RESEARCH ARTICLE

Evaluation of clinical symptoms and disease severity in patients with temporomandibular joint disorders using the fonseca anamnestic index: A cross-sectional descriptive study

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Abstract

Objective: To examine the association of age and gender with temporomandibular joint disorders, and to determine the most common symptoms using the Fonseca Anemnestic Index.

Method: The cross-sectional, descriptive study was conducted at the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Dicle University, Diyarbakır, Turkiye, from June to October 2024, and copmprised patients aged 18-65 years who presented with symptoms of temporomandibular joint disorders. Demographic and clinical data was collected along with severity of the patients'condition, and assessments were made using the Fonseca questionnaire and the Fonseca Anamnestic Index. Data was analysed using SPSS 25.

Results: Of the 201 patients with mean age 37.7±11.4 years, 141(70.1%) were female and 60(29.9%) were male. Overall, 190(94.5%) patients were found to have temporomandibular joint disorders. The mean Fonseca Anamnestic Index total score was 63.2±18.8 for females and 54.5±23.7 for males. The most common symptom identified was clicking sounds in the temporomandibular joint during chewing or mouth opening 139(69.1%). Age and gender had no significant association with Fonseca score (p>0.05). However, a significant association was found between gender and total Fonseca Anamnestic Index score (p=0.035).

Conclusion: The Fonseca questionnaire was found to be a practical, quick and economical tool for temporomandibular joint disorder diagnosis.

Keywords: Temporomandibular joint disorders, Clinical symptoms, Fonseca Anamnestic Index, Epidemiology.

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Introduction

The temporomandibular joint (TMJ) is one of the primary movable joints in the craniofacial region. Located on both sides of the head, TMJ enables mandibular movement during speech and chewing.[1] Morphologically, it varies from person to person, and between the left and right joints in the same individual. It is a hinge-and-gliding joint with a compound structure, and has a bicondylar joint type.[2] The TMJ is a highly sensitive structure with a complex design, susceptible to many disorders in the craniofacial region, including psychological issues.

When considering temporomandibular joint disorders (TMD), pain in the joint, joint space, associated structures, surrounding muscles, ligaments and adjacent anatomical structures or physiological dysfunctions come to mind.[1] Several factors play a role in the aetiology of TMJ disorders. For example, occlusal disorders, prolonged dental treatments, psychological issues, stress, poor oral hygiene, parafunctional habits, masticatory muscle spasms, infections, trauma to the jaw and face, long-term edentulism, bruxism, aging, malocclusions and others.[3] It has been observed that approximately 20-60% of TMDs occur during adolescence and childhood.[4] Nighttime and daytime teeth grinding, clenching, biting on nails, lips, cheeks or pencils, and chewing gum are important parafunctional habits in the pathogenesis of TMD.5 A positive relationship is often reported between TMD and parafunctional habits.[5] Early diagnosis of TMD is essential, as aetiological factors may initially cause acute and mild damage to the joint, but later lead to irreversible joint damage.[6]

TMD is becoming increasingly prevalent in society. In some studies, the prevalence of TMD in the general population has been reported to vary between 50% and 70%, depending on racial differences, population size, diagnostic criteria, and methods used.[7,8] These disorders present various symptoms, such as muscle spasms in the cervicofacial region, chewing muscle spasms, clicking sounds in the joint, restricted mouth opening, and deviation during mouth opening. However, there is no standardised clinical profile for TMD. Therefore, since there

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is no symptom that can be clearly and definitively identified in patients with TMD, this makes diagnosing TMD more difficult.[5] Diagnosing TMD patients in the general population is a complex process for clinicians. Because the TMD aetiology is multifactorial and involves a complex interaction of mechanical, physiological and psychosocial factors, diagnosis and management often require diverse and multidisciplinary evaluation methods.[9]

Consequently, undiagnosed patients experience progression of their disorders, and often present to a healthcare facility at very late stages. As a result, treatment becomes more difficult, costs increase, and surgical requirements rise. Thus, early diagnosis of TMD patients is critical. Starting with the most common symptoms is essential for early diagnosis, and clinicians must be well-versed in these symptoms.

The Fonseca Anamnestic Index (FAI) is one of the indices used to diagnose TMD in healthy populations. Its low cost and ease of application make it a preferred diagnostic tool for TMD patients. The FAI consists of 10 questions that assess the presence of pain in the TMJ, head and back areas during chewing, parafunctional habits, movement restrictions, clicking, malocclusion and emotional stress.[10]

The current study was planned to evaluate the association of age and gender with TMD, and to determine the most common symptoms using FAI.

Patients and Methods

The cross-sectional, descriptive study was conducted at the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Dicle University, Diyarbakır, Turkiye, from June to October 2024.

After approval from institutional ethics review committee, the sample was raised using consecutive sampling technique. An a-priori sample size calculation was not performed because all the patients who presented to the clinic during the study were enrolled. Since the study population consisted of consecutively recruited real-time clinical admissions, it was not possible to estimate the expected effect size or prevalence distribution beforehand. Therefore, the final sample size reflected the total number of participants meeting the inclusion criteria. To evaluate the adequacy of this sample, a post-hoc power analysis based on the observed effect size was subsequently performed. On the basis of mean FAI total scores for men and women, the effect size was d=0.44, alpha (α)=0.05, and power 81%. No formal randomisation procedure was applied.

Those included were Diyarbakır-based patients aged 18-65 years who could complete the questionnaire independently and were classified as American Society of Anesthesiologists (ASA) risk classification[11] ASA1 or ASA2, and presented with TMD symptoms, like pain in the TMJ region, trismus, bruxism, crepitus, stiffness in head and neck muscles, difficulty chewing, deviation during mouth opening, and parafunctional habits. included. Since the study aimed at evaluating patients unaware of their TMD, only those who had not previously presented to a clinic for such complaints were selected.

Those who did not meet the inclusion criteria, were assessed as ASA3 and ASA4, patients with neurological or psychological disorders, those undergoing active orthodontic treatment, patients who had undergone treatment or surgery in the joint area, patients with total edentulism, those with a history of trauma to the joint or head region, and those experiencing acute pain or who had previously received treatment for TMJ disorders were excluded. Additionally, patients who refused to complete the survey, those without TMD complaints, or those with dental problems in the relevant area were also excluded. After taking written informed consent from all the subjects, data wsa collected using a questionnaire adapted from earlier studies.[10,12] A total of 10 questions were translated from English to Turkish, and responses were collected as 'yes', 'no' or 'sometimes'. The Turkish version of the questionnaire was prepared using a forward-backward translation procedure to ensure linguistic clarity. However, no separate pilot testing or internal reliability assessment was performed for the current study. A 'yes' answer was scored as 10 points, a 'sometimes' answer as 5 points, and a 'no' answer as 0 points. The patients were instructed to provide a single answer to each question. Additionally, the severity of TMD was assessed using the FAI10 (Table 1).

Table 1: Fonseca questionnaire items and the categorisation of Fonseca Anamnestic Index (FAI).

Fonseca Questionnaire	Yes	Sometimes	No
1. Do you have difficulty opening your mouth?			
2. Do you have difficulty moving your lower jaw sideways?			
3. Do your muscles feel tired or painful during chewing?			
4. Do you often have headaches?			
5. Do you experience pain or stiffness in your neck?			
6. Do you experience ear or TMJ pain?			
7. Have you ever heard a clicking sound from the TMJ during chewing or opening?			
8. Do you have a habit of grinding or clenching your teeth?			
9. Do you feel that your teeth do not fit together properly?			
10. Do you consider yourself tense (irritable)?			
Fonseca Anamnestic Index			
0-15 Points: TMD – None (-)			
20-40 Points: TMD – Mild (+)			
45-65 Points: TMD – Moderate (+)			
70-100 Points: TMD – Severe (+)			

Data was analysed using SPSS 25. Continuous variables were expressed as mean±standard deviation or median with interquartile range (IQR), while categorical variables

were expressed as frequencies and percentages. Data normality was assessed using the Shapiro-Wilk test. Categorical variables were compared between the groups using Pearson's chi-square test. Since the assumption of normality was not met for comparisons between two groups, the Mann-Whitney U test was used. Furthermore, the relationship of disease severity with gender and age was analysed. P<0.05 was considered statistically significant.

Results

Of the 201 patients with mean age 37.7±11.4 years, 141(70.1%) were female and 60(29.9%) were male. There were 54(26.8%) participants (38[18.9%] females, 16[7.9%] males) aged 18-30 years, 69(34.3%) (47[23.3%] females, 22 [11%] males) aged 31-40 years, 50(24.8%) (36[17.9%] females, 14[6.9%] males) aged 41-50 years, 18(8.9%) (13[6.4%] females, 5[2.5%] males) aged 51-60 years, and 10(4.9%) (7[3.4%] females, 3[1.5%] males) aged 60-65 years. Among the participants, 11(5.4%) patients (6[3%] males and 5[2.4%] females) did not exhibit TMD, while 190(94.5%) were found to have TMD. A total of 35(17.4%) patients (10[5%] males and 25[12.4%] females) had mild TMD, 77(38.3%) (24[12%] males and 53[26.3%] females) had moderate TMD, and 78(38.8%) (20[10%] males and 58[28.8%] females) had severe TMD (Table 2, Figure 1).

Table-2: Distribution of Fonseca Scores by age and gender.

	Gender			
	Female n (%)	**Male** n (%)	**Total** n (%)	***p*-value**
Fonseca Score				
TMD - (None)	5 (3.5)	6 (10)	11 (5.5)	0.266[a]
TMD - (Mild)	25 (17.7)	10 (16.7)	35 (17.4)	
TMD - (Moderate)	53 (37.6)	24 (40)	77 (38.3)	
TMD - (Severe)	58 (41.1)	20 (33.3)	78 (38.8)	
Total	141 (100)	60 (100)	201 (100)	
Gender				
18-30 years	38 (27)	16 (26.7)	54 (26.9)	0.992[a]
31-40 years	47 (33.3)	22 (36.7)	69 (34.3)	
41-50 years	36 (25.5)	14 (23.3)	50 (24.9)	
51-60 years	13 (9.2)	5 (8.3)	18 (9)	
60-65 years	7 (5)	3 (5)	10 (5)	

TMD: Temporomandibular joint disorders. Data expressed as n%, [a]: Pearson Chi-Square test, $p>0.05$, no significant difference *$p\leq0.05$, There is a significant difference

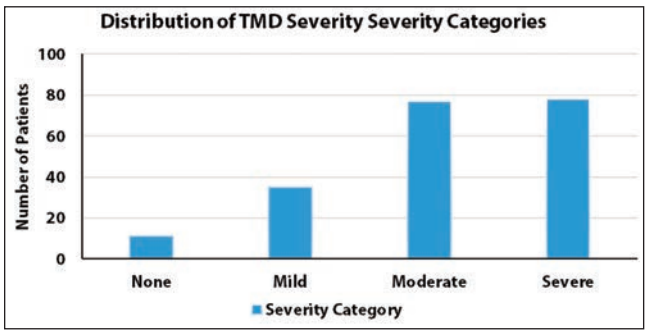

Figure-1:Distribution of temporomandibular disorders (TMD) severity.

No significant difference was found between female and male participants in terms of TMD severity and prevalence (p=0.266). However, TMD prevalence was both more frequent and more severe in female participants (Table 2). According to the FAI, the most prevalent patient group was the severe TMD group (Table 2). TMD was more common in those aged 31-40 years, but the difference was not significant (p=0.992) (Table 2).

The most common symptom identified was clicking sounds in the temporomandibular joint during chewing or mouth opening 139(69.1%) (Table 3, Figure 2).

The rates of headaches, clicking sounds and teeth clenching or grinding habits in male patients were higher than in female patients (Table 3).

Table-3: Responses to Fonseca questions segregated by gender.

		Gender		
Questions		**Female** n (%)	**Male** n (%)	***p*-value**
Fonseca Question 1	Yes	34 (56.7)	88 (62.4)	0.277[a]
	Sometimes	13 (21.7)	35 (24.8)	
	No	13 (21.7)	18 (12.8)	
Fonseca Question 2	Yes	32 (53.3)	81 (57.4)	0.860[a]
	Sometimes	12 (20)	25 (17.7)	
	No	16 (26.7)	35 (24.8)	
Fonseca Question 3	Yes	35 (58.3)	98 (69.5)	0.178[a]
	Sometimes	12 (20)	26 (18.4)	
	No	13 (21.7)	17 (12.1)	
Fonseca Question 4	Yes	16 (26.7)	65 (46.1)	0.036a*
	Sometimes	22 (36.7)	37 (26.2)	
	No	22 (36.7)	39 (27.7)	
Fonseca Question 5	Yes	14 (23.3)	55 (39)	0.099[a]
	Sometimes	20 (33.3)	36 (25.5)	
	No	26 (43.3)	50 (35.5)	
Fonseca Question 6	Yes	26 (43.3)	76 (53.9)	0.383a
	Sometimes	15 (25)	30 (21.3)	
	No	19 (31.7)	35 (24.8)	
Fonseca Question 7	Yes	34 (56.7)	105 (74.5)	0.033a*
	Sometimes	10 (16.7)	17 (12.1)	
	No	16 (26.7)	19 (13.5)	
Fonseca Question 8	Yes	22 (36.7)	71 (50.4)	0.035[a]*
	Sometimes	18 (30)	21 (14.9)	
	No	20 (33.3)	49 (34.8)	
Fonseca Question 9	Yes	28 (46.7)	56 (39.7)	0.608[a]
	Sometimes	10 (16.7)	30 (21.3)	
	No	22 (36.7)	55 (39)	
Fonseca Question 10	Yes	11 (18.3)	39 (27.7)	0.367[a]
	Sometimes	22 (36.7)	44 (31.2)	
	No	27 (45)	58 (41.1)	
Fonseca Anamnestic Index Total Score	Mean ± SD	63.2±18.8	54.5±23.7	0.035[b]*
	Median (IQR)	62.5 (30)	60 (30)	

Data is expressed as n%, mean ± standard deviation (SD) and median (interquartile range [IQR]). [a]: Pearson Chi-Square test; [b]: Mann-Whitney U test. p>0.05, no significant difference *$p\leq0.05$, There is a significant difference.

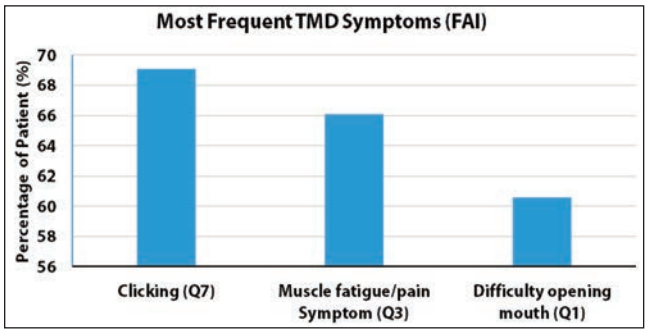

Figure-2: Most frequent temporomandibular disorder (TMD) symptoms reported by the patients.

The mean FAI total score was 63.2±18.8 for females and 54.5±23.7 for males (p=0.035). Median Fonseca scores (62.5 [IQR: 30] for women and 60 [IQR: 30] for menfell within the moderate TMD severity category.

Discussion

The current study evaluated patients who presented with TMD complaints in terms of gender, age and the most common TMD complaints. The data was evaluated using the FAI because of its speed, reliability, ease of application, and cost-effectiveness.[10] In the study, 38.8% participants had severe TMD, 38.3% had moderate TMD, 17.4% had mild TMD, and 5.5% did not exhibit TMD at any level. Among the patients presenting with TMD complaints, 70.1% were women, demonstrating that TMD is more prevalent among females. Recent studies suggest that the higher prevalence of TMD in women may be related to a combination of psychosocial stress, hormonal and physiological differences, and genetic predisposition.[13,14]

De Stefano et al.[15] reported that TMD is more commonly observed in adolescents and young patients, and occurs more frequently in females. The current finding that TMD is more prevalent in younger populations supports this observation. Similarly, Yadav et al.[16] examined elderly groups with TMD, and found that it was more common in females and often did not require invasive surgery or result in irreversible damage.[16] In the current study, TMD prevalence was lower in adults aged 50 or more years compared to younger adults. Additionally, the symptoms observed were generally milder, limited, and self-resolving, which aligned with Yadav et al.'s findings. The higher prevalence of TMD in women is thought to be associated with the influence of oestrogen hormones.[17] TMD is most commonly observed among females aged 18-40 years. However, the literature also reports that TMD is not non-significant among children and adolescents.[18]

Among the 201 patients in the current study, the most common finding was a clicking sound from the TMJ during chewing or mouth opening (69.1%). In the literature, clicking sounds during mouth opening and closing in the TMJ region and orofacial muscle pain are noted as significant aetiological factors.[19] This suggests that clicking sounds, muscle pain and muscle fatigue are significant aetiological factors in patients with TMD. Parafunctional habits, such as nighttime and daytime teeth grinding and clenching, have also been reported to be associated with painful TMJ disorders.[20] In the current study, bruxism was observed in 46.2% of the patients, further supporting the notion that bruxism is an important aetiological factor in TMD. The least common symptoms among the current patients were tension and nervousness. Although only 23.8% of the patients exhibited this symptom, studies have identified nervousness and stress as significant aetiological factors for TMD, with Vlăduţu et al.[21] observing stress-induced bruxism and associated TMD symptoms in 39.3% of 328 students.[21] The lower percentage in the current study may was perhaps due to patients not associating their teeth grinding and clenching with stress.

In the current study, the questions about hearing a clicking sound when opening the mouth, and experiencing restricted mouth opening were answered "yes" by 69.1% and 60.6% of the participants, respectively. This indicates a high likelihood of disc displacement with or without reduction in TMD patients. However, definitive diagnosis requires radiological examination. Maizlin et al.[22] examined 72 patients radiologically, based on the symptoms of patient groups with clicking sounds and limited mouth opening. It was reported that 37% of these patients had reduced disc displacement and 17% had non-reduced disc displacement. This supports the importance of symptoms in diagnosing the condition.

The literature contains sevral studies on TMD using the Fonseca questionnaire.[10] For example, Zareef et al.[12] used it to evaluate the prevalence, severity and distribution of TMD among medical and dental students. They found that 42.6% of the participants exhibited TMD, with symptoms increasing with age and women being more affected than men. Ertaş et al.[23] evaluated 270 patients. Of the participants, 120(44.4%) were male, and 150(55.5%) were female. They reported that 176(65.1%) patients had TMD ranging from mild to severe. A total of 94(34.8%) patients were reported to have no TMD. In their study using the Fonseca questionnaire on 172 dental students, Türker et al.[24] found that 79.6% of the participants had a TMD problem, and that the disorder was statistically more common in female patients compared to male patients. In a study by Bevilaqua-Grossi et al.,[10] more than 87% of the participants showed TMD symptoms, with a significant portion categorised as mild TMD (43.2%) and moderate TMD (34.8%). They demonstrated that the frequency of

pain during chewing, TMJ pain, and TMD sounds were good predictors of the severity of TMD. In their study using the Fonseca questionnaire to assess TMD severity in dental students in Brazil, Nomura et al.[8] reported that 53.2% of the students had TMD at any level. In a study by Pedroni et al.,[25] which investigated TMD in university students through surveys and clinical examination, it was found that 68% of the students had TMD at any level, and 84% of these students were female.

The current study found that 190 of the 201 patients (94.6%) had TMJ disorders, and the high rate observed may be attributed to the fact that the patient population consisted of young and adolescent individuals.

The current study, to guide young dentists and those who are not very experienced with the subject, identified the most common symptoms of TMD to help with its diagnosis at a clinical level, without the need for complex imaging devices, in a simple and cost-effective manner. Clinicians should inform their patients about the necessary appliances or clinical treatment procedures to be initiated, taking these symptoms into account during the clinical and radiological examination.

The current study has several limitations. The data related to a single city, and the findings cannot be generalised to the overall knowledge about TMD in Turkiye's general population. Larger sample studies involving TMD patients from other cities are needed. Another limitation is that the Turkish version of FAI used in the survey was not subjected to separate pilot testing or internal reliability analysis (such as Cronbach's α) and, therefore, the linguistic adaptation relied solely on a forward-backward translation procedure. Another limitation is the use of a short questionnaire and the restriction of the age range. Additionally, future studies should incorporate clinical and radiographical findings to eliminate limitations in evaluating the severity and degree of TMD using the Fonseca questionnaire.

A short and simplified questionnaire is effective for preliminary diagnosis of the disease. It also helps identify TMD patients, and classify them into different categories based on disease severity. Since this questionnaire aids in the early diagnosis of the disease, provides necessary treatment for managing temporomandibular-related pain, and helps prevent future complications through successful TMD management, it shuold be included in routine screening processes.

Conclusion

There was no significant gender- or age-related differences in TMD severity or prevalence according to FAI scores. However, women exhibited higher total FAI scores than men, indicating greater symptom severity. Severe TMD was the most common classification, and TMD complaints were most frequently observed in individuals aged 31-40 years. A problem in the TMJ can have a cascading effect on other regions and functions of the system. As TMD can lead to permanent orofacial pathological changes and is increasingly prevalent, diagnosing it places a significant responsibility on dentists. Routine TMJ examinations should be conducted for individuals at risk of TMD.

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RG: Concept, design, data analysis, interpretation, supervision, revision & final approval.
AA: Concept, design, data acquisition, analysis, interpretation, drafting & final approval.
BG: Concept, design, revision & final approval.
HO: Concept, design, biostatistical analysis, interpretation, revision & final approval.