CHARACTERISTICS OF TEMPOROMANDIBULAR DISORDERS AND OROFACIAL PAIN IN INDIVIDUALS WITH RHEUMATOID ARTHRITIS

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Submitted December 19, 2021; accepted July 5, 2022.
**Purpose:** To compare characteristics of temporomandibular disorders (TMDs) in patients with rheumatoid arthritis (RA) to controls without RA. **Materials and Methods:** The sample included 80 subjects (aged 33 to 73 years; 88% women), 40 in each group. An international diagnostic protocol for TMD was followed. **Results:** Arthralgia was the most prevalent TMD in the RA group. Orofacial pain was more common than in controls (42.5% vs 15%, \( P = .031 \)), with higher chronic pain grade and pain intensity (\( P \leq .005 \)). Somatization and depression were also increased (\( P < .001 \)). In multiple logistic regression analysis, arthralgia (OR: 6.4; 95% CI: 1.1 to 37.1; \( P = .038 \)) and age \( \geq 55 \) years were predictors of RA (OR 3.9; 95% CI: 1.4 to 10.8; \( P = .009 \)) when controlling for the effects of gender and pain intensity. TMD was related to 7.4-times higher odds for presence of orofacial pain, while RA was related to 3.4-times higher odds for pain. **Conclusion:** RA patients experienced more orofacial pain and higher pain intensity, somatization, and depression compared to healthy individuals. Pain is more influenced by TMD than by RA. *Int J Prosthodont 2022. doi: 10.11607/ijp.8145*

**INTRODUCTION**

Rheumatoid arthritis (RA) is a chronic inflammatory, autoimmune, connective tissue disease characterized by symmetrical peripheral polyarthritis with consequent joint destruction and internal organ involvement leading to systemic disease.\(^1\)\(^2\) RA prevalence is 3-4 times higher in women.\(^3\)\(^-\)\(^5\) One of its main characteristics is pain.\(^6\)\(^,\)\(^7\) Although it predominantly affects wrist and foot joints, any joint in the body can be affected. Temporomandibular joint (TMJ) is rarely the first joint to be affected. The prevalence of its involvement ranges between 35% and 94%, and RA brings a 2.5-fold higher risk of
temporomandibular disorders (TMD). TMD is a musculoskeletal disorder that affects the TMJ, masticatory muscles and associated structures. Along with limited mouth opening and sounds in TMJ during mandibular movements, pain in the masticatory muscles area, preauricular region and TMJ is the most common TMD symptom. Pain occurs in structures innervated by the trigeminal nerve. Orofacial pain occurs in 10%-20% of the population with a 1.5-9 times higher incidence in women. Orofacial nonodontogenic pain is one of the most common forms of chronic regional pain and often present in TMD. The etiology and pathogenesis of orofacial pain and depression are very complex and multifactorial, and have still not been fully clarified. Research shows that patients with TMD have elevated somatization, anxiety and depression and a consistent connection between anxiety, general somatic symptoms and TMD-associated pain has been established. The cause of this connection has not been fully elucidated. It is clear that depression is frequent in RA patients, and is associated with reduced quality of life, increased pain intensity, fatigue and somatization. Despite new findings and attempts to relieve pain, it remains one of the main symptoms in RA patients. Although many research study the etiopathogenesis and pathophysiology of orofacial pain, depression and somatization, and the disability degree, it remains unclear why some RA patients do not have and do not suffer from these symptoms.

The aims of this study were to investigate the prevalence and types of TMDs and characteristics of orofacial pain in patients diagnosed with RA and to compare it with healthy individuals without RA. Predictors of pain intensity and interference were also explored. Higher prevalence of TMD, orofacial pain intensity, depression and somatization in patients with RA than controls were expected. It was hypothesized that TMD is higher predictor of pain intensity and interference than RA.
MATERIALS AND METHODS

A case-control study from clinical sample included 80 individuals aged 33 to 73 years (median 53 years; interquartile range 46 to 57 years; 88% women) - 40 subjects with RA, and 40 healthy individuals without RA. Subjects were consecutively selected from the population of patients who visited a specialized hospital for medical rehabilitation of heart, lung and rheumatism Thalassotherapia in Opatija, Croatia for diagnostics, treatment, or routine physical examination. Diagnoses of RA were made by a rheumatologist (TK) according to the 2010 European League Against Rheumatism/American College of Rheumatology classification criteria. The control group, matched by age and sex, was taken from the population that came for the regular annual systematic examination. Excluding factors were chronic diseases with an emphasis on autoimmune diseases. The Ethics committee of hospital approved the study. International diagnostic protocols for TMD were followed (Research Diagnostic Criteria for Temporomandibular Disorders, RDC / TMD) which included a symptom questionnaire, the Graded Chronic Pain Scale, somatization, depression, and clinical examination with a measurement of mandibular dynamics. Somatization is generally defined as the tendency to experience psychological distress in the form of somatic symptoms and to seek medical help for these symptoms, which may be initiated and/or perpetuated by emotional responses such as anxiety and depression. Depression is a psychological mood characterized by feelings of sadness, helplessness, guilt, despair and emptiness. Familiar pain in one or both joint sites (lateral pole and/or posterior attachment) during palpation; one or more of the following self-reports of pain: pain in the region of the joint, pain in the joint during mandibular movement was used for a diagnosis of arthralgia. Crepitus reported by patient
and detected by clinician during examination was used for diagnosis of degenerative temporomandibular joint (TMJ) disease. No imaging techniques of TMJ were used. Patients were examined by one examiner (VFM). The examiner was not blinded. A chi-square test, Fisher’s test, the Mann–Whitney test, Pearson’s correlation, linear and logistic regression were used to analyze TMD characteristics and orofacial pain in groups.

RESULTS
In general, TMDs were more prevalent in patients with RA than in the control group, but this difference was not statistically significant (45% vs. 25%; Figure 1). TMJ arthralgia was the most prevalent type of TMD in RA, significantly more often than in controls (22.5% vs. 5%; p=0.048). Degenerative disease of TMJ was also more frequent in those with RA, but not significantly (17.5% vs. 12.5%), as were disc displacement (15% vs. 12.5%) and myofascial pain (10% vs. 2.5%). In patients with RA, mandibular dynamics were reduced, but not significantly. Orofacial pain was more common in RA group (42.5% vs. 15%; p=0.013), with higher chronic pain grades and higher levels of characteristic pain intensity (p≤0.005; Figures 2 and 3). High characteristic pain intensity (≥50) was more frequently seen in patients with RA, but this difference was not statistically significant (25 vs. 7.5%; p=0.066). None of the patients in the control group presented with high disability due to chronic orofacial pain, but 10% of patients in the RA group did. Somatization and depression were also higher in patients with RA than in healthy individuals (p<0.001; Figure 3).

In multiple logistic regression analysis, TMJ arthralgia and age ≥55 were predictors of RA, when controlling for the effects of gender and pain intensity (Table 1). Odds for RA were 6.4 times higher in people with TMJ arthralgia (95% CI 1.1-37.1; p=0.038) and 3.9x higher
in people older than 55 years of age (95% CI 1.4-10.8; p=0.009). Depression and somatization were not included in model due to correlation with pain.

In univariate correlations, the intensity of orofacial pain was positively correlated with interference score, RA, TMD, arthralgia, myofascial pain, depression, and somatization (r=0.271–0.773; p≤0.015), while interference score positively correlated with pain intensity, depression, somatization and TMD (r=0.353–0.773; p≤0.001). After controlling for age and gender, the predictors of orofacial pain intensity were TMD and RA, accounting for 14.1% and 4.6% of variability, respectively (Table 2). When controlling for age, gender and RA, the predictor of interference was only TMD, accounting for 13.3% of variability (Table 2). In multiple logistic regression RA was related to 3.4x higher odds for presence of orofacial pain, but not for high pain intensity (Table 3). TMD was related to 7.4x higher odds for pain, 13.8x for high pain intensity and 5.6x for interference.

DISCUSSION
The present research demonstrates that TMJ arthralgia and degenerative joint disease are more common in patients with RA than in healthy individuals, but RA is more characterized by orofacial pain, somatization, and depression than by TMD.

Compared to our results higher prevalence of both arthralgia and myofascial pain in RA patients is previously reported (36-39%), while lower of disk displacement (3%). Due to the flattening of the condyle, the disc displacement does not seem to be more frequent, nor is there more subluxation. Several papers reveal that degenerative joint disease in RA
is underestimated. When using imaging techniques structural damage is often seen in the RA patients without symptoms of TMJ involvement which mostly include flattening, followed by osteophytes, erosion and sclerosis. Although not using imaging may be perceived as a limitation of our study according to RDC / TMD protocol imaging can be used as a confirmation of clinical findings in symptomatic patients, and not in asymptomatic subjects. Clinically if there is no pain or impaired mandibular function, the patient is considered compensated and not treated for TMD.

Arthralgia appears to be present in only 1/3 of subjects with degenerative TMJ change confirmed by CBCT. Myalgia is equally represented in the presence and absence of TMJ degeneration. Another problem we encountered when comparing our data to other studies of RA patients with TMD is poor standardization of TMJ pain and function assessment. RA patients are primarily treated by rheumatology specialists, and they almost never use the RDC / TMD protocol. What was imposed by the review of other studies, and is consistent with the results of our study, is the more frequent presence of orofacial pain in RA patients than in the control group. However, orofacial pain and crepitus occur on average two years after systemic symptoms of RA, while pain-related dysfunction develop with time. If RA is well controlled and patients are under systemic therapy, orofacial pain tend to be reduced. Even though patients are under therapy, the disease still progresses, including in the orofacial region. Due to the fact that RA is primarily a joint disease, the incidence of myofascial pain in our study did not differ significantly from the control group in contrast to some other studies which reported the more frequent muscle pain, up to 65%.

Psychological component of RA could be as the reason, which leads to clenching of teeth, bruxism and muscle pain.
Considering characteristics of pain, our study demonstrated that majority of RA patients have no pain or low pain intensity, as well as not many patients with disability. Contrary, other report much higher prevalence of subjects with high pain intensity and disability. The differences could be attributed to disease control and duration. Cultural factors may also influence pain sensitivity and reporting pain intensity and pain-related disability. Age and sex were controlled in analyzed as two most fundamental confounders. However socioeconomic status might have also played a role in pain perception. People with lower education and lower income tend to report more frequently severe pain, higher pain intensity and greater disability through pain. Usually patients with chronic conditions compare themselves with those patients who are better off, so those with more adaptive coping strategies will more easily learn to live with and give a higher rating of their quality of life than those with acute conditions. Depression is a common comorbidity in RA, three times higher than in the general population, affecting illness activity, pain perception, and disability via the alteration of disease perception. The current research confirmed the overlapping of nonspecific physical symptoms and depression. A previous study implied that TMD placed additional burdens on those with RA; patients with RA and TMD tended to have both increased depression and nonspecific physical symptoms in comparison with patients who had RA but not TMD. Variables which are strongly correlated with pain, such as depression, somatization, were not included in multivariate model not to mask the pain effect. RA and TMD are important factor leading to pain, which in turn have psychosocial consequences, such as depression and somatization. TMD and not RA appears to be primary source of orofacial pain, high pain intensity and interference. Both regression models confirmed that, so pain affecting
the face is not higher nor more frequent in subjects with RA than in those with TMD. Also interreference is not more frequent nor higher in RA than TMD patients. But there is a synergistic effect, so subjects with RA who also have TMD will more frequently experience orofacial pain and of higher intensity. Subjects with TMD but without RA will have more frequent facial pain, with higher intensity and interference than those with RA but without TMD. Patients with RA may have more pain in the rest of the body, but this study measured orofacial pain, which is more related to TMD. RA is a multietiological disease and it is not necessary for every orofacial pain to have an inflammatory underlying nature. RA patients have more depressive symptoms and severe depression which can then lead to orofacial pain that is not primarily caused by inflammation but by the psychological status of RA patients. Other factors, such as catastrophizing, anxiety and sleep disturbances may also impact the perception of pain in RA patients. Depressed mood and somatization may be the result of long-term RA disease, and may be initially present and contribute to pain amplification. Also, somatic amplification may strengthen the association between depression and pain intensity. In TMD patients somatization and depression have been shown to be predictors of chronic painful TMP. The limitation of this study is that RA patients were treated for their primary disease which could have reduced reporting pain and restrictions. But as RA is a serious and long-lasting condition, its non-treatment could not be justified. Another limitation is that the examiner was not blinded to cases and controls which might have affected the results considering examiner bias. However, diagnostics of TMD is mostly based on subjects’ responses from symptom questionnaire which a clinician is confirming by clinical examination (familiar pain, limitations in mandibular function and joint sounds). Arthralgia was the only condition
which was significantly more prevalent in patients with RA, and joint pain that was not familiar was not registered as arthralgia.

Dentists must be aware that RA can affect patients’ orofacial and psychological status; therefore, they must recognize the signs and modify dental care accordingly.49

CONCLUSION

RA patients experienced more orofacial pain, higher pain intensity, somatization and depression compared to healthy individuals, related to arthralgia. Pain is more influenced by TMD than RA.

ACKNOWLEDGMENTS

Funded by the University of Rijeka and University of Osijek grants (13.06.1.3.49, uniri-biomed-18-22, and IP2-FDMZ-2021).

CONFLICT OF INTEREST

The authors declare that are no commercial conflicts of interest.

REFERENCES


Table 1. Logistic regression model for predictors of RA (0=non-RA; 1=RA)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE</th>
<th>p</th>
<th>OR (95% CI)</th>
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</thead>
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<tr>
<td>Gender (0=male; 1=female)</td>
<td>-0.4</td>
<td>0.8</td>
<td>0.598</td>
<td>0.7 (0.2-2.9)</td>
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<tr>
<td>Age (0≤45; 1≥55)</td>
<td>1.4</td>
<td>0.5</td>
<td><strong>0.009</strong></td>
<td>3.9 (1.4-10.8)</td>
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<tr>
<td>Arthralgia (0=no; 1=yes)</td>
<td>1.9</td>
<td>0.9</td>
<td><strong>0.038</strong></td>
<td>6.4 (1.1-37.1)</td>
</tr>
<tr>
<td>High pain intensity (0=no; 1=yes)</td>
<td>0.8</td>
<td>0.8</td>
<td>0.337</td>
<td>2.1 (0.5-10.1)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.4</td>
<td>0.9</td>
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Negelkerke pseudo $R^2 = 0.269$; $p=0.012$; 73% correctly classified cases, in total and in every group.
Table 2. Correlations and regression analysis for assessment of predictors of intensity of orofacial pain and interference

<table>
<thead>
<tr>
<th>Model and variable</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>p</th>
<th>Correlations</th>
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<td></td>
<td>B</td>
<td>SE</td>
<td>Beta</td>
<td>Zero-order</td>
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<td><strong>intensity of orofacial pain</strong></td>
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<td></td>
<td></td>
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<tr>
<td>(Constant)</td>
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<td>17.4</td>
<td>0.0</td>
<td>0.734</td>
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<tr>
<td>gender (0=M; 1=F)</td>
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<td>6.7</td>
<td>-0.0</td>
<td>0.734</td>
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<tr>
<td>age (years)</td>
<td>0.1</td>
<td>0.3</td>
<td>0.0</td>
<td>0.834</td>
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<tr>
<td>RA (0=absent; 1=present)</td>
<td>10.9</td>
<td>5.2</td>
<td>0.2</td>
<td><strong>0.037</strong></td>
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<tr>
<td>TMD (0=absent; 1=present)</td>
<td>19.4</td>
<td>5.2</td>
<td>0.4</td>
<td><strong>&lt;0.001</strong></td>
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<tr>
<td><strong>interference score</strong></td>
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<tr>
<td>(Constant)</td>
<td>-0.1</td>
<td>15.1</td>
<td>-0.0</td>
<td>0.945</td>
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<tr>
<td>gender (0=M; 1=F)</td>
<td>-0.4</td>
<td>5.8</td>
<td>-0.0</td>
<td>0.945</td>
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<tr>
<td>age (years)</td>
<td>0.0</td>
<td>0.3</td>
<td>0.0</td>
<td>0.927</td>
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<tr>
<td>RA (0=absent; 1=present)</td>
<td>3.9</td>
<td>4.5</td>
<td>0.1</td>
<td>0.389</td>
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<tr>
<td>TMD (0=absent; 1=present)</td>
<td>15.6</td>
<td>4.5</td>
<td>0.4</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*R=0.480; R²=0.230; Adjusted R²=0.189; p=0.001.

**R=0.399; R²=0.159; Adjusted R²=0.114; p=0.011.
Table 3. Logistic regression analysis for assessment of predictors of orofacial pain (presence and high pain intensity) and interference

<table>
<thead>
<tr>
<th>Model and variable</th>
<th>B</th>
<th>SE</th>
<th>p</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Presence of orofacial pain</strong>*</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(Constant)</td>
<td>-3.0</td>
<td>0.8</td>
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<tr>
<td>age (0≤49; 1≥50 years)</td>
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<td>0.7</td>
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<tr>
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<td>3.4</td>
<td>1.0-11.1</td>
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<tr>
<td>TMD (0=absent; 1=present)</td>
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<td>0.6</td>
<td><strong>0.001</strong></td>
<td>7.4</td>
<td>2.4-23.0</td>
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<tr>
<td><strong>High pain intensity</strong></td>
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<td></td>
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<tr>
<td>(Constant)</td>
<td>-4.1</td>
<td>1.1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>age (0≤49; 1≥50 years)</td>
<td>0.4</td>
<td>0.8</td>
<td>0.659</td>
<td>1.4</td>
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<td>3.0</td>
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<td>TMD (0=absent; 1=present)</td>
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<td><strong>0.002</strong></td>
<td>13.8</td>
<td>2.7-69.8</td>
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<td><strong>Interference</strong>*</td>
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<td>-3.3</td>
<td>0.9</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>age (0≤49; 1≥50 years)</td>
<td>-5.4</td>
<td>0.8</td>
<td>0.470</td>
<td>1.7</td>
<td>0.4-7.5</td>
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<td>RA (0=absent; 1=present)</td>
<td>0.8</td>
<td>0.7</td>
<td>0.241</td>
<td>2.2</td>
<td>0.6-8.4</td>
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<tr>
<td>TMD (0=absent; 1=present)</td>
<td>1.7</td>
<td>0.7</td>
<td><strong>0.009</strong></td>
<td>5.6</td>
<td>1.5-20.7</td>
</tr>
</tbody>
</table>

* Negelkerke Pseudo $R^2=0.348$; p<0.001; 78.8% correctly classified cases (52.2% with pain and 89.5% with no pain)
**Negelkerke Pseudo R^2 = 0.359; p < 0.001; 82.5% correctly classified cases (46.2% with high pain intensity and 89.6% with no pain or low pain)**

***Negelkerke Pseudo R^2 = 0.222; p = 0.009; 82.5% correctly classified cases (100% without interference, no one with interference)**

**Figure 1. Prevalence of TMD**

**Figure 2. Ratio of chronic pain grade and pain intensity**
Figure 3. Somatization, depression, and pain characteristics in individuals with rheumatoid arthritis and in control groups