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Evalution of relationship between degenerative changes of the temporomandibular joint and myofascial pain syndrome

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Abstract

Purpose: The aim of this study was to investigate whether there is a relationship between Myofascial Pain Syndrome (MPS) and degenerative changes in the Temporomandibular joint (TMJ) in muscle fibers in the upper part of trapezius muscle based on radiological findings.

Methods: Data processing records and patient records of 31 patients diagnosed with MPS and Temporomandibular dysfunction (TMD) due to active trigger points in the fibers in the upper region of the trapezium muscle were examined. Pain during resting and activity was evaluated by Visual Analog Scale (VAS) and neck pain and functions were evaluated by Neck Disability Index (NDI) score. Degenerative bone changes (flattening, erosion, osteophytes, sclerosis, and pseudocysts) seen in the condyle and articular eminence structures of TMJ were examined by Cone-Beam Computed Tomography (CBCT).

Results: A total of 31 patients (6 males and 25 females) were included in the study. Age (35.7 ± 12.8 years) and BMI values (BMI: 27 ± 2 kg / m2) of the patients were recorded. Resting, activity and mean VAS values at trigger points (VAS rest; 3.6 ± 1.3, VAS activity; 7.3 ± 1.3 and mean VAS 5.5 ± 1.3) and NDI score (30.2 ± 10,8) were recorded. When the right and left TMJ were examined separately or bilaterally, there was a significant relationship between the evaluated parameters and degenerative changes ($p < 0.05$).

Conclusion: It is thought that TMD may be predisposed in patients with MPS and it may contribute to increased degenerative changes in TMJ. Evaluation of TMJ in patients with MPS may be useful for early diagnosis and treatment.

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Introduction

Myofascial Pain Syndrome (MPS) is characterized by pain derived from trigger points in the stretched bands in the muscles and/or fascia or pain associated muscle contractions, sensitivity, limited range of motion in joints, stiffness, fatigue, and sometimes autonomic dysfunction that can lead to sleeping disorders as well as depression [1]. The trigger points due to MPS are most commonly seen in the upper fibers of the trapezius muscle. Trigger points in this region can cause pain in the neck, shoulder, and back of the same side, as well as reflected pain and temporal headache that can spread to the jaw and temporomandibular joint (TMJ) [2,3]. Temporomandibular joint dysfunction (TMD) is characterized by a group of diseases affecting chewing muscles, TMJs and adjacent structures; joint pain, muscle tenderness, limited mouth opening, a clicking sound, and crepitation is a picture accompanied by symptoms such as degenerative bone changes involving bone structures are frequently associated with [4]. Many clinical symptoms seen in TMD such as pain, cervical spine disorders, fibromyalgia syndrome, sleep disorder, chronic fatigue can trigger points in the masticatory muscles that can be seen in the presence of trigger points in the upper trapezius muscle [5-7].

Pain or dysfunction in TMJ may not only be limited to the mandibular joint but may also cause pathologies in other anatomical areas over the neck and spine as well as MPS. In addition, TMJ may be affected by pathologies occurring in different regions [6]. TMD can be seen in patients with MPS since both diseases have common pathology beginning in the upper trapezoidal region and develop pain and deformity in TMJ, common etiologies such as age, female gender, stress, anxiety, sleep disturbance and depression, and similar clinical symptoms [8,9]. In our literature review, we did not find any studies evaluating radiological changes in TMJ in patients with MPS and TMD of the upper trapezoidal muscle. Therefore, our study examining the possible radiological changes in TMJ is the first study in the literature.

The aim of this study was to investigate whether there is a relationship between the presence of MPS in the upper trapezoidal muscle and the radiological findings of degenerative changes in TMJ.

Material and methods

This retrospective study was conducted in Atatürk University Faculty of Medicine Department of Physical Medicine and Rehabilitation (FTR) and Oral and Maxillofacial Radiology of the Faculty of Dentistry. The Ethics Committee of Ataturk University (26.09.2019 / 06; 14). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Patients applied to physical medicine and rehabilitation clinic with neck, shoulder and back pain between September 2018 and September 2019 were included in this study. Routine biochemistry, hemogram, Erythrocyte Sedimentation Rate (ESR), C-reactive protein (CRP) and cervical vertebra radiographs were obtained from patients diagnosed with MPS based on anamnesis, physical examination, active trigger points (trigger point 1; TrP1 and / or trigger point 2; TrP2) findings in the fibers in the upper region of the trapeze. Patients were referred to the Oral, Dental and Maxillofacial Radiology outpatient clinic for TMJ examination due to pain and other complaints in the TMJ region. As a result of the clinical and radiological examination, records of 31 patients diagnosed with temporomandibular joint dysfunction were examined [10,11].

Gender, age, and Body Mass Index (BMI) values of the participants were recorded. Pain levels (derived from trigger points due to TrP1 and TrP2 localization related to MPS) during rest and activity were evaluated by Visual Analog Scale (VAS), and neck pain and functions were evaluated by Neck Disability Index (NDI) score as a result of. In addition, neck ROM (flexion, extension, lateral flexion, right, and left rotation) values were recorded.

VAS assessment method was explained to the patients as 0 represents no pain, 5 represents moderate level of pain and 10 represents the most powerful pain that has ever been experienced. According to these explanations, patients were asked to mark their pain on a 10 cm line, then this distance was measured with the ruler, and the value that was more than half of the comma accepted as the full value [12].

NDI was used to evaluate neck pain and functions. NDI consists of 10 topics: pain severity, personal care, lifting, reading, headache, concentration, work, driving, sleeping and leisure activities. Individuals included in the study were asked to score between 0 (no disability) and 5 (full disability) for each title. The total score ranges between 0 (no disability) and 50 (full disability) [13].

Degenerative bone changes in the condyle and articular eminence were investigated in patients with a diagnosis of TMJ dysfunction in both TMJs examined by cone-beam computed tomography (CBCT; Quantitative Radiology, NNT Software version 2.21, Verona, Italy). The bone changes evaluated are (Figure 1):

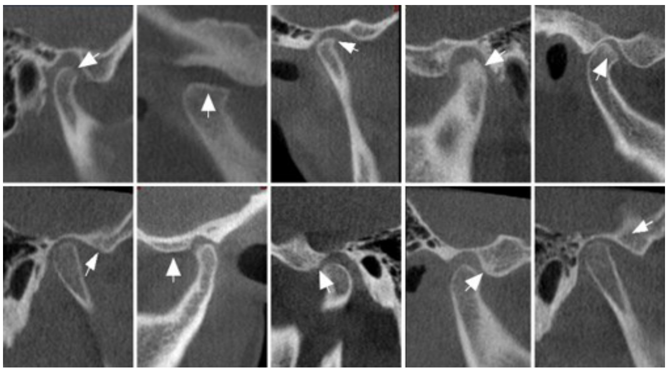

Figure 1: Degenerative bone changes in TMJ. Condylar erosion (a), flattening (b), osteophyte (c), increased sclerosis (d), pseudocyst (e); in articular eminence erosion (f), flattening (g), osteophyte (h), increased sclerosis (i), pseudocyst (k).

1. Flattening (convex form turns into flat bone contour),
2. Erosion (decrease in the density of cortical bone and loss of continuity),
3. Osteophyte (marginal bone protrusion on the condyle),
4. Sclerosis (increased cortical bone density extended to bone marrow),
5. Pseudocysts (subchondral cysts) (well-circumscribed osteolytic area in the subcortical region without cortical bone destruction) [14].

Inclusion criteria

1. Having TMJ complaints accompanying myofascial pain sydrome diagnosis,

2. Age between 18-60,
3. Normal test results.

Exclusion criteria

1. Presence of cervical disc herniation, radiculopathy or myelopathy,
2. Tumoral, infectious, psychiatric and rheumatologic diseases,
3. Stage 3-4 osteodegeneration,
4. Diagnosis of fibromyalgia syndrome,
5. Presence of kyphoscoliosis,
6. Pregnancy,
7. Having previous operation related to the cervical spine and/or shoulder surgery, TMJ,
8. Previous history of trauma or occupational damage,
9. The onset of symptoms is less than 3 months.

Statistical analysis

SPSS 20.0 package program was used for statistical analysis of the data. Data; mean, standard deviation, minimum, maximum, percentage and number were recorded. The normal distribution of continuous variables was determined by the Shapiro Wilk-W test when the sample size was <50; In case of> 50, the Kolmogorov Simonov test was performed. In the comparison between the two independent groups, the Independent Samples t-test was used when the normal distribution condition was met. The chi-square independence test was used to determine whether the degenerative changes in the joint were sex-dependent. $p<0.05$ was considered as statistically significant.

Results

A total of 31 patients (6 male and 25 female) diagnosed with MPS and TMD were included in the study. Age (mean age 35.7 years and age range: 18-57 years) and BMI values (mean BMI: 27 ± 2 kg / m2) were recorded. The VAS values of resting and activity values of the trigger points originating from TrP1 and/or TrP2 localization (VAS resting mean; 3.6 ± 1.3, VAS activity mean; 7.3 ± 1.3) and the mean VAS values of the patients were 5.5 ± 1.3 and NDI was found to be 30.2 ± 10.8 (Table 1).

Table 1: Mean, standard deviation, minimum and maximum values of patients' demographic data and clinical symptoms

	n	Mean	SD	Minimum	Maksimum
Sex (m/f)	6/25				
Age (year)		35,7	12,8	18	57
BMI (kg/m²)		27,2	5,6	18,8	41,1
VAS rest (0-10 cm)		3,6	1,3	1	6
VAS activity (0-10 cm)		7,3	1,3	5	9
VAS average (0-10 cm)		5,5	1,2	3	7
NDI score (0-50)		30,2	10,8	9	45

N: Patients Number; SD: Standart Deviation; M: Male; F: Female; BMI: Body Mass Index; VAS: Visual Anolog Scalae For Pain; NDI: Neck Disability Index.

The numerical and percentage values of changes in radiological parameters (erosion, flattening, osteophyte, increase in sclerosis and pseudocyst) seen in TMJ condyle and articular eminence structures are shown in Table 2.

Table 2: Frequency and percentage of degenerative changes in temporomandibular joints according to upper trapezoidal muscle involvement of patients

	Upper trapezius muscle
Right condyle	
Erosion (n, %)	25 (%81)
Flattening (n, %)	13 (%42)
Osteophyte (n, %)	16 (%52)
Sclerosis (n, %)	7 (%23)
Cyst (n, %)	2 (%7)
Right eminentia	
Erosion (n, %)	11 (%36)
Flattening (n, %)	4 (%13)
Osteophyte (n, %)	3 (%10)
Sclerosis (n, %)	11 (%36)
Cyst (n, %)	1 (%3)
Left condyle	
Erosion (n, %)	23 (%74)
Flattening (n, %)	20 (%65)
Osteophyte (n, %)	23 (%74)
Sclerosis (n, %)	4 (%13)
Cyst (n, %)	4 (%13)
Left eminentia	
Erosion (n, %)	10 (%32)
Flattening (n, %)	5 (%16)
Osteophyte (n, %)	1 (%3)
Sclerosis (n, %)	16 (%51)
Cyst (n, %)	1 (%3)
Biletaral condyle	
Erosion (n, %)	27 (%87)
Flattening (n, %)	21 (%68)
Osteophyte (n, %)	26 (%84)
Sclerosis (n, %)	9 (%29)
Cyst (n, %)	5 (%16)
Bilateral eminentia	
Erosion (n, %)	15 (%48)
Flattening (n, %)	5 (%16)
Osteophyte (n, %)	3 (%10)
Sclerosis (n, %)	19 (%61)
Cyst (n, %)	2 (%7)

n: number of patients with degenerative changes

The relationship between gender, age, BMI, VAS rest, VAS activity, VAS mean, NDI values and radiological degenerative changes in TMJ condyle and eminence are shown in Table 3.

Table 3: The relationship between demographic data, visual anolog scale and neck disability index values and degenerative changes in temporomandibular joints

	Sex (m/f)	Age (year)	BMI (kg/m²)	VAS rest	VAS activity	VAS average	NDI score
Right condyle							
Erosion (n, %)	0.335	0.478	0.471	0.781	0.011*	0.025*	0.14
Flattening (n, %)	0.02*	0.14	0.600	0.818	0.267	0.627	0.647
Osteophyte (n, %)	0.318	0.097	0.749	0.152	0.380	0.185	0.892
Sclerosis (n, %)	0.7	0.029*	0.965	0.793	0.243	0.421	0.877
Cyst (n, %)	0.474	0.048*	0.134	0.267	0.806	0.421	0.226
Right eminentia							
Erosion (n, %)	0.283	0.967	0.95	0.873	0.102	0.397	0.133
Flattening (n, %)	0.096	0.084	0.017*	0.322	0.255	0.97	0.219
Osteophyte (n, %)	0.519	0.456	0.655	0.018*	0.018*	0.009**	0.815
Sclerosis (n, %)	0.408	0.482	0.82	0.702	0.473	0.866	0.908
Cyst (n, %)	0.618	0.64	0.375	0.632	0.553	0.968	0.399
Left condyle							
Erosion (n, %)	0.108	0.043*	0.084	0.028*	0.004**	0.005*	0.066
Flattening (n, %)	0.075	0.304	0.631	0.116	0.331	0.144	0.013*
Osteophyte (n, %)	0.132	0.497	0.061	0.293	0.536	0.335	0.179
Sclerosis (n, %)	0.759	0.061	0.083	0.082	0.135	0.069	0.848
Cyst (n, %)	0.294	0.197	0.13	0.068	0.059	0.038*	0.772
Left eminentia							
Erosion (n, %)	0.301	0.741	0.997	0.24	0.098	0.112	0.227
Flattening (n, %)	0.202	0.201	0.024*	0.262	0.626	0.674	0.673
Osteophyte (n, %)	0.618	0.858	0.018*	0.755	0.922	0.81	0.608
Sclerosis (n, %)	0.411	0.009**	0.143	0.175	0.483	0.234	0.229
Cyst (n, %)	0.618	0.963	0.51	0.692	0.965	0.795	0.979
Biletaral condyle							
Erosion (n, %)	0.294	0.248	0.862	0.186	0.304	0.193	0.003**
Flattening (n, %)	0.045*	0.031*	0.569	0.114	0.074	0.062	0.001**
Osteophyte (n, %)	0.202	0.015*	0.935	0.496	0.917	0.67	0.678
Sclerosis (n, %)	0.457	0.001**	0.414	0.43	0.555	0.444	0.255
Cyst (n, %)	0.232	0.614	0.931	0.267	0.049	0.082	0.235
Bilateral eminentia							
Erosion (n, %)	0.93	0.175	0.785	0.241	0.739	0.409	0.954
Flattening (n, %)	0.202	0.352	0.282	0.989	0.884	0.926	0.872
Osteophyte (n, %)	0.519	0.124	0.717	0.035*	0.064	0.029*	0.493
Sclerosis (n, %)	0.763	0.058	0.797	0.045*	0.143	0.056	0.072
Cyst (n, %)	0.474	0.001**	0.163	0.401	0.182	0.221	0.117

SD: Standart Deviation; M: Male; F; Female; BMI; Body Mass Index; VAS: Visual Anolog Scalae for Pain; NDI; Neck Disability Index; N: Number of atıents wıth degeneratİve changes, * p<0.05, ** p<0.01.

When the right TMJ condyle or articular eminence structures are evaluated, it was found that there were significant correlations between the female gender and the flattening in the right condyle, between age and condyle sclerosis and pseudocyst, between BMI and flattening in the eminence, between resting, activity, mean VAS values and flattening in the condyle ($p < 0.05$). However; there was no significant relationship between other parameters ($p > 0.05$) (Table 3).

When left TMJ condyle and eminentia structures were evaluated, there was a statistically significant relationship between age and left condyle erosion and left eminentia sclerosis, between BMI and left eminentia flattening and osteophyte, between rest, activity, mean VAS values, NDI values, and condyle erosion, between mean VAS value and left condyle pseudocyst. ($p < 0.05$). However, there was no significant relationship between the other parameters ($p > 0.05$) (Table 3).

When both joints (62 TMJ condyles in total) and articular eminence structures were evaluated statistically significant relationship was found between female sex and flattening of condyles, between age and flattening of condyles, osteophyte, sclerosis, between age and pseudocyst in articular eminence, between resting VAS values and between osteophyte and sclerosis in eminence, between mean VAS value and osteophyte in eminence, and between NDI and erosion, flattening. There was a significant relationship ($p < 0.05$). However, there was no significant relationship between the other parameters ($p > 0.05$) (Table 3). In addition, no significant relationship was found between radiological degenerations and ROM values in all directions of the neck ($p > 0.05$).

Discussion

In our study, it was seen that the rate and frequency of degenerative changes such as erosion, osteophyte, flattening and sclerosis of TMJ condyle and eminence structures were high in patients diagnosed with MPS in upper trapezoidal muscle. In addition, age, gender, BMI, VAS and NDI values were found to be significantly correlated with some degenerative parameters.

Presence of studies showing active trigger points in the neck and shoulder (upper trapezius) muscles of patients with TMD; it is probable that TMD can also be accompanied in patients with active trigger points in the upper trapezoidal muscle, and thus the possibility of degenerative changes that can be detected radiologically in TMJ.[15] Radiological examination is a routine part of clinical evaluation in TMD and its main objective is to evaluate the structures of the joint and degenerative bone changes. It is accepted that CBCT is a more sensitive and accurate diagnostic method in radiological changes that may occur in bone structures of the joint in TMD [10-12].

Degenerative changes in TMJ occur through processes such as cartilage destruction, inflammation, and bone response in the end. In order to repair damage caused by inflammation and cartilage destruction and to promote joint integrity, bone tissue responds by producing extra bone. In this context, radiological irregularities such as erosion, flattening of bone surfaces and/or deformation of mandibular condyle surface, degenerative changes such as osteophyte, pseudocyst and increased sclerosis in the bone may be seen radiologically in TMJ [12-14].

It is known that both pathologies are more common in women aged 20-50 years.[16,17] In addition, degenerative changes in TMJ and pain in the TMJ region have been reported to be more common in women than men [18,19]. In the literature, it has been reported that more and more severe degenerative changes will occur in older patients compared to younger ones, while there are studies indicating that there is no relationship between age and degenerative changes [14, 19,20] In our study, 81% of the participants had female gender similar to the literature. This may be explained by the hormonal effects of estrogen and prolactin on the stimulation of several immunological responses in TME, which may exacerbate the disruption of cartilage and joint bone structures [14] In addition, it is seen that there is a significant relationship between gender and flattening in the condyle structure of TMJ, and between flattening, osteophyte, sclerosis, and age when both condyle structures are considered. Other degenerative changes and lack of relationship between gender and age may be related to the low number of participants and the lack of advanced age (mean age; 35.7 years). In addition, since the degenerative changes may increase with increased age, the lack of elder patients in our study has shown us that the effect of the age on degenerative changes in TMJ may be minimal.

It has been reported in the literature that various degenerative bone changes may occur radiologically in TMJ in patients with TMD [21,22] In studies examining radiological changes in TMJ joint with CBCT, it has been reported that the incidence of flattening, osteophyte and erosion from degenerative bone changes is high and these radiological changes are seen less frequently in articular eminence compared to condyle structure [14,19,23]. In our study, similar to the literature, TMJ condyles were found to have erosion, osteophyte, flattening, sclerosis, and cyst, respectively, whereas in articular eminence, these changes were found to be less frequent (Table 2). These radiological changes in TMJ structures may cause symptoms and signs such as muscle pain, especially joint pain, impaired jaw movement due to limitation in opening the mouth, click sound, crepitation, and dysfunction [24].

MPS pain was accepted as chronic pain. Therefore, patients whose pain persisted for at least 3 months due to TrP1 and / or TrP2 trigger points were included in the study [10]. Since the most important complaint of the patients in MPS was pain in the neck and back, VAS was used to measure the current pain severity and the NDI score was used to evaluate neck functions. It has been reported in the literature that there is a positive relationship between VAS, which is a numerical expression of pain intensity, and NDI score [25]. Similar to the literature, VAS and NDI scores were found to be high in patients in our study (Table 1). Since pain caused by trigger points in the upper trapezoidal muscle is reflected in the TMJ region and the deterioration of neck functions may cause mandibular dysfunction; it has been reported that both pathologies may cause dysfunction and degenerative bone changes in TMJ [15,26]. Therefore, according to the results obtained in our study, when both condyles were evaluated together, a significant relationship was found between VAS scores and osteophyte, sclerosis in the eminetial structures, between NDI scores and erosion, flattening in the condyle structures. However, there was no relationship between neck ROM values and radiological degenerations. This may explain the relationship of chronic pain and dysfunctions seen in the neck region with erosion and flattening which are the most frequent changes in TMJ. In addition, if both pathologies persist chronically, it is possible that significant associations may occur between neck pain and functions and other radiological changes that increase in frequency with the advanced age [27]. This may also be valid for the neck ROM since there is a functional connection between TMJ and neck. Neck movements are a natural inseparable part of the jaw opening and closing process and controlled by common neural stimulus. Impaired jaw movement will result in degenerative changes in hard tissues in TMJ, causing TMD [28].

As it was also mentioned above; degenerative changes in TMJs of patients with MPS may have occurred through several mechanisms. First, the fact that MPS and TMD have some common etiology and symptoms may indicate that they have similar susceptibility and may be affected by each other [16]. In one study, it was reported that neck and shoulder pain decreased after TMD treatment [29]. Secondly, it may be caused by jaw movements and thus TMJ may be affected by cervical region problems [28] Thirdly, the increase in pain sensitivity due to psychological complaints such as pain, stress, sleep disturbance and depression that may be seen in people with chronic MPS may result from the development of stress-induced diurnal or nocturnal bruxism and the development of TMD by bringing together a series of TMJ complaints.

The most important limitation of our study is the limited number of patients and lack of a control group due to incomplete patient cooperation and motivation frequently seen in multicenter studies. Therefore, there is a need for further and comprehensive studies in which the relationship between MPS and TMJ degenerative changes can be assessed in a better way.

Conclusions

As a result; It is thought that TMD may be predisposed in patients with MPS and that MPS may contribute to increased degenerative changes in TMJ. Evaluation of TMJs in patients with MPS would be useful for early diagnosis and treatment. Teamwork of medical doctors and dentists in the treatment of these two pathologies is important in terms of achieving a good result in a shorter time.

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