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Original Article

# The Relationship Between Temporomandibular Joint Disorder Level and Clinical Parameters in Patients with Fibromyalgia Syndrome

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**Abstract**

**Introduction:** The aim of this study was to investigate the relationship between fibromyalgia disease activity and temporomandibular joint disorder (TMD) level in patients with fibromyalgia, as well as TMD-related symptoms of cervical muscle endurance, cervical pain, anxiety and kinesiophobia.

**Method:** The study comprised 50 participants, consisting of 3 males and 47 females, all diagnosed with TMD and fibromyalgia. The severity of TMD was gauged through the Fonseca Amnestic Questionnaire (FAQ), while the functional status of the subjects was evaluated using the Fibromyalgia Impact Questionnaire (FIQ). Cervical muscle endurance was measured via the Cervical Flexor Muscle Endurance Test (CFMET). Additionally, cervical pain, kinesiophobia, and anxiety levels were assessed utilizing the Visual Analog Scale (VAS), Tampa Scale for Kinesiophobia (TSK), and Beck Anxiety Scale (BAS), respectively.

**Results:** A statistically significant positive correlation was observed between the level of TMD and the functional status of the patients ($p < 0.05$). Conversely, no statistically significant correlation was discerned between TMD and the variables of VAS, CFMET, TSK, and BAQ ($p > 0.05$). Notably, a significant correlation was detected between TMD and the disease activity among fibromyalgia patients exhibiting TMD. However, no statistically significant correlation was identified between head and neck complications, kinesiophobia, and anxiety within the fibromyalgia patient cohort.

**Conclusion:** Although it is recognized that these clinical parameters in the context of fibromyalgia do not depend solely on the level of TMD, it is imperative that they be evaluated collectively when evaluating the patient.

**Keywords:** Anxiety, fibromyalgia, kinesiophobia, pain, temporomandibular disorder.

## 1. Introduction

Fibromyalgia syndrome (FMS) is a syndrome characterised by chronic widespread pain and multiple symptoms, including fatigue, sleep disturbances, cognitive dysfunction and depressive episodes. It occurs in all populations worldwide,

with a prevalence of 2% to 4% in the general population (1). The prevalence is higher in women and increases with age (2). Common disorders associated with FMS include chronic fatigue syndrome, irritable bowel syndrome (IBS), irritable bladder syndrome or interstitial cystitis, and temporomandibular disorder (TMD) (3).

TMD encompasses a spectrum of pathological conditions characterized by pain, limited jaw mobility, and tenderness in the temporomandibular joint and/or associated masticatory muscles, often extending to the preauricular region (4). This disorder represents a musculoskeletal dysfunction of the masticatory system, impacting over a quarter of the general population (5). Moreover, TMD frequently co-occurs with various symptoms affecting the craniofacial and cervical regions, including headaches, otologic symptoms, and cervical spine manifestations (6). Investigations have explored the interrelation between masticatory motor system pain and cervical spine disorders, suggesting a bidirectional causative relationship (7,8). Notably, elevated levels of kinesiophobia have been observed in both painful and painless TMD cases (9). Cluster analyses employing the Tampa Scale for Kinesiophobia (TSK) have delineated subgroups within TMD cohorts characterized by heightened kinesiophobia, often concomitant with elevated anxiety levels (10). Chronic TMD patients frequently report symptoms indicative of psychological distress, including depression, anxiety, poor sleep quality, and low energy (11).

FMS and TMD have some common clinical characteristics, encompassing prolonged duration, incompletely elucidated pathophysiology, significant physical and psychological ramifications, and common predisposing factors (12). It is postulated that there may exist shared underlying mechanisms contributing to pain in both TMD and FMS (13). FMS is linked with various comorbidities, including chronic and widespread musculoskeletal pain, depressive symptoms, sleep disturbances, heightened stress responses, and central sensitization, which serve as predisposing and precipitating factors for TMD and elucidate the elevated incidence of TMD signs and symptoms among individuals with FMS (14,15).

Given the elevated occurrence of TMD among FMS patients, the recognition of TMD indicators and manifestations should be integrated into the diagnostic framework for FMS to improve pain management in these patients. Nevertheless, research investigating the correlation between TMD severity and clinical parameters characteristic of TMD among individuals with FMS remains limited. Hence, the primary objective of this study was to explore the association between TMD severity and fibromyalgia disease activity, alongside assessments of cervical muscle endurance, cervical pain, anxiety, and kinesiophobia, within the FMS patient population.

## 2. Methods

This study was conducted with 50 patients between aged between 18 and 65 years, all of whom had received a clinical diagnosis of fibromyalgia. Prior to the study, ethical approval was obtained from Uskudar University Non-Interventional Studies Ethics Committee with decision number 61351342/September 2021-39. Patients were informed before the study and signed an informed consent form.

Inclusion criteria encompassed individuals aged 18 to 65 years, previously diagnosed with FMS, and exhibiting symptoms indicative of TMD, as evidenced by a Fonseca Anamnestic Index (FAI) score exceeding 15 points (16).

Exclusion criteria included individuals with a history of cardiovascular, pulmonary, neurological or psychiatric disorders, malignancy, pregnancy, or difficulties in cooperation.

### 2.1. Data Collection Tools

The socio-demographic data of the individuals participating in the study was recorded by taking detailed anamnesis face-to-face. The presence and levels of TMD were determined with the Fonseca Amnestic Questionnaire (FAQ). FAQ is a questionnaire developed by Fonseca et al. in 1994 to classify TMD (17). The Turkish validity and reliability study of the questionnaire was

conducted by Kaynak et al. in 2018 (18). The questionnaire consists of 10 questions answered as yes, no or sometimes. The total score is calculated as 10 points for yes, 5 points for sometimes, and 0 points for no. A score range of 0-15 points indicates no TMD, 20-40 points indicates mild TMD, 45-65 points indicates moderate TMD, and 70-100 points indicates severe TMD (17).

Fibromyalgia Impact Questionnaire (FIQ) was used to assess the functional status of the participants. The FIQ is a 21-question questionnaire that assesses how patients' pain status has affected their activities of daily living, physical functioning, social life, sleep quality, pain status, and mood in the last 1 week. The maximum score is 100, and a score of 70 and higher indicates severe fibromyalgia (19). The questionnaire was developed in 1991 and a Turkish validity and reliability study was conducted (20).

The cervical muscle endurance was evaluated with the Cervical Flexor Muscle Endurance Test (CFMET). Patients were asked to lie supine, with hands on the abdomen, in a resting position, with their heads in a chin-tuck position, and perform an isometric contraction. The assessor placed his/her hand on the occiput of the patient. The patient was asked to hold the head 2.5 cm above the resting position while maintaining the chin-tuck position, and the duration of the head elevation was recorded. The test was terminated when the chin-tuck position was broken. The test was repeated twice, and a 5-minute rest time was given between each test. The mean of the two tests was recorded in seconds (21).

The Visual Analogue Scale (VAS) was used to assess pain in the cervical region. A 10-cm-long straight line is drawn, and "I have intense pain" and "I have no pain" are written at the beginning and end of the study, respectively. The side without pain is considered "0," and the side with pain is considered "10.". The patient was asked to mark the most appropriate place for the pain condition. The distance from the marked place to the starting point was measured with a ruler and recorded (22).

TSK, which was developed in 1991 and has Turkish validity and reliability, was used to measure the fear of movement or injury in individuals. The scale consists of 17 questions, and 4-point Likert scoring is used (1=strongly disagree, 4=completely agree). The total score is calculated by scoring the questions in the 4th, 8th, 12th, and 16th items in reverse order. A high score on the scale indicates a high severity of kinesiophobia (23, 24).

Beck Anxiety Scale (BAS) was used for anxiety assessment. The degree of anxiety is determined according to the total score. Each question in the BAS is scored between 0 and 3 (0=Not at all, 3=I had a lot of difficulty) It is a 4-point Likert-type scale. It consists of 21 questions. According to the score obtained, a 0–17 point range indicates low severity, an 18–24 point range indicates moderate severity, and 25 and higher scores indicate a high degree of anxiety (25). Turkish validity and reliability were performed by Ulusoy et al. (26).

### 2.2. Statistical Analysis

IBM SPSS 26 package programme was used for data analysis. "Kolmogorov-Smirnov Test" was performed to test whether the data of the research variables show normal distribution. Frequency analysis was performed to determine the demographic characteristics of the participants in the study, the characteristics of the answers given to the scales used in the study and the distribution of the participants according to the TMD categories. Spearman Correlation Analysis was conducted with the purpose of elucidating potential correlations between the level of TMD and variables such as VAS scores and cervical muscle endurance. Pearson Correlation Analysis was performed to determine whether there was a relationship between TMD level and kinesiophobia, fibromyalgia and anxiety levels. Significance level $p<0.05$ was accepted.

## 3. Results

Demographic characteristics and TMD levels of the individuals who participated in the study are shown in Table 1.

The standard deviation, median, minimum and maximum values of VAS, TSK, FIQ, FAQ BAS and CFMET were shown in Table 2.

As seen in Table 3, a positive and moderately statistically significant relationship was found between TMD level and fibromyalgia level (r=.330; p<0.05) There was no statistically significant correlation between the level of TMD and cervical muscle endurance, cervival pain, kinesiophobia, anxiety levels.

**Table 1.** Demographic characteristics of study participants (N=50)

| Variables | Mean ± sd (min max) N (%) | |
|---|---|---|
| Age | | 41,38 ±1,63 (24-62) |
| Gender | Male<br>Female | 3 (6)<br>47 (94) |
| Mild TMD (20-40 Points) | | 7 |
| Moderately(45-65 Points) | | 23 |
| Severe (70-100 points) | | 20 |

**Table 2**. General information on research variables

| Assessments | Mean ± SD | Median | Min. | Max. |
|---|---|---|---|---|
| **VAS** | 6,72 ±,23 | 7 | 3 | 10 |
| **TSK** | 44,52 ±78 | 44,5 | 29 | 55 |
| **FIQ** | 63,32±2,32 | 59 | 17 | 96 |
| **FAQ** | 63,60±2,59 | 65 | 25 | 95 |
| **BAS** | 22,70±0,51 | 23 | 16 | 29 |
| **CFMET (sec)** | 20,0±,45 | 19 | 14 | 28 |

SD: Standard Deviation, sec: second

**Table 3.** Comparison of the relationship between TMD level and research variables

| | r | P |
|---|---|---|
| **FIQ** | 0,330* | 0,019 |
| **VAS** | 0,271** | 0,057 |
| **TSK** | 0,122* | 0,322 |
| **BAS** | 0,119* | 0,41 |
| **CFMET** | -0,127** | 0,378 |

FIQ: Fibromyalgia Impact Questionnaire; VAS: Visual Analogue Scale; TSK-SV: Tampa Scale for Kinesiophobia questionnaire; BAS: Beck Anxiety Scale; CFMET: Cervical Flexor Muscle Endurance Test; p<0.05 statistical significance level **r: pearson coefficient*; ***rho: spearman coefficient*

## 4. Discussion

The findings of this study, undertaken among individuals diagnosed with TMD concomitant with FMS, revealed a notable association between the severity of TMD and the activity level of fibromyalgia disease. However, no statistically significant correlations were observed between the degree of TMD severity and other parameters examined, including cervical muscle endurance, pain intensity, kinesiophobia, and anxiety levels.

FMS is more common in middle-aged women than in men, and most commonly between the ages of 20 and 50 (27). Similar to the study in the literature, 94% of the 50 individuals diagnosed with fibromyalgia in the present study were women with a mean age of 41.38±1.63 years.

Considering that the most common symptoms in patients with FMS with a high frequency of TMD are muscle pain, temporomandibular joint pain, and muscle tenderness on palpation, it is thought that fibromyalgia syndrome may be an etiological or aggravating factor for TMD or may represent a general vulnerability to pain disorders (28). In the present study, the cervical muscle pain of the participants was questioned with VAS, and the mean score was 6.72±0.23. A low-level correlation close to statistical significance was found between TMD level and pain.

Kinesiophobia is defined as the fear of avoiding movement due to pain caused by trauma and the possibility of experiencing pain again (29).When the literature is reviewed, there are many studies showing that fibromyalgia syndrome causes kinesiophobia in patients (30–32). In another study in which it was investigated that TMD also causes kinesiophobia, it was also reported that TMD patients developed fear of movement due to problems such as limitation of movement in the head and neck region and locking in the jaw (33). No study investigating kinesiophobia in patients with fibromyalgia syndrome with TMD was found in the literature. In the present study, the mean total score of the participants on the kinesiophobia scale was 44.52±.078. No significant relationship was found between TMD and the kinesiophobia levels of the participants.

In the literature, there is no study on the relationship between TMD and cervical deep flexor muscle endurance in patients with fibromyalgia syndrome. In one study, cervical endurance was evaluated with the test used in the present study, and a decrease in endurance was found in participants with neck pain (34). In another study, cervical endurance was evaluated in individuals with TMD, and it was found to be affected (35). In the present study, the duration of keeping the head 2.5 cm above the resting position while maintaining the chin-tuck position was measured, and the mean was found to be 20±0.45 seconds. No significant correlation was found between TMD levels and the duration of neck elevation.

FMS is characterised by widespread and chronic musculoskeletal pain throughout the body, which may include pain in the masticatory muscles and temporomandibular joints in some patients, and these patients are defined as having temporomandibular disorders (36, 37). In the literature, there is a high prevalence of TMD in patients with FMS. Albayrak et al. found the prevalence of TMD in individuals with fibromyalgia to be 83.8%, and Erbaşar Hasanoğlu et al. found the prevalence of fibromyalgia in patients with TMD to be 60% (38, 39). This study included fibromyalgia patients with TMD, and 14% of patients with fibromyalgia had mild, 46% had moderate, and 40% had severe TMD. It was also found that those with severe TMD had higher fibromyalgia disease activity, and the level of fibromyalgia increased as the level of TMD increased.

## 5. Conclusion

The results suggest that there is a relationship between TMD and FMS, that the prevalence of TMD is high in patients with FMS, and that signs and symptoms of TMD should be considered in the diagnosis of FMS to improve pain management in these patients.

## Limitations

This study is subject to some limitations; The most important of these is the inclusion of a limited number of studies on fibromyalgia patients diagnosed with TMD. Large-scale studies are recommended to ensure broader applicability of the findings. Moreover, while the FAQ serves as a preliminary diagnostic tool in determining the presence of TMD, a definitive diagnosis by a qualified dentist will increase the robustness of the study. Additionally, the lack of inquiry regarding the duration of TMD symptoms among the patients participating in the study constitutes another limitation that could potentially affect the study results.

**Conflict of Interest:** Authors state that there are no conflicts of interest in the manuscript, including financial, consultant, institutional, and other relationships that might lead to bias or a conflict of interest.

**Ethics approval:** The approval of this study, which was conducted in accordance with the ethical rules communicated in The World Medical Association (WMA) Declaration of Helsinki, was approved by the Uskudar University Non-Interventional Research Ethics Committee with the decision dated September 2021-39 and numbered 61351342

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