca index; Bruxism; Psychological stress; Parafunctional habits; Prevalence.*



Introduction

Temporomandibular joint disorders (TMD) encompass a diverse group of musculoskeletal and functional conditions affecting the temporomandibular joint, masticatory muscles, and associated craniofacial structures. These disorders represent one of the most common causes of non-dental orofacial pain and are recognized as a significant public health concern due to their impact on oral function, psychological well-being, and quality of life [1,2]. Individuals with TMD may experience a wide range of symptoms, including jaw pain, joint sounds such as clicking or crepitus, restricted mandibular movement, muscle tenderness, headaches, facial discomfort, and difficulties with chewing, speaking, and other routine oral functions. Persistent symptoms can interfere with daily activities, impair social interactions, reduce work productivity, and contribute to emotional distress, thereby substantially affecting overall health-related quality of life [3]. The etiology of TMD is complex and multifactorial, involving an interplay of biological, behavioral, mechanical, and psychological factors. Numerous studies have identified parafunctional habits such as bruxism and tooth clenching as important contributors to excessive loading of the temporomandibular joint and masticatory muscles, potentially leading to tissue damage and dysfunction. Psychological factors, particularly stress, anxiety, and emotional tension, have also been implicated in the onset and exacerbation of TMD symptoms through mechanisms involving increased muscle activity, altered pain perception, and behavioral responses [4,5]. Additional factors including malocclusion, trauma, postural abnormalities, genetic predisposition, and hormonal influences have been proposed as contributing determinants. Notably, epidemiological studies consistently report a higher prevalence of TMD among females, suggesting possible sex-related biological and psychosocial influences on disease susceptibility and symptom expression [4,5]. Given the multifaceted nature of TMD, reliable screening and diagnostic tools are essential for identifying affected individuals and assessing disease burden within populations. The Fonseca Anamnestic Index is a widely used, validated screening instrument that facilitates epidemiological evaluation of TMD by classifying symptom severity and identifying individuals who may require further clinical assessment [6]. Despite extensive research, reported prevalence estimates of TMD vary considerably across populations because of differences in demographic characteristics, cultural factors, diagnostic criteria, and assessment methods [7]. Furthermore, understanding modifiable risk factors remains important for developing preventive strategies, improving early detection, and guiding effective management approaches [8]. Local epidemiological data are particularly valuable for characterizing the burden of TMD and identifying population-specific risk factors that may influence disease occurrence. Therefore, the present cross-sectional study was undertaken to determine the prevalence of temporomandibular joint disorders among adults and to investigate factors associated with their occurrence. The primary objective was to estimate the prevalence of TMD using the Fonseca Anamnestic Index, while secondary objectives included describing the distribution of TMD severity and identifying demographic, behavioral, and psychological factors independently associated with the disorder. The study tested the null hypothesis (H_0) that the investigated factors are not associated with TMD against the alternative hypothesis (H_1) that female sex, bruxism, perceived stress, and parafunctional habits are significantly associated with an increased risk of temporomandibular joint disorders.

MATERIALS AND METHODS

This cross-sectional study was conducted and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure comprehensive and transparent reporting of observational research. The study was carried out in the Department of Oral Medicine at during the study period of and aimed to determine the prevalence of temporomandibular joint disorders (TMD)



and identify associated risk factors among adults. Ethical approval was obtained from the Institutional Ethics Committee and written informed consent was secured from all participants prior to enrolment. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Adults aged 18 years and older who attended the department during the study period and met the eligibility criteria were invited to participate. Individuals with a history of facial trauma, maxillofacial surgery, and rheumatologic diseases affecting the joints, current orthodontic treatment, or inability to understand and complete the study questionnaire were excluded to minimize potential confounding factors and ensure the reliability of self-reported information. A total of 300 eligible participants were enrolled in the study. Assessment of temporomandibular joint disorders was performed using the validated Fonseca Anamnestic Index (FAI), a widely accepted screening tool for epidemiological studies of TMD. The questionnaire evaluates symptoms related to temporomandibular joint dysfunction, pain, mandibular movement, and associated complaints, allowing classification of participants according to TMD severity. Individuals identified as having possible TMD based on the questionnaire were further evaluated through a standardized clinical examination conducted by trained clinicians. The clinical assessment included evaluation of temporomandibular joint sounds such as clicking or crepitus, palpation for joint and muscle tenderness, and measurement of mandibular range of motion. Based on the combined questionnaire and clinical findings, participants were categorized as having no TMD, mild TMD, moderate TMD, or severe TMD according to established criteria [6]. Information regarding potential risk factors was also collected. Bruxism and other parafunctional habits, including tooth clenching, nail biting, lip biting, and gum chewing, were recorded through structured interviews and clinical assessment. Occlusal characteristics and the presence of malocclusion were documented during oral examination. Psychological stress was assessed using the validated Perceived Stress Scale (PSS), which provides a quantitative measure of perceived stress levels during recent life experiences [9]. Sample size estimation indicated that approximately 285 participants would be required to estimate a TMD prevalence of 35% with a 95% confidence interval and a margin of error of 5.5%. To enhance statistical precision and compensate for potential missing or incomplete data, a total of 300 participants were recruited. Statistical analyses were performed using. Descriptive statistics were used to summarize demographic and clinical characteristics. The prevalence of TMD was calculated and presented with corresponding 95% confidence intervals. Associations between TMD and potential risk factors were initially assessed using chi-square tests for categorical variables. Variables demonstrating significant associations were subsequently entered into multivariable logistic regression models to identify factors independently associated with TMD and to estimate adjusted odds ratios (aORs) with 95% confidence intervals. All statistical tests were two-sided, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Prevalence and characteristics

Of 300 adults (mean age 32 ± 10 years; 168 [56%] female), 114 (38%, 95% CI 33–44%) had TMD, predominantly mild (Figure 1; Table 1).

A total of 300 participants were included in the study and underwent assessment for temporomandibular joint disorders (TMD) using the Fonseca Anamnestic Index and clinical examination. Of these, 114 individuals were diagnosed with TMD, corresponding to an overall prevalence of 38%, while the remaining 186 participants showed no evidence of the disorder. The majority of TMD cases were classified as mild in severity, indicating that temporomandibular dysfunction was relatively common within the study population. Comparative analysis of demographic and behavioral characteristics revealed several



significant differences between participants with and without TMD. Female participants constituted a significantly greater proportion of the TMD group, accounting for 76 individuals (67%), compared with 92 individuals (49%) in the non-TMD group ($p < 0.01$). Similarly, bruxism was considerably more prevalent among individuals with TMD, being reported by 48 participants (42%) compared with only 33 participants (18%) without TMD ($p < 0.001$). Assessment of psychological factors demonstrated a strong association between perceived stress and TMD, with high perceived stress levels observed in 59 participants (52%) with TMD compared with 48 participants (26%) without TMD ($p < 0.001$). Parafunctional habits, including behaviors such as tooth clenching, nail biting, and excessive gum chewing, were also significantly more common among participants with TMD, affecting 51 individuals (45%) compared with 41 individuals (22%) in the non-TMD group ($p < 0.001$). Malocclusion was observed in 40 participants (35%) with TMD and 46 participants (25%) without TMD, demonstrating a borderline statistically significant association ($p = 0.05$). To identify factors independently associated with TMD and control for potential confounding influences, multivariable logistic regression analysis was performed. The analysis revealed that bruxism was the strongest independent predictor of TMD, with affected individuals demonstrating nearly threefold higher odds of having the disorder compared with those without bruxism (adjusted odds ratio [aOR] = 2.8, 95% confidence interval [CI]: 1.8–4.3, $p < 0.001$). High perceived stress was also significantly associated with TMD, increasing the likelihood of the condition by approximately 2.4 times (aOR = 2.4, 95% CI: 1.6–3.7, $p < 0.001$). Female sex remained an independent risk factor, with women exhibiting approximately double the odds of TMD compared with men (aOR = 2.1, 95% CI: 1.4–3.2, $p < 0.01$). Likewise, parafunctional habits were independently associated with TMD, conferring a twofold increase in risk (aOR = 2.0, 95% CI: 1.3–3.1, $p < 0.01$). Collectively, these findings indicate that temporomandibular joint disorders are common among adults and are strongly associated with behavioral, psychological, and sex-related factors, particularly bruxism, elevated stress levels, and parafunctional oral habits.

Table 1: Characteristics by TMD status (TMD n = 114, no TMD n = 186).

Variable	No TMD	TMD	p
Female, n (%)	92 (49)	76 (67)	<0.01
Bruxism, n (%)	33 (18)	48 (42)	<0.001
High perceived stress, n (%)	48 (26)	59 (52)	<0.001
Parafunctional habits, n (%)	41 (22)	51 (45)	<0.001
Malocclusion, n (%)	46 (25)	40 (35)	0.05

Risk factors

Female sex, bruxism, high perceived stress, and parafunctional habits were independently associated with TMD (Figure 2; Table 2).

Table 2: Adjusted associations with TMD.

Factor	aOR	95% CI	p
Bruxism	2.8	1.8–4.3	<0.001
High perceived stress	2.4	1.6–3.7	<0.001
Female sex	2.1	1.4–3.2	<0.01
Parafunctional habits	2.0	1.3–3.1	<0.01



Figure 1. Severity distribution of temporomandibular joint disorders (Fonseca index)

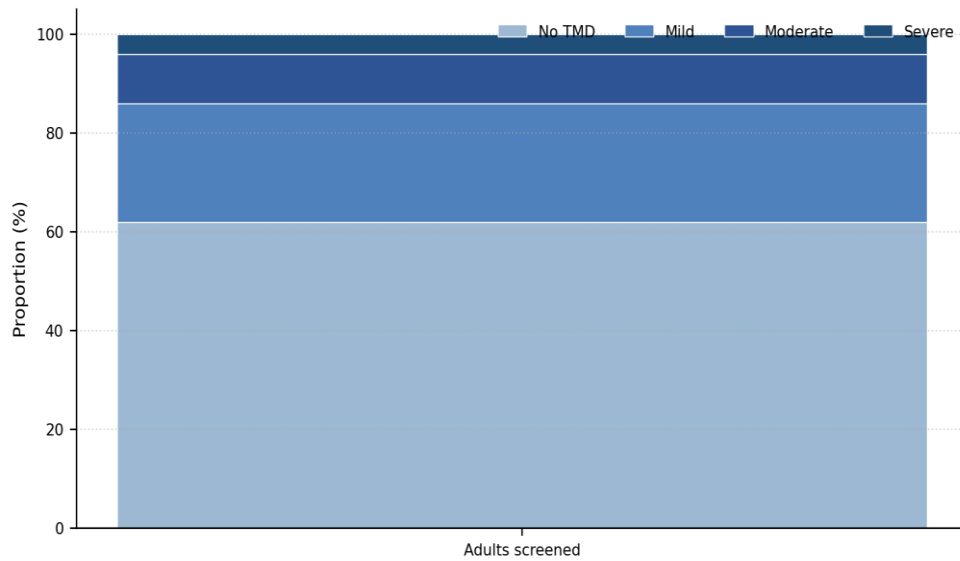


Figure 1. Severity distribution of TMD (Fonseca index).

Figure 2. Adjusted odds ratios for temporomandibular joint disorder

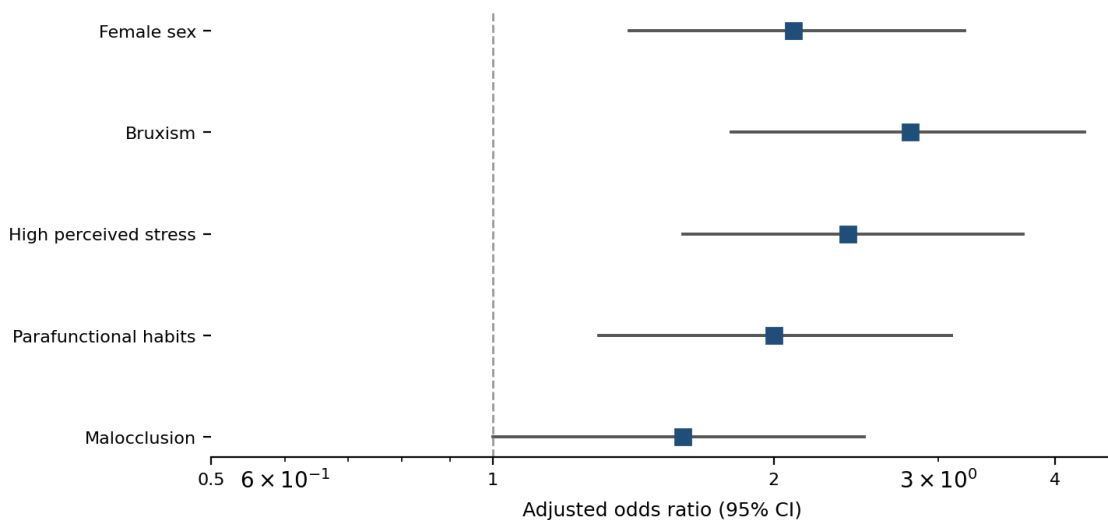


Figure 2. Adjusted odds ratios (95% CI) for TMD.

DISCUSSION

The present cross-sectional study demonstrated that temporomandibular joint disorders (TMD) are highly prevalent among adults, affecting more than one-third of the study population, with the majority of cases presenting in a mild form. Furthermore, the study identified female sex, bruxism, elevated perceived stress, and parafunctional habits as significant independent factors associated with the presence of TMD. These findings are consistent with the widely accepted biopsychosocial model of temporomandibular disorders, which recognizes that biological, behavioral, psychological, and social factors interact in the development and persistence of TMD symptoms [10-11]. Among the identified risk factors, bruxism demonstrated the strongest association with TMD, supporting previous evidence that repetitive clenching and grinding activities can lead to excessive loading of the temporomandibular joint and masticatory muscles, resulting



in pain, muscle fatigue, joint dysfunction, and structural stress. Similarly, parafunctional habits such as nail biting, lip biting, and habitual jaw clenching may contribute to chronic muscle overactivity and increased mechanical strain on the temporomandibular system.[12] The strong association observed between perceived stress and TMD further highlights the important role of psychological factors in orofacial pain conditions. Stress may increase muscle tension, alter pain perception, and exacerbate parafunctional behaviors, thereby contributing to the onset or progression of TMD symptoms. The higher prevalence of TMD among women observed in the present study is also consistent with previous epidemiological investigations and may be explained by hormonal influences, differences in pain sensitivity, psychosocial factors, and healthcare-seeking behaviors. In contrast, malocclusion demonstrated only a weak association with TMD, supporting contemporary evidence suggesting that occlusal factors may play a less significant role than previously believed. [13-15] The findings have important clinical implications, emphasizing the need for routine screening of TMD symptoms and associated behavioral and psychological risk factors in dental and oral medicine settings. Early identification of individuals at increased risk may facilitate timely intervention through conservative and non-invasive approaches, including patient education, stress management, behavioural modification, habit awareness training, physiotherapy, and occlusal appliances when indicated [16-17]. Several strengths enhance the validity of the study, including the use of a validated screening instrument, clinical confirmation of TMD status, and multivariable analysis to account for potential confounding factors. Nevertheless, certain limitations should be acknowledged. The cross-sectional design prevents determination of causal relationships between identified risk factors and TMD. Additionally, self-reported measures of stress and parafunctional habits may be subject to recall and reporting bias, while the single-centre setting may limit the generalizability of the findings. The Fonseca Anamnestic Index, although useful for epidemiological screening, is not a definitive diagnostic tool. Future research should employ longitudinal designs and standardized Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) to better establish causal pathways and evaluate the effectiveness of behavioral, psychological, and multidisciplinary interventions in reducing the burden of TMD and improving patient outcomes.

CONCLUSION

The present study demonstrated that temporomandibular joint disorders (TMD) are common among adults, affecting a substantial proportion of the study population and highlighting their importance as a significant oral health concern. The findings revealed that bruxism, elevated perceived stress, and parafunctional habits were independently associated with an increased likelihood of TMD, even after adjustment for potential confounding factors. These results support the contemporary understanding of TMD as a multifactorial condition influenced by complex interactions between behavioral, psychological, and biological factors. The strong associations observed with bruxism and parafunctional habits emphasize the role of excessive and repetitive loading of the masticatory system in the development of temporomandibular dysfunction, while the association with perceived stress underscores the contribution of psychosocial factors to symptom onset and persistence. From a clinical perspective, the findings highlight the importance of early identification of individuals at risk for TMD through routine screening in dental and oral healthcare settings. Incorporating assessments for stress levels, bruxism, and parafunctional behaviors into regular clinical evaluations may facilitate timely diagnosis and intervention before symptoms progress to more severe and disabling forms. The results also support the implementation of behaviorally oriented preventive strategies, including patient education, stress-management programs, relaxation techniques, habit-awareness training, and conservative therapeutic approaches aimed at reducing functional overload of the temporomandibular joint and associated musculature. Such interventions may contribute to symptom reduction, improved



quality of life, and decreased healthcare burden. Although the study provides valuable insights into the prevalence and correlates of TMD, the cross-sectional design limits the ability to establish temporal or causal relationships between identified risk factors and disease occurrence. Therefore, future research should focus on well-designed longitudinal studies employing standardized diagnostic criteria, such as the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), to better elucidate causal pathways and disease progression. Further investigations evaluating the effectiveness of preventive, behavioral, and multidisciplinary management strategies are also warranted. Overall, the findings reinforce the need for comprehensive and patient-centred approaches to TMD prevention and management, with particular attention to modifiable behavioral and psychological risk factors in susceptible individuals.

REFERENCES

1. Schiffman E, Ohrbach R, Truelove E, et al. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for clinical and research applications. *J Oral Facial Pain Headache*. 2014;28(1):6–27.
2. List T, Jensen RH. Temporomandibular disorders: old ideas and new concepts. *Cephalalgia*. 2017;37(7):692–704.
3. Dahlstrom L, Carlsson GE. Temporomandibular disorders and oral health-related quality of life: a systematic review. *Acta Odontol Scand*. 2010;68(2):80–85.
4. Manfredini D, Lobbezoo F. Relationship between bruxism and temporomandibular disorders: a systematic review of literature from 1998 to 2008. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2010;109(6):e26–e50.
5. Fillingim RB, Ohrbach R, Greenspan JD, et al. Potential psychosocial risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case-control study. *J Pain*. 2011;12(11 Suppl):T46–T60.
6. Fonseca DM, Bonfante G, Valle AL, Freitas SF. Diagnosis of the craniomandibular dysfunction through anamnesis. *Rev Gaucha Odontol*. 1994;42(1):23–28.
7. Manfredini D, Guarda-Nardini L, Winocur E, et al. Research diagnostic criteria for temporomandibular disorders: a systematic review of axis I epidemiologic findings. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2011;112(4):453–462.
8. de Kanter RJ, Truin GJ, Burgersdijk RC, et al. Prevalence in the Dutch adult population and a meta-analysis of signs and symptoms of temporomandibular disorder. *J Dent Res*. 1993;72(11):1509–1518.
9. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24(4):385–396.
10. LeResche L. Epidemiology of temporomandibular disorders: implications for the investigation of etiologic factors. *Crit Rev Oral Biol Med*. 1997;8(3):291–305.
11. Slade GD, Bair E, Greenspan JD, et al. Signs and symptoms of first-onset TMD and sociodemographic predictors of its development: the OPPERA prospective cohort study. *J Pain*. 2013;14(12 Suppl):T20–T32.
12. Bueno CH, Pereira DD, Pattussi MP, et al. Gender differences in temporomandibular disorders in adult populations: a systematic review and meta-analysis. *J Oral Rehabil*. 2018;45(9):720–729.
13. Nomura K, Vitti M, Oliveira AS, et al. Use of the Fonseca's questionnaire to assess the prevalence and severity of temporomandibular disorders in Brazilian dental undergraduates. *Braz Dent J*. 2007;18(2):163–167.
14. Manfredini D, Winocur E, Guarda-Nardini L, et al. Epidemiology of bruxism in adults: a systematic review of the literature. *J Orofac Pain*. 2013;27(2):99–110.
15. Progiante PS, Pattussi MP, Lawrence HP, et al. Prevalence of temporomandibular disorders in an adult Brazilian community population using the RDC/TMD. *Int J Prosthodont*. 2015;28(6):600–609.



-
16. Gauer RL, Semidey MJ. Diagnosis and treatment of temporomandibular disorders. *Am Fam Physician*. 2015;91(6):378–386.
 17. Chisnoiu AM, Picos AM, Popa S, et al. Factors involved in the etiology of temporomandibular disorders—a literature review. *Clujul Med*. 2015;88(4):473–478.