Prevalence and Severity of Temporomandibular Disorders Among Dental Patients in Nepal: A Cross-Sectional Study Using DC/TMD and Fonseca Index

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ABSTRACT

Background: Temporomandibular disorders (TMDs) are musculoskeletal and neuromuscular conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and associated structures. They are a major cause of chronic facial pain, impacting oral function and quality of life. Prevalence among dental patients varies widely.

Methods: A cross-sectional study was conducted among 294 dental patients. TMDs were diagnosed using the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) and severity was assessed via Fonseca's questionnaire. Data were collected and statistical analysis was performed to assess the correlations between demographic and clinical variables and the prevalence of TMD.

Results: Among 294 participants, 40 (13.6%) patients were diagnosed with TMDs among which 65% were female and 35% were male. Pain on mouth opening was the most common sign (92.5%), followed by clicking sound (72.5%). Various diagnoses included arthralgia (12.5%), arthralgia with disc displacement with reduction (15%), and arthralgia with disc displacement with reduction with intermittent locking (12.5%). No significant correlations were observed between age, gender, range of mouth opening or molar relationship and TMD prevalence or severity.

Conclusions: TMDs are common among dental patients, with pain on mouth opening as the predominant clinical sign. Age, gender, range of mouth opening and molar relationships were not significantly associated with TMD occurrence and severity. Thus, routine TMD assessment in dental practice is recommended for early detection and management.

Keywords: Fonseca's questionnaire, Prevalence, Severity, Temporomandibular disorders (TMD), Temporomandibular joint (TMJ)

INTRODUCTION

The temporomandibular joint (TMJ) is one of the most complex articulations in the human body, enabling mastication, speech, and deglutition.[1] Its structural and functional intricacy renders it susceptible to a range of disorders collectively termed temporomandibular disorders (TMDs).[2] The American Academy of Orofacial Pain (1993) defines TMDs as "a collective term that encompasses a number of clinical problems involving the masticatory muscles, the temporomandibular joint, and associated structures."[3] These conditions are a leading cause of chronic non-dental orofacial pain and represent a significant public health concern due to their impact on quality of life, psychosocial well-being, and functional efficiency.[4]

Conflict of Interest: None

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TMDs are multifactorial conditions resulting from complex interactions among biological, biomechanical, behavioral, and psychosocial factors including occlusal discrepancies, trauma, parafunctional habits, emotional stress, hormonal influences, and systemic disorders. These diverse contributors help explain the wide spectrum of TMD manifestations highlighting the importance of the biopsychosocial model in understanding their onset and clinical presentation.[2,5,6]

Accurate diagnosis of TMDs remains challenging owing to their multifactorial nature and overlapping symptomatology.[7] Standardized diagnostic systems such as the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD, 1992) and its revised form, the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD, 2014; updated 2020), have enhanced the reliability and validity of TMD diagnosis by incorporating both physical and psychosocial dimensions.[5] Complementary to these structured criteria, simplified screening tools such as the Fonseca Anamnestic Index (FAI) serve as practical tools for rapid assessment and severity grading that offers a cost-effective and consistent tool for application in epidemiological surveys.[8] In the present study, both DC/TMD and FAI were employed to achieve a comprehensive and comparative evaluation of TMD prevalence and severity.

TMDs present with various subjective symptoms, such as pain, joint noises, and functional difficulty, alongside objective clinical signs, including tenderness on palpation, joint sounds on auscultation, and limited mandibular motion. Symptoms capture the patient's perceived burden and functional impact, while clinical signs provide observable evidence of pathology, validating complaints and revealing subclinical cases. Reporting both facilitates comparisons across studies using different diagnostic tools (e.g., FAI, DC/TMD, RDC/TMD), highlights subgroups with different risk profiles such as early-stage or pain-dominant TMD versus adaptive or compensated dysfunction and informs treatment planning and resource allocation by indicating the proportion of patients who require interventions, referrals, or preventive strategies.

Epidemiological studies report considerable variation in prevalence, influenced by diagnostic criteria, age, and sociocultural factors.[8] Approximately one-third of the global population (29.5%) across all age groups is affected by TMDs while, among individuals above 18 years, the prevalence is 41%. Clinically significant TMD affects 34.1% of adults, while 30–60% experience at least one symptom during their lifetime.[10] Manfredini et al. reported that nearly one-third of adults exhibit TMD signs or symptoms, while List and Axelsson estimated that 10–15% experience pain warranting professional care.[11,12] Epidemiological data on TMD prevalence show considerable variation across different regions.[13] In the USA, prevalence ranges from 10% to 15%, while in Brazil it is higher at 34%.[14,15] In China, reported prevalence varies between 17% and 25% reflecting regional differences that may be influenced by population characteristics and study methodologies.[16]

A consistent gender predilection exists, with women affected two to four times more frequently than men, possibly due to hormonal modulation of pain sensitivity, behavioral factors, and differences in health-seeking behavior.[17] Prevalence rates show 36.7% in females versus 26.7% in males, corresponding to a 1.75-fold higher likelihood among women.[13] Thus, limited awareness, absence of standardized diagnostic protocols, and minimal integration of TMD screening in routine dental care contribute to underdiagnosis.[18]

Comprehensive epidemiological data on TMDs in Nepal are few thus making it essential to investigate their prevalence among dental patients to establish baseline data that can guide diagnosis, early intervention, and clinician's awareness. The present study aims to assess the prevalence and severity of Temporomandibular Disorders (TMDs), along with their clinical signs and symptoms, among Nepalese dental patients using the Fonseca Anamnestic Index and the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). This assessment aids in providing valuable insights for clinical practice, guide public health strategies, and provide region-specific epidemiological data on TMDs.

METHODS

This observational, cross-sectional study was conducted in the Department of Oral Medicine and Radiology, People's Dental College and Hospital, Sorhakhutte, Kathmandu, Nepal. Ethical approval was obtained from the Institutional Review Committee of People's Dental College and Hospital and written informed consent was obtained from all participants**.** Inclusion criteria included the patients aged 18 years and above visiting the dental outpatient department and individuals who will give the consent to participate in the study. Exclusion criteria included recent maxillofacial trauma or surgery, systemic conditions affecting the temporomandibular joint, congenital craniofacial anomalies, or ongoing orthodontic treatment. Patients were selected using convenience sampling over a two-month period from, 21st February to 21st April 2024. The sample size of 294 was calculated based on a reported TMD prevalence of 83.96% (Shivhare et al.) using the formula $N=Z2 \cdot p \cdot q/d2$. Age groups were divided as 19-29 years, 30-39 years, 40-49 years, 50-59 years and TMD examinations were performed by single researcher under the supervision of specialist who has more than 10 years of clinical experience. Clinical diagnosis was established according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), and TMD severity was assessed using the Fonseca Anamnestic Questionnaire. Types and subtypes of TMD, along with associated signs and symptoms, were recorded. Participants suspected of degenerative joint disorders were advised to undergo radiographic evaluation, which was explained in clear terms, and reasons for refusal were documented. Data were collected using structured pro-forma and analyzed using SPSS version 22.0. Descriptive statistics were used to determine the prevalence of TMD along with signs and symptoms of TMDs, while associations between TMD severity, age, gender, and occlusal status were analyzed using the Chi-square test, with a significance level set at $p < 0.05$.

RESULTS

Among the 294 participants assessed, 40 (13.6%) were found to have TMDs, most of whom were females (26; 65.0%) and individuals aged 19–29 years (16; 40.0%). (Table 1).

Mild TMD was most common (18, 45%), followed by moderate and severe forms, with bilateral involvement (25, 62.5%) exceeding unilateral cases (Figures 1 and 2).

Pain on mouth opening emerged as the most frequent symptom (92.5%), followed by clicking (72.5%) whereas less common symptoms included limited mouth opening (35%), intermittent locking (25%) (Table 2). Females more often experienced joint tenderness while radiating pain was more frequent in males.

Age-stratified analysis revealed distinct trends as clicking was highest among 19–29-year-olds (93.8%) whereas crepitus, indicative of degenerative changes, increased with age, reaching 25% in 50–59 years. Pain on opening remained consistently high across all age. (Table 3).

Most TMD patient had Class I occlusion (77.5%) with arthralgia and disc displacement with reduction as the predominant diagnoses, while those with Class II (10%) and Class III (12.5%) occlusion showed varied TMD patterns. (Table 4).

No significant associations were found between TMD severity and age (p = 0.157), gender (p = 0.556), site of involvement (p = 0.606), or molar relation (p = 0.743) (Table 5).

Mean mouth opening values were 40.06 ± 10.67 mm for mild, 43.13 ± 10.74 mm for moderate, and 38.33 ± 9.16 mm for severe cases, with no significant differences (p = 0.558) (Table 6).

Overall, functional disturbances such as pain on mouth opening, clicking, and joint tenderness were the most common TMD findings, whereas structural features like intermittent or persistent locking, restricted mouth opening, and jaw lock were less frequent. Bilateral involvement occurred more often than unilateral, and although Class I occlusion was predominant, individuals with Class II and III malocclusions tended to show more varied TMD presentations, emphasizing the multifactorial etiology of TMD and indicating that occlusion serves as a contributing rather than a primary factor.

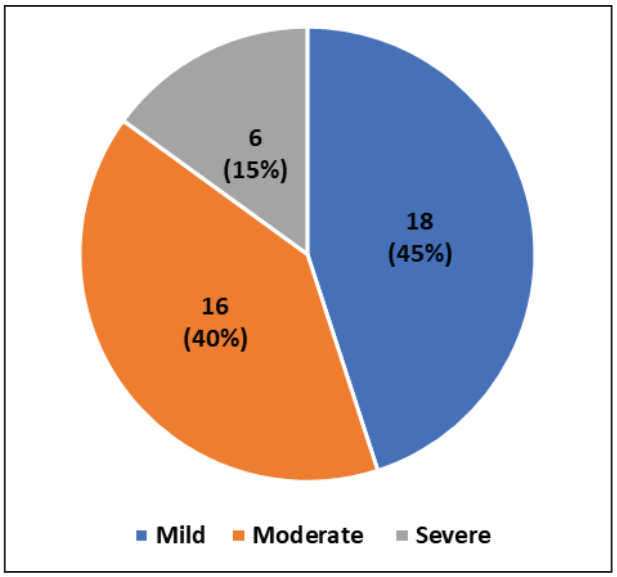

Figure 1: Distribution of study participants according to severity of TMD

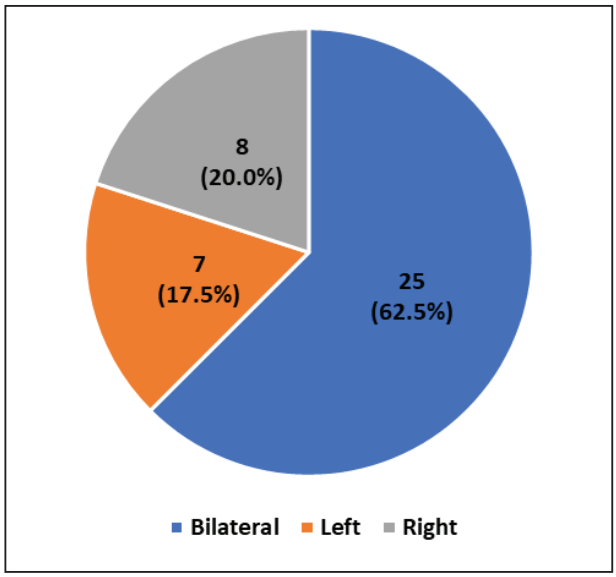

Figure 2: Distribution of study participants according to site of TMD

Table 1: Sociodemographic characteristics of the study participants with TMDs

Sociodemographic characteristics		n (%)
Gender	Male	14 (35.0)
	Female	26 (65.0)
Age group (in years)	19-29	16 (40.0)
	30-39	9 (22.5)
	40-49	7 (17.5)
	50-59	8 (20.0)
Total		40 (100.0)

Table 2: Distribution of Gender with TMDs based on the signs and symptoms

TMD signs and symptoms		Gender n (%)		Total
		Male	Female	n (%)
Clicking sound	Yes	10 (71.4)	19 (73.1)	29 (72.5)
	No	4 (28.6)	7 (26.9)	11 (27.5)
Crepitus	Yes	1 (7.1)	3 (11.5)	4 (10.0)
	No	13 (92.9)	23 (88.5)	36 (90.0)
Joint tenderness	Yes	8 (57.1)	20 (76.9)	28 (70.0)
	No	6 (42.9)	6 (23.1)	12 (30.0)
Deviation of mandible on mouth opening	Yes	8 (57.1)	14 (53.8)	22 (55.0)
	No	6 (42.9)	12 (46.2)	18 (45.0)
Pain on mouth opening	Yes	14 (100.0)	23 (88.5)	37 (92.5)
	No	-	3 (11.5)	3 (7.5)
Pain on closing mouth	Yes	7 (50.0)	11 (42.3)	18 (45.0)
	No	7 (50.0)	15 (57.7)	22 (55.0)
Limited mouth opening	Yes	3 (21.4)	11 (42.3)	14 (35.0)
	No	11 (78.6)	15 (57.7)	26 (65.0)
Radiating pain	Yes	4 (28.6)	3 (11.5)	7 (17.5)
	No	10 (71.4)	23 (88.5)	33 (82.5)
Intermittent locking	Yes	-	10 (38.5)	10 (25.0)
	No	14 (100.0)	16 (61.5)	30 (75.0)
Jaw lock	Yes	-	3 (11.5)	3 (7.5)
	No	14 (100.0)	23 (88.5)	37 (92.5)

Table 3: Distribution of various age groups of study participants with TMDs based on the signs and symptoms

TMD signs and symptoms		Age group in years n (%)				Total
19-29		30-39	40-49	50-59		n (%)
Clicking sound	Yes	15 (93.8)	4 (44.4)	4 (57.1)	6 (75.0)	29 (72.5)
	No	1 (6.3)	5 (55.6)	3 (42.9)	2 (25.0)	11 (27.5)
Crepitus	Yes	-	1 (11.1)	1 (14.3)	2 (25.0)	4 (10.0)
	No	16 (100.0)	8 (88.9)	6 (85.7)	6 (75.0)	36 (90.0)
Joint tenderness	Yes	10 (62.5)	8 (88.9)	4 (57.1)	6 (75.0)	28 (70.0)
	No	6 (37.5)	1 (11.1)	3 (42.9)	2 (25.0)	12 (30.0)
Deviation of mandible on mouth opening	Yes	11 (68.8)	3 (33.3)	3 (42.9)	5 (62.5)	22 (55.0)
	No	5 (31.3)	6 (66.7)	4 (57.1)	3 (37.5)	18 (45.0)
Pain on mouth opening	Yes	14 (87.5)	9 (100.0)	7 (100.0)	7 (87.5)	37 (92.5)
	No	2 (12.5)	-	-	1 (12.5)	3 (7.5)
Pain on closing mouth	Yes	4 (25.0)	5 (55.6)	6 (85.7)	3 (37.5)	18 (45.0)
	No	12 (75.0)	4 (44.4)	1 (14.3)	5 (62.5)	22 (55.0)
Limited mouth opening	Yes	7 (43.8)	2 (22.2)	1 (14.3)	4 (50.0)	14 (35.0)
	No	9 (56.3)	7 (77.8)	6 (85.7)	4 (50.0)	26 (65.0)
Radiating pain	Yes	3 (18.8)	4 (44.4)	-	-	7 (17.5)
	No	13 (81.3)	5 (55.6)	7 (100.0)	8 (100.0)	33 (82.5)
Intermittent locking	Yes	4 (25.0)	2 (22.2)	-	4 (50.0)	10 (25.0)
	No	12 (75.0)	7 (77.8)	7 (100.0)	4 (50.0)	30 (75.0)
Jaw lock	Yes	-	2 (22.2)	-	1 (12.5)	3 (7.5)
	No	16 (100.0)	7 (77.8)	7 (100.0)	7 (87.5)	37 (92.5)

Table 4: Distribution of study participants with TMD based on diagnosis and Angles molar relation

Diagnosis	Angles molar relation			Total n (%)
	Class I n (%)	Class II n (%)	Class III n (%)	
Arthralgia	5 (16.1)	-	-	5 (12.5)
Arthralgia, Disc displacement with reduction	4 (12.9)	-	2 (40.0)	6 (15.0)
Arthralgia, Disc displacement with reduction with intermittent locking	4 (12.9)	1 (25.0)	-	5 (12.5)
Arthralgia, Local Myalgia, Disc displacement with reduction	2 (6.5)	-	-	2 (5.0)
Arthralgia, Myofacial pain with referral	1 (3.2)	-	-	1 (2.5)
Arthralgia, Myofacial pain with spreading	1 (3.2)	-	-	1 (2.5)
Degenerative joint diseases	3 (9.7)	-	1 (20.0)	4 (10.0)
Disc displacement with reduction	4 (12.9)	1 (25.0)	1 (20.0)	6 (15.0)
Disc displacement with reduction with intermittent locking	1 (3.2)	-	-	1 (2.5)
Local Myalgia, Arthralgia, Disc displacement with reduction with intermittent locking	2 (6.5)	-	-	2 (5.0)
Local Myalgia, Disc displacement with reduction with intermittent locking	-	1 (25.0)	-	1 (2.5)
Myofacial pain with spreading	2 (6.5)	-	-	2 (5.0)
Myofacial pain with spreading, Disc displacement with reduction	1 (3.2)	-	1 (20.0)	2 (5.0)
Subluxation, Athralgia	1 (3.2)	1 (25.0)	-	2 (5.0)
Total	31 (100.0)	4 (100.0)	5 (100.0)	40 (100.0)

Table 5: Association of TMD severity with age group, gender, site and molar relation

Study parameters		TMD severity			p-value
Mild		Moderate	Severe		
Age group (in years)	19-29	9 (56.2)	7 (43.8)	-	0.157
	30-39	2 (22.2)	5 (55.6)	2 (22.2)	
	40-49	4 (57.1)	1 (14.3)	2 (28.6)	
	50-59	3 (37.5)	3 (37.5)	2 (25.0)	
Gender	Male	6 (42.9)	7 (50.0)	1 (7.1)	0.556
	Female	12 (46.2)	9 (34.6)	5 (19.2)	
Site	Bilateral	11 (44.0)	9 (36.0)	5 (20.0)	0.606
	Left	4 (57.1)	2 (28.6)	1 (14.3)	
	Right	3 (37.5)	5 (62.5)	-	
Molar relation	I	15 (48.4)	11 (35.5)	5 (16.1)	0.743
	II	2 (50.0)	2 (50.0)	-	
	III	1 (20.0)	3 (60.0)	1 (20.0)	

Chi square test, p-value<0.05 statistically significant*

Table 6: Comparison of mouth opening on the basis of TMD severity

TMD severity	Mouth opening Mean±SD	p-value
Mild	40.06±10.67	0.558
Moderate	43.13±10.74	
Severe	38.33±9.16	

DISCUSSION

Temporomandibular disorders (TMDs) are recognized as the leading cause of persistent facial pain affecting the temporomandibular joint (TMJ), masticatory muscles, and associated structures.[19] Clinically, TMDs manifest as pain or discomfort in the preauricular region, TMJ, muscles of mastication, frequently accompanied by limitations or deviations in mandibular movement and joint sounds such as clicking or crepitus during function that usually affects young and middle-aged individuals, particularly women.[20,21] In the present study prevalence of temporomandibular disorder were assessed among dental patients with pain on mouth opening as the predominant clinical sign. Age, gender, range of mouth opening and molar relationships were not significantly associated with TMD occurrence and severity.

In this study, the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) and the Fonseca Anamnestic Index (FAI) were employed for assessment. The DC/TMD offers a standardized, evidence-based, and psychosocially integrated framework, while the FAI, a validated and cross-culturally adapted tool, complements it to enable a comprehensive and refined evaluation of TMD severity. [5,8]

Approximately 5–12% of the general population experience clinically significant TMD symptoms, while lifetime prevalence may reach 25–50% when mild or subclinical signs are included.[21] Studies have shown an increase in prevalence from 4.6% in 2007 to 4–10% in 2016 among adults with painful, clinically significant TMD, while a prevalence of 35–40% has been reported among dental patients. Although the prevalence differs, the most common clinical signs like pain and joint sounds are consistent with the findings of our study.[22-24]

Variations in diagnostic criteria, study populations, and assessment methods contribute to differences in reported prevalence.[27] Prevalence rates of TMD vary worldwide, with 47% reported in South America, 33% in Asia, 29% in Europe, and 26% in North America.[10] Specific country-level reports include 24.8% in Saudi Arabia, 26.17% in Italy, and 21.83% in Spain.[25,26] Within South Asia, the reported prevalence of TMD shows wide variation, with individual studies ranging from student populations to orthodontic patients documenting prevalence rates of approximately 18% in India to 66.6% in Pakistan. In contrast, epidemiological data from other South Asian countries remain scarce, underscoring the need for standardized, community-based epidemiological studies in these regions.[27-32] In our study, 13.6% were found to have TMD, which is lower than many of these reported rates. The variation largely arises from differences in population selection, sampling techniques, age distribution, and study setting, which limit direct comparisons across studies. Moreover, institution-based samples may not reflect the general population accurately, potentially resulting in over- or underestimation of the true prevalence of TMD.

Studies from Nepal shows considerable variability. Acharya et al. reported a 47.4% prevalence of TMDs, mostly mild to moderate, while Tiwari et al. found 38.66%, Chaulagain et al. 31.9%, Rokaya et al. 31%, and Regmi et al. 34.7%.[33-36] In contrast, Shivahare et al. reported a much higher prevalence of 83.96%.[37]

In the present study, no significant correlation was observed between age and TMD severity ($p = 0.157$), consistent with several reports showing little to no association or only minor trends between age and TMD prevalence and severity. [38,39] In contrast, other studies have reported higher TMD prevalence or severity in young to middle-aged adults.[9,40,41] Maharjan et al. reported that 51.3% of participants had moderate, 33.8% had mild, and 15% had severe TMD, but they had not specifically evaluated

the association between age and severity.[42] These inconsistencies likely reflect differences in study populations, sample sizes, diagnostic methods, and psychosocial or behavioral factors, suggesting that age alone is not a consistent determinant of TMD severity.

Gender-related trends in TMD remain variable. In this study, females had slightly higher severe TMD (19.2%) than males (7.1%), though not statistically significant (p = 0.556) which is consistent with the studies done by Kuc et al and Al-Jundi et al.[43,44] Conversely, several studies have shown that TMD affects females more than males, with ratios ranging from 2:1 to 4:1, especially in women aged 20–40 years.[8,30] Epidemiology has several uses in addition to its traditional role of documenting the public health significance of a condition. Notably, epidemiologic methods and data can be used to identify and verify causes of disease. This article reviews the epidemiologic data on pain in the temporomandibular region, and on signs and symptoms associated with specific subtypes of temporomandibular disorders, with the aim of identifying possible etiologic factors for these conditions that deserve further study. Despite methodologic and population differences, several consistencies are apparent in the epidemiologic literature. Pain in the temporomandibular region appears to be relatively common, occurring in approximately 10% of the population over age 18; it is primarily a condition of young and middle-aged adults, rather than of children or the elderly, and is approximately twice as common in women as in men. This prevalence pattern suggests that etiologic investigations should be directed at biologic and psychosocial factors that are more common in women than in men, and diminish in older age groups. Most signs and symptoms associated with particular temporomandibular disorders (e.g., joint sounds, pain in the joint These discrepancies reflect methodological differences, population characteristics, and complex multifactorial determinants.

In the present study, bilateral TMJ involvement was the most common finding across all severity levels. There was no significant association between the side of involvement and the severity of TMD, which is consistent with previous studies.[11] However, multiple studies have reported unilateral involvement associated with higher severity.[12,18] In Nepal, Maharjan et al. found right TMJ pain was most common (37.5%), followed by left (21.3%) and bilateral (3.8%).[44] These findings suggest population-specific variations in TMD laterality and severity correlation.

In this study, analysis by Angle's molar classification showed predominance of Class I (31 patients), followed by Class II (4) and Class III Angle's molar relation. Severity of TMD was not significantly associated with occlusion (p = 0.743). While some research links Class II or III malocclusion to a higher TMD risk, most evidence suggests occlusion has only a minor influence on TMD severity.[28]

In our study functional assessment of mouth opening showed mean measurements of 40.06 ± 10.67 mm for mild TMD, 43.13 ± 10.74 mm for moderate TMD, and 38.33 ± 9.16 mm for severe TMD, with no statistically significant differences (p = 0.558). Similarly, Gomes et al reported that TMD was not associated with mandibular range of motion indicating that limited mouth opening does not necessarily correspond to TMD severity.[49] In contrast to these findings, some studies have indicated that mouth opening may still serve as a useful clinical indicator of TMD, as reductions in mandibular range of motion are often observed in affected individuals.[5,50] Thus, assessing mouth opening alongside other clinical signs and patient-reported symptoms can aid in the evaluation and management of TMD.

LIMITATIONS

The study's cross-sectional design and use of convenience sampling limit its ability to establish causality and generalize findings beyond the study population. The non-significant associations observed between age, gender, and TMD severity may reflect sample characteristics rather than true trends, while key etiological factors such as parafunctional habits, trauma, stress, and lifestyle were not directly assessed. Additionally, focusing on Angle's molar classification provides only a partial view of occlusion's complex role in TMD. Together, these limitations underscore the need for larger, multicenter, and longitudinal studies incorporating comprehensive assessments to better understand TMD epidemiology.

CONCLUSION

Temporomandibular disorders are highly prevalent among dental patients, predominantly mild, with slightly higher severity in females and common bilateral involvement. Age and molar classification were not significantly associated with severity. The findings underscore the multifactorial etiology of TMD and highlight the importance of routine screening, early detection, and comprehensive management. Larger multicenter and longitudinal studies incorporating advanced diagnostics are warranted to better understand TMD epidemiology and to develop evidence-based preventive and therapeutic strategies.

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