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Original Article

The relationship between the oral behavioral checklist and the jaw functional limitation scale in temporomandibular joint pain

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Abstract

Background: Temporomandibular disorders (TMDs) impair orofacial function and reduce functional capacity and have an impact on a person's overall health and quality of life. For clinical and research purposes, it is encouraged to adopt the Diagnostic Criteria for Temporomandibular Diseases (DC/TMD) for an evidence-based assessment of abnormalities of the jaw joint. The purpose of this study was to identify the factors influencing the jaw's functional restriction and to assess the association between pain, the Jaw Functional Limitation Scale (JFLS-8), and the Oral Behavioral Checklist (OBC) utilizing the DC/TMD.

Methods: A hundred and two patients with TMD were included in present study. TMD-Pain Screener and TMD-Symptom Questionnaire from DC/TMD Axis-I were used. In order to determine parafunctional habits and function limitations, JFLS-8 and the OBC from the DC/TMD Axis-II assessment tools were utilized. Data analysis was performed using chi-square, the Kruskal-Wallis test, and the Mann-Whitney U test. The Spearman and Pearson tests were used for correlation assessment.

Results: Age, education level, occupation, marital status, and the onset time of jaw complaints of the 102 patients (64 female and 38 male) were not found to be associated with JFLS-8. Statistical significance was found between female gender and JFLS-8 ($P<0.05$). While there was no statistically significant relationship between joint closed locking and JFLS-8 evaluated with the TMD-Symptom Questionnaire, a significant relationship was found between open locking and JFLS-8 ($P<0.001$). There was a positive correlation between JFLS-8 and the TMD-Pain Questionnaire and also between JFLS-8 and the OBC ($P<0.001$, $r=0.380$; $P=0.028$, $r=0.248$).

Conclusion: DC/TMD is an important tool in the evaluation of jaw limitation. Female gender, presence of pain, and parafunctional habits are risk factors for functional limitation of the jaw.

Keywords: Craniomandibular disorders, Temporomandibular joint disorders, Pain assessment

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Introduction

The temporomandibular joint (TMJ) is one of the most important joints in the body. It permits a variety of orofacial activities, like speaking, breathing, chewing, swallowing, speaking, emotional expression, and facial expression.[1] A set of diseases known as temporomandibular disorders (TMDs) have diverse pathogenic causes, such as malocclusion, craniofacial trauma, neurological and psychosocial variables, and oral habits. TMDs are a group of conditions that can cause orofacial discomfort sensations.[2] TMJ pain can be felt in the jaw joint, neck, and even in the head and may lead to limitation of mandibular movement.[3-5] Although the etiology of TMD has not been fully determined, it is considered to be multifactorial and is evaluated at an individual level.[6] Parafunctional habits, trauma, occlusal changes, and psychosocial factors have been reported as risk factors for TMD.[7,8] Oral parafunctions lead to overuse of the chewing muscles.[9]

It has been reported in the literature that certain oral habits such as muscle tightening and tensing, diurnal teeth-grinding, and sustained talking are associated with TMD. Oral behaviors affect chewing structures and may cause microtrauma to the temporomandibular disc and joint.[10] Studies that investigate the causal factors of TMDs show that parafunctional habits can affect the masticatory musculature and lead to tissue injury, pain, and functional limitations around the TMJ.[11] However, the relationship between TMD and parafunctional habits is contradictory. While some studies have established a link between TMD and parafunctional behaviours that is in favor, other studies have not found a link.[12,13]

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TMDs result in a decline in orofacial function, which has an impact on a person's general health and quality of life. Functional limitation is included in the World Health Organization's definition of disability and subjectively measures the organ-level impact on mouth-facial function.[3] Today, when classifying TMD sub-diagnoses, doctors and researchers are encouraged to use the Diagnostic Criteria for Temporomandibular Diseases (DC/TMD). The DC/TMD is composed of a biaxial model. Axis-I is made up of diagnostic standards for intra-articular and pain-related TMD that are based on clinical signs and symptoms. DC/TMD Axis-II assesses psychological and behavioral aspects associated with TMD based on accurate and reliable questionnaires.[6]

We designed this study because of the importance of the functional limitation of the jaw and the scarcity of information on the effect of parafunctional habits on functional limitation. In our study, we used a current tool for assessment, the DC/TMD IV criteria.

The purpose of this study was to determine the variables influencing the functional limitation of the jaw and to assess the link between pain, the Oral Behavioral Checklist (OBC), and the Jaw Functional Limitation Scale (JFLS-8) using the DC/TMD.

Methods

This study included 102 TMD patients who applied to the Istanbul Physical Therapy and Rehabilitation Training and Research Hospital's outpatient clinic. Prior to the start of the study, Bakirköy Sadi Konuk Training and Research Hospital acquired ethics committee approval (Approval Number: 2021/209), and each patient signed a voluntary consent form before the evaluation. This trial complied with the Declaration of Helsinki and the study protocol was registered on ClinicalTrials.gov (identifier: NCT05029908). One hundred eighty nine patients who applied to our outpatient clinic between April and September 2021 and had TMJ complaints assessed. This cross-sectional study included 102 participants aged 18 to 65 who had TMJ complaints (pain, joint sounds, locking, or bruxism) for more than 3 months and had the cognitive capacity to comprehend test instructions. Patients having a history of face or cervical trauma or neoplasia, as well as those with muscle, neurological, or rheumatic diseases that may influence the TMJ, were excluded from the study. G*Power version 3.1.9.2 was used for statistical analysis, research power analysis, and sample size calculation to make sure there were enough participants to detect correlations. The total sample size based on the effect size of 0.6 was calculated as 102 participants. To obtain a power of 0.90 α (type I error) was 0.05 and β (type II error) was 0.05.

Detailed examinations of each participant were performed according to DC/TMD Axis I and II. DC/TMD Axis-I, including the TMD Pain Screener Questionnaire and the TMD Symptom Questionnaire, was used to assess participants. DC/TMD Axis-II evaluation tools (JFLS-8 and OBC) were used to identify parafunctional behaviors and functional limitations. Additionally, demographic information (including age, gender, level of education, and occupation) was recorded. The DC/TMD includes a biaxial evaluation model. Axis I includes diagnostic standards for pain-related and intra-articular TMD based on clinical symptoms and indicators.[2] Based on trustworthy and valid surveys, DC/TMD Axis II assesses psychological and behavioral aspects associated with TMD.[6] It has acceptable sensitivity and specificity for the diagnosis of both pain disorders (sensitivity ≥ 0.86, specificity ≥ 0.98) and TMJ disorders (0.80 sensitivity and 0.97 specificity).[2]

The effects of physical elements on the human body are highlighted by axis I. Axis-II denotes the evaluation of the patient's psychosocial, psychological, and behavioral needs, including somatization, functional jaw limitation, oral behaviors, anxiety, and depressive symptoms.[14]

The TMD pain screener questionnaire was developed by Gonzalez et al. It is a pain scale in DC/TMD Axis-I scored between 0 and 7.[15]

The JFLS-8 scale, which is part of the DC/TMD Axis-II evaluate the functional limitation of the jaw while chewing, opening the mouth, and forming verbal and emotional expression.[16] It comprises of eight questions that measure restraint brought on by TMDs, such as verbal and emotional expression (items 5-8), changes in jaw mobility (items 1-4), and chewing (items 1-3).[2,15] The total score range is between 0 and 80.

The OBC is a scale used to examine the participants' bruxism and parafunctional habits. It consists of 21 items. The scores of each item are 4 = always, 3 = most of the time, 2 = sometimes, 1 = several times, or 0 = none. The total score range is between 0 and 84.[17]

IBM SPSS was used for the statistical analysis of data. In descriptive data, mean and standard deviation were calculated and used in parametric tests. The median, lowest, and greatest values were employed in nonparametric tests. The Kolmogorov-Smirnov test was used to determine how the variables were distributed. The independent t-test, Mann-Whitney U test, and chi-square test were used to evaluate values. The Spearman and Pearson tests were used to evaluate correlations. The data were evaluated within a 95% confidence interval, and the significance level of $P < 0.05$ was utilized to signify statistical significance.

Results

The study involved 102 patients, 64 (62.7%) of whom were female, and 38 (37.3%), who were male. The mean age of the patients was 42.74 ± 9.86. No statistical significance was found with the JFLS-8 in the age, education, occupation and marital status except for female gender

($P = 0.033$). Table 1, Table 2 and Table 3 give the values.

The JFLS-8 score was 1.69 ± 1.17 in 27 subjects with low OBC scores and the JFLS-8 score was 2.22 ± 1.58 in 75 subjects with high OBC scores, and there was a statistically significant relationship between the two groups ($P = 0.031$). A correlation was found between the TMD pain score and OBC and JFLS-8 scores ($r = 0.380$, $r = 0.248$). Joint sounds evaluated with the TMD Symptom Questionnaire were found in 86 people, and closed locking evaluated with the TMD Symptom Questionnaire

Table 1. Descriptive characteristics of participants

Variable	N = 102
Duration of jaw complaints (%)	
<1 year	24 (23.5)
1–3 years	34 (33.3)
3–5 years	15 (14.7)
5–10 years	18 (17.6)
>10 years	11 (10.8)
Joint sounds (%)	
No	16 (15.7)
Yes	86 (84.3)
Closed locking (%)	
No	71 (69.3)
Yes	31 (30.4)
Open locking (%)	
No	83 (81.4)
Yes	19 (18.6)
OBC (%)	
Low	27 (26.5)
High	75 (73.5)
OBC Total score (mean ± SD)	29.31 ± 8.87
TMD Pain Screener (mean ± SD)	4.89 ± 1.34

Table 2. Characteristics of participants

Variable	n (%)
Age	
<30	14 (13.7)
30–40	29 (28.4)
40–50	34 (33.3)
>50	25 (24.5)
Gender	
Female	64 (62.7)
Male	38 (37.3)
Education	
Primary school	37 (36.3)
High school	39 (38.2)
University	26 (25.5)
Occupation	
Unemployed	33 (32.4)
Desk worker	29 (28.4)
Physically active	40 (39.2)
Marital status	
Single	21 (20.6)
Married	75 (73.5)
Divorced	6 (5.9)

Table 3. Factors associated with JFLS-8

	JFLS-8 (Mean ± SD)	*P* value
Age		0.335
<30	2.35 ± 1.54	
30–40	2.40 ± 1.73	
40–50	2.05 ± 1.53	
>50	1.82 ± 1.09	
Gender		0.033
Female	2.33 ± 1.66	
Male	1.69 ± 1.04	
Education		0.663
Primary school	2.18 ± 1.73	
High school	1.98 ± 1.22	
University	2.12 ± 1.54	
Occupation		0.635
Unemployed	1.89 ± 1.46	
Desk worker	2.10 ± 1.43	
Physically active	2.24 ± 1.58	
Marital status		0.821
Single	1.86 ± 1.24	
Married	2.17 ± 1.58	
Divorced	1.85 ± 1.14	
Duration of jaw complaints		0.246
<1 year	1.83 ± 1.50	
1–3 years	2.12 ± 1.40	
3–5 years	1.90 ± 1.22	
5–10 years	2.42 ± 1.90	
>10 years	1.75 ± 1.06	
Joint sounds		0.573
No	1.89 ± 1.56	
Yes	2.12 ± ± 1.49	
Closed locking		0.231
No	1.97 ± 1.40	
Yes	2.36 ± 1.67	
Open locking		<0.001
No	1.84 ± 1.31	
Yes	3.17 ± 1.77	
OBC		0.031
Low	1.69 ± 1.17	
High	2.22 ± 1.58	

JFLS-8: Jaw Functional Limitation Scale-8; OBC: Oral Behavioral Checklist; TMD: temporomandibular disorder. SD: standard deviation

was found in 31 people. No significant relationship was found between joint sounds and closed locking and JFLS-8 score. The JFLS-8 score was 3.17 ± 1.77 in 19 individuals with open locking and 1.84 ± 1.31 in 83 individuals without open locking, and between the two groups, there was a statistically significant correlation ($P < 0.001$). The values are presented in Table 3 and Table 4.

Discussion

In this study, the factors influencing the jaw's functional limitation and the connection between pain and parafunctional behaviors were the main topics. A positive correlation was found between the functional limitation of the jaw and parafunctional habits. In addition, this study showed a relationship between the functional limitation of the jaw and pain. Also, parafunctional habits, demographic data, and onset time of jaw complaints, joint sound, closed locking, were not associated with functional limitation of the jaw, but a relationship was found with TMD open locking.

JFLS-8 is one of the five scales recommended by the Axis-II self-reported screening tool and is used to assess functional limitation of the jaw.[14] The JFLS is not used for the purpose of diagnosing TMD. It has been reported in the literature that the JFLS does not provide information about the prognosis of the disease. This scale is mainly used to assess functional limitations. The JFLS score has been reported to be much higher in TMD patients than in healthy controls.[3] Additionally, parafunctional behaviors, clenching and grinding during the day and at night have been linked in the literature to painful TMDs.[18]

The OBC is a tool for evaluating oral behaviors (such clenching and other oral parafunctions) while a person is awake or asleep.[19] Patients with a diagnosis of TMD reported more parafunctional habits than patients without a diagnosis of TMD.[6]

TMD is a multifactorial condition in which oral behavior is also a risk factor. However, few studies have evaluated the changes in oral behavior associated with TMD.[8] In our study, it was determined that parafunctional habits assessed with the OBC questionnaire were associated with JFLS-8. However, the improvement in pain and JFLS-8 scores after education do not be shown to affect OBC scores in the same way. This situation is explained by the increase in OBC scores that occur with the awareness created in patients post-education.[8]

Table 4. Correlations between variables and JFLS-8

	N = 102	JFLS-8	*P* value
OBC	Mean ± SD	Mean ± SD	= 0.028
Total score	29.31 ± 8.87	2.09 ± 1.49	*r* (0.248)
TMD pain screener	Mean ± SD	Mean ± SD	< 0.001
Total score	4.89 ± 1.34	2.09 ± 1.49	*r* (0.380)

JFLS-8: Jaw Functional Limitation Scale-8; OBC: Oral Behavioral Checklist; TMD: temporomandibular disorder; SD: standard deviation.

The positive relationship between JFLS-8 and the OBC can be explained by increased oral behavioral changes and the effect of microtrauma on the temporomandibular disc and joint, causing functional limitation.[17]

Various oral habits can put more strain on the TMJ and result in pathological alterations to the joint and its surrounding tissues. There has been evidence in the literature that TMD patients have more masseter and temporalis activation. When the teeth are clenched, pressure on the lateral side of the articular disc increases, and the pressure in the TMJ space is highest in the maximal intercuspal position. This may harm the articular discs.[20-22]

Similarly, in our study, a relationship was found between JFLS-8 and open locking of the jaw. This shows that open locking in the jaw negatively affects jaw functions. The lack of correlation between joint sounds and closed locking and restriction may be related to the small number of samples. Another positively correlated assessment is pain. Also, bruxism may be a possible trigger of TMD-pain.[23] Pain also leads to avoidance of jaw mobility, mastication, and verbal and emotional expression in patients, thus causing functional limitation.

It has been reported in the literature that TMD is seen three times more frequently in women than in men, and this may be associated with hormonal, postural, emotional, and functional factors as well as muscle structure and genetic predisposition.[24] Estrogen secretion has been shown to be the main reason why TMJ problems are more common in women, especially in women between the ages of 20 and 40. The decrease in the prevalence of TMD in the postmenopausal and pre-adolescent period is also attributed to lower estrogen secretion.[25] In addition, a significant relationship between oral parafunctional behaviors and female gender has been shown in the literature.[26,27] Among the results of our study, a relationship was found between the limitation of jaw functions and female gender. We think that this situation might be related to the prevalence of OBC and TMD in females.

Strengths and Limitations

The small sample size of our study can be considered a limitation. The DC-TMD questionnaire was used in our study. In the detection of TMD, only certain results can be obtained using this questionnaire. Therefore, in future, more comprehensive well-designed studies evaluating TMD using clinical and radiological examination may contribute to the literature. Also, studies are needed for evaluating the effect of stress, anxiety, and occlusion on jaw limitation.

Conclusion

In this study, it was determined that pain and parafunctional habits were associated with functional

limitation of the jaw. In addition, female gender was found to be a risk factor for functional limitation of the jaw.

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Authors' Contribution

Conceptualization: Cansın Medin-Ceylan, Basak Cigdem Karacay.
Data curation: Cansın Medin-Ceylan.
Formal analysis: Basak Cigdem Karacay.
Investigation: Cansın Medin-Ceylan, Basak Cigdem Karacay.
Methodology: Cansın Medin-Ceylan, Basak Cigdem Karacay.
Project administration: Cansın Medin-Ceylan.
Resource: Cansın Medin-Ceylan, Basak Cigdem Karacay.
Software: Cansın Medin-Ceylan, Basak Cigdem Karacay.
Supervision: Basak Cigdem Karacay.
Validation: Basak Cigdem Karacay.
Visualization: Cansın Medin-Ceylan.
Writing–original draft: Cansın Medin-Ceylan.
Writing–review & editing: Basak Cigdem Karacay.

Competing Interests

The authors declare that they have no conflict of interest.

Data Availability Statement

Data for this study can be obtained from the corresponding author upon reasonable request.

Ethical Approval

Ethics Committee approval was obtained from Bakirköy Sadi Konuk Training and Research Hospital (Approval Number: 2021/209) before starting the study and a voluntary consent form was signed by the patients before the evaluation. This trial complied with the Declaration of Helsinki and the study protocol was registered on ClinicalTrials.gov (identifier: NCT05029908).

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