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EVALUATION OF TEMPOROMANDIBULAR DYSFUNCTION IN PATIENTS WITH DIAGNOSIS OF RHEUMATOID ARTHRITIS

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ABSTRACT

To investigate the presence of temporomandibular joint dysfunction in patients with and without a diagnosis of rheumatoid arthritis, by analyzing the relationship between the variables by means of the Craniomandibular index, questionnaire of the American association of orofacial pain and questionnaire and index of functional limitation of the mandible. **Materials and methods:** The study was approved by the Ethics Committee in research, numbered 2.234.767, composed of 91 patients, divided into three groups. Two groups were tested: patients with rheumatoid arthritis using synthetic (n = 40) or biological (n = 27) drugs and control group with patients with no diagnosis of rheumatoid arthritis (n = 24). Participants were interviewed and examined by a researcher previously prepared to evaluate joints and their involvement with rheumatoid arthritis. **Results:** There was no statistical difference between patients in the test and control groups regarding the perception of joint noises (p = 0.181). Patients with rheumatoid arthritis had a higher degree of severity in the questionnaire and mandibular functional limitation index (p = 0.044) and craniomandibular index (p = 0.003). There was no statistical difference between the patients who used synthetic and biological drugs and in relation to age in the indices and questionnaires analyzed. **Conclusion:** Rheumatoid arthritis has been associated with ageing and predisposing temporomandibular joint dysfunction.

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INTRODUCTION

Rheumatoid arthritis (RA) is the main degenerative joint alteration, determined as an autoimmune disease of idiopathic cause, characterized as chronic inflammatory disease, reaching synovial articular membranes. RA can affect several joints, such as: hands, wrists, elbows, knees, ankles, and feet (Cunha et al., 2007; Nagayoshi et al., 2018; Marques et al., 2016; Rehan et al., 2018; Sidebottom e Salha, 2013). Treatment of RA is performed through of anti-inflammatory drugs and disease-modifying drugs (DMARDs), physical therapy and surgical intervention. The treatment should begin soon after the discovery of the disease preventing joint damage, limiting

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function and reducing pain of the patient, culminating in a better quality of life for the individual (Laurindo et al., 2004; Wiens et al., 2012; Carvalho et al., 2016). Temporomandibular dysfunction (TMD) is a term that encompasses several clinical problems, with a derangement in the masticatory system, both muscular disorders, and in the temporomandibular joint itself (TMJ) (Andrade et al., 2015; Porporatti et al., 2015; Florian et al., 2011). Lomas et al. (2018) state that TMD has a prevalence of clinical signs in about 60 to 70% of the population, with a predilection for women. This disharmony in the joint generates pain, alters function, causes midline deviation, stiffening sensation and develops noises during joint movement (Andrade et al., 2015; Porporatti et al., 2015; Florian et al., 2011). Andrade et al. (2015) report that TMJs undergo changes when involved with RA, characterizing as a TMD, presenting deformities ranging from minimal erosions

to severe impairment of the bone structure of the head of mandible, glenoid cavity, and joint eminence, reducing the range of motion. The diagnosis of RA is performed through the union of clinical, laboratory and radiographic exams (Goeldner *et al.*, 2011). To diagnose TMD, varieties of tools are used, such as questionnaires, anamnestic and clinical indices, which combined help in the correct diagnosis (Chaves *et al.*, 2008). According to Chaves *et al.* (2008), the indices present in the literature are Clinical Dysfunction Index (CDI), which classifies the degree of severity of the dysfunction, and Craniomandibular Index (CMI) or Temporomandibular Index (TMI), which evaluates the impairment of function, musculature and articulation. The existing questionnaires are questionnaire and Anamnestic Index of Fonseca, which characterizes the severity of TMD symptoms, American Academy of Orofacial Pain Questionnaire, which is useful for pre-screening patients, and Questionnaire and Mandibular function impairment questionnaire (MFIQ), which classifies patients in categories of severity of functional limitation related to TMD. Clinically, there is the diagnostic criterion (CDC / TMD) that evaluates the signs present in the individual. The positive relationship between RA and TMD is already established in the literature, but the fact that this dysfunction is multifactorial, makes its diagnosis difficult. The use of instruments that aid in this diagnosis, such as CMI, MFIQ and the questionnaire of the American association of orofacial pain, have already been well studied and confronted. However, it cannot be stated that these instruments are reliable when the individuals are diagnosed of RA related to the use of biological or synthetic DMARDs, justifying the accomplishment of the present investigation. In this context, the objective of this study was to investigate the presence of TMD in patients with and without RA diagnosis, analyzing the relationship between the variables through the CMI and the questionnaire of the American association of orofacial pain and MFIQ, comparing the influence of the use biological or synthetic DMARDs.

MATERIALS AND METHODS

This paper is an observational / descriptive and analytical study, following a cross-sectional design, submitted to the Research Ethics Committee of the Faculdade Independente do Nordeste (CEP / FAINOR), taking into account the ethical aspects set forth in Resolution 466/12 of the National Council health, and the same with the number of approved CAAE: 72679117.5.0000.5578 and the report number: 2234767.

The 91 patients who accepted to participate in the study signed the Informed Consent Form (ICF). They were divided into 3 groups:

- **Group 01:** Composed of 27 patients diagnosed with RA treated with biological DMARDs;
- **Group 02:** Composed of 40 patients diagnosed with RA treated with synthetic DMARDs;
- **Group 03:** Composed of 24 patients without RA diagnosis.

The common inclusion criteria for the test groups were as follows:

- Female and male individuals;
- Individuals diagnosed with RA (ICDs M05.0, M05.3, M05.8, M06.0, M06.8, M05.1, M05.2 and M08.0);

- over the age of 18 years
- Sign the ICF.

The common exclusion criteria for the test and control groups were as follows:

Do not respond or accept the clinical evaluation of temporomandibular joints

The epidemiological profile questionnaire was applied in the pharmacy of the Regional Nucleus of Health-Southwest in a reserved room that guaranteed secrecy about the identity of the individual, obtaining information such as sex, age and type of treatment instituted for patients with RA. The jumping TMJ evaluation was performed by means of a previously calibrated questionnaire, from the MFIQ and CMI, by a previously prepared researcher. All data were tabulated and statistically analyzed. For the descriptive analysis of the data the average \pm standard deviation and absolute and relative frequencies were used. The normality of the data was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Comparisons of the quantitative variables between the groups were performed using Student's t-tests for independent samples and Mann-Whitney. The frequencies were compared using chi-square or Fisher's exact tests (for cases where an expected frequency of less than five occurred). The level of significance adopted in all analyzes was 5% ($\alpha = 0.05$). The data were tabulated and analyzed in IBM SPSS Statistics for Windows (IBM SPSS, 21.0, 2012, Armonk, NY: IBM Corp.).

RESULTS

In the present study, 91 individuals were analyzed, 24 of the control group (without RA diagnosis) and 67 of the RA diagnosis group. Table 1 shows demographic characteristics and temporomandibular dysfunction parameters, according to the groups evaluated. The evaluation of temporomandibular dysfunction using the American Academy of Orofacial Pain Questionnaire indicated that, compared with controls, patients with RA had a higher frequency of "difficulty and / or pain when opening the mouth", "Difficulty and / or pain when chewing, speaking or using the cheek", "Rigid TMJ, tight or tired with regularity" and "Headache, neck pain or toothache frequently". RA patients also presented a higher frequency of moderate and severe mandibular functional limitation (MFIQ) compared to their peers. Although no difference was observed in the functional index, the RA group presented higher muscle, joint and temporomandibular indices evaluated by CMI instrument. Table 2 shows the demographic characteristics and TMD parameters in RA patients, according to the type of drug treatment. The mean age of the patients was statistically higher in the group treated with synthetic drug. In addition, the CMI functional index was lower in the group that used synthetic drug therapy. No significant differences were identified between the patients treated with biological or synthetic medication in the TMD components of the American Academy of Orofacial Pain Questionnaire, the degree of severity of mandibular functional limitation (MFIQ), and the CMI muscle, joint, and temporomandibular indices. Table 3 shows the demographic characteristics and parameters of temporomandibular dysfunction in patients with RA, according to the age group. The frequency of women was statistically higher in the older group (> 51), while the proportion of men was higher in the younger group (≤ 51).

Table 1. Demographic characteristics and parameters of temporomandibular dysfunction in the groups with rheumatoid arthritis and without rheumatoid arthritis (n = 91)

Parameter	Variable	Group		p-value
		Control (n = 24)	RA (n = 67)	
Demography	Age (Average \pm SD*)	45,42 \pm 9,46	51,30 \pm 11,46	0,023
	Sex [†]			
	Female	21 (87,5%)	57 (85,1%)	1,000
	Male	3 (12,5%)	10 (14,9%)	
Temporomandibular dysfunction - American Academy of Orofacial Pain questionnaire	Difficulty and / or pain when opening the mouth [‡]			
	Yes	1 (4,2%)	17 (25,4%)	0,034
	No	23 (95,8%)	50 (74,6%)	
	Jaw that "get stuck", locked, go out [†]			
	Yes	3 (12,5%)	12 (17,9%)	0,751
	No	21 (87,5%)	55 (82,1%)	
	Difficulty and / or pain when chewing, speaking or using the cheek [‡]			
	Yes	1 (4,2%)	19 (28,4%)	0,030
	No	23 (95,8%)	48 (71,6%)	
	Hear noises within the TMJ [‡]			
	Yes	7 (29,2%)	32 (47,8%)	0,181
	No	17 (70,8%)	35 (52,2%)	
	Rigid TMJ, tight or tired with regularity [‡]			
	Yes	3 (12,5%)	27 (40,3%)	0,026
	No	21 (87,5%)	40 (59,7%)	
	Pain in or around the ears, at the temples and cheeks [‡]			
	Yes	4 (16,7%)	19 (28,4%)	0,391
	No	20 (83,3%)	48 (71,6%)	
	Headache, neck pain or toothache frequently [‡]			
	Yes	6 (25,0%)	38 (56,7%)	0,015
No	18 (75,0%)	29 (43,3%)		
Recent trauma to the head, neck or jaws [†]				
Yes	1 (4,2%)	5 (7,5%)	1,000	
No	23 (95,8%)	62 (92,5%)		
A sudden change in the way the upper and lower teeth fit together [‡]				
Yes	2 (8,3%)	20 (29,9%)	0,067	
No	22 (91,7%)	47 (70,1%)		
Recent treatment for an unexplained problem in the TMJ [†]				
Yes	0 (0,0%)	2 (3,0%)	1,000	
No	24 (100,0%)	65 (97,0%)		
Functional mandibular limitation- MFIQ	Degree of severity of FJL [†]			
	Mild	23 (95,8%)	48 (71,6%)	0,044
	Moderate	1 (4,2%)	16 (23,9%)	
	Severe	0 (0,0%)	3 (4,5%)	
Temporomandibular dysfunction - Friction and Shiffman	Functionalindex(Average \pm SD)*	0,32 \pm 0,15	0,34 \pm 0,18	0,887
	Muscleindex(Average \pm SD) *	0,03 \pm 0,05	0,13 \pm 0,21	0,014
	Joint index (Average \pm SD)*	0,09 \pm 0,12	0,24 \pm 0,19	< 0,001
	TMI (Average \pm SD)*	0,15 \pm 0,08	0,24 \pm 0,15	0,003

RA, rheumatoid arthritis; SD, standard deviation; MFIQ, *Mandibular Function Impairment Questionnaire* (Mandibular Functional Limitation Index and Questionnaire); FJL, functional jaw limitation; degree of functional impairment; TMI, temporomandibular index. * Mann-Whitney Test; [†]Fisher exact test; [‡]Chi-square test.

Table 2. Demographic characteristics and parameters of temporomandibular dysfunction in patients with rheumatoid arthritis, according to the type of drug treatment (n = 67)

Parameter	Variable	Type of drug		p-value
		Biological (n = 22)	Synthetic (n = 5)	
Demography	Age(Average \pm SD*)	47,14 \pm 12,14	53,33 \pm 10,68	0,037
	Sex [†]			
	Female	17 (77,3%)	40 (88,9%)	0,277
	Male	5 (22,7%)	5 (11,1%)	
Temporomandibular dysfunction - American Academy of Orofacial Pain questionnaire	Difficulty and / or pain when opening the mouth [‡]			
	Yes	5 (22,7%)	12 (26,7%)	0,961
	No	17 (77,3%)	33 (73,3%)	
	Jaw that "get stuck",locked, go out [†]			
	Yes	3 (13,6%)	9 (20,0%)	0,737
	No	19 (86,4%)	36 (80,0%)	
	Difficulty and / or pain when chewing, speaking or using the cheek [‡]			
	Yes	7 (31,8%)	12 (26,7%)	0,880
	No	15 (68,2%)	33 (73,3%)	
	Hear noises within the TMJ [‡]			
	Yes	10 (45,5%)	22 (48,9%)	0,997
	No	12 (54,5%)	23 (51,1%)	
	Rigid TMJ, tight or tired with regularity [‡]			
	Yes	10 (45,5%)	17 (37,8%)	0,737
	No	12 (54,5%)	28 (62,2%)	
	Pain in or around the ears, at the temples and cheeks [‡]			
	Yes	6 (27,3%)	13 (28,9%)	1,000
	No	16 (72,7%)	32 (71,1%)	

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	Headache, neck pain or toothache frequently [‡]			
	Yes	13 (59,1%)	25 (55,6%)	0,991
	No	9 (40,9%)	20 (44,4%)	
	Recent trauma to the head, neck or jaws [†]			
	Yes	2 (9,1%)	3 (6,7%)	1,000
	No	20 (90,9%)	42 (93,3%)	
	A sudden change in the way the upper and lower teeth fit together [‡]			
	Yes	9 (40,9%)	11 (24,4%)	0,272
	No	13 (59,1%)	34 (75,6%)	
	Recent treatment for an unexplained problem in the TMJ [†]			
	Yes	1 (4,5%)	1 (2,2%)	1,000
	No	21 (95,5%)	44 (97,8%)	
Functional mandibular limitation- MFIQ	Degree of severity of FJL [†]			
	Mild	15 (68,2%)	33 (73,3%)	0,891
	Moderate	6 (27,3%)	10 (22,2%)	
	Severe	1 (4,5%)	2 (4,4%)	
Temporomandibular dysfunction - Fricton and Shiffman	Functionalindex(Average ± SD)**	0,41 ± 0,17	0,31 ± 0,17	0,026
	Muscleindex(Average ± SD) **	0,15 ± 0,23	0,13 ± 0,20	0,932
	Joint index (Average ± SD)**	0,26 ± 0,18	0,22 ± 0,19	0,354
	TMI (Average ± SD)**	0,27 ± 0,15	0,22 ± 0,14	0,077

RA, rheumatoid arthritis; SD, standard deviation; MFIQ, *Mandibular Function Impairment Questionnaire* (Mandibular Functional Limitation Index and Questionnaire); FJL, functional jaw limitation; degree of functional impairment; TMI, temporomandibular index. * * Student's t-test for independent samples; † Fisher's exact test; ‡ chi-square test; ** Mann-Whitney test.

Table 3. Demographic characteristics and parameters of temporomandibular dysfunction in patients with rheumatoid arthritis, according to the age group (n = 67)

Parameter	Variable	Age group*		p-value
		≤ 51 (n = 33)	> 51 (n = 34)	
Demografy	Sex [†]			
	Female	25 (75,8%)	32 (94,1%)	0,045
	Male	8 (24,2%)	2 (5,9%)	
Temporomandibular dysfunction - American Academy of Orofacial Pain questionnaire	Difficulty and / or pain when opening the mouth [‡]			
	Yes	8 (24,2%)	9 (26,5%)	1,000
	No	25 (75,8%)	25 (73,5%)	
	Jaw that "get stuck", locked, go out [‡]			
	Yes	7 (21,2%)	5 (14,7%)	0,707
	No	26 (78,8%)	29 (85,3%)	
	Difficulty and / or pain when chewing, speaking or using the cheek [‡]			
	Yes	10 (30,3%)	9 (26,5%)	0,939
	No	23 (69,7%)	25 (73,5%)	
	Hear noises within the TMJ [‡]			
	Yes	14 (42,4%)	18 (52,9%)	0,537
	Não	19 (57,6%)	16 (47,1%)	
	Rigid TMJ, tight or tired with regularity [‡]			
	Yes	12 (36,4%)	15 (44,1%)	0,691
	No	21 (63,6%)	19 (55,9%)	
	Pain in or around the ears, at the temples and cheeks [‡]			
	Yes	8 (24,2%)	11 (32,4%)	0,642
	No	25 (75,8%)	23 (67,6%)	
	Headache, neck pain or toothache frequently [‡]			
	Yes	18 (54,5%)	20 (58,8%)	0,915
	No	15 (45,5%)	14 (41,2%)	
	Recent trauma to the head, neck or jaws [†]			
	Yes	2 (6,1%)	3 (8,8%)	1,000
	No	31 (93,9%)	31 (91,2%)	
	A sudden change in the way the upper and lower teeth fit together [‡]			
	Yes	10 (30,3%)	10 (29,4%)	1,000
	No	23 (69,7%)	24 (70,6%)	
	Recent treatment for an unexplained problem in the TMJ [†]			
	Yes	0 (0,0%)	2 (5,9%)	0,493
	No	33 (100,0%)	32 (94,1%)	
Functional mandibular limitation- MFIQ	Degree of severity of FJL [†]			
	Mild	25 (75,8%)	23 (67,6%)	0,535
	Moderate	6 (18,2%)	10 (29,4%)	
	Severe	2 (6,1%)	1 (2,9%)	
Temporomandibular dysfunction - Fricton and Shiffman	Functionalindex(Average ± SD)**	0,39 ± 0,17	0,28 ± 0,16	0,007
	Muscleindex(Average ± SD) **	0,13 ± 0,20	0,14 ± 0,21	0,805
	Joint index (Average ± SD)**	0,23 ± 0,21	0,24 ± 0,17	0,549
	TMI (Average ± SD)**	0,25 ± 0,15	0,22 ± 0,14	0,306

RA, rheumatoid arthritis; SD, standard deviation; MFIQ, *Mandibular Function Impairment Questionnaire* (Mandibular Functional Limitation Index and Questionnaire); FJL, functional jaw limitation; degree of functional impairment; TMI, temporomandibular index. * Age was categorized based on the median of the sample. † Fisher's exact test; ‡ Chi-square test; ** Mann-Whitney test.

Curiously, the functional CMI index was higher in younger patients compared to older patients. No significant differences were identified between patients of the two age groups in the temporomandibular dysfunction components of the American Academy of Orofacial Pain Questionnaire, severity of mandibular functional limitation (MFIQ), and muscle, joint, and temporomandibular indexes of CMI.

DISCUSSION

The questionnaire of the American Academy of Orofacial Pain depends on the interviewee's response and interpretation, which may present some unexpected results by the researchers and not justified by the literature. In addition to the scarcity of studies using this questionnaire in patients with RA. The mandibular displacement or locking, the perception of joint noises, pain in the ears or cheeks and the recent treatment for TMD in the present study did not present statistical differences between the groups analyzed. Chaves *et al.* (2008), describe that this questionnaire should be used as a pre-screening. Manfredi *et al.* (2001) used this method in their research doing later clinical examination to confirm the data, which was not performed in the present study. The MFIQ was analyzed and it was observed that patients with RA had a higher degree of severity than in patients in the control group. However, even though the results are widely accepted in the literature, some authors report that examinations that are more detailed should be carried out to certify the data (Chaves *et al.*, 2008; Parente and Cerdeira, 2013). It also highlights the lack of works that use this index for TMD evaluation in patients diagnosed with RA. The use of indexes helps in the classification of dysfunction severity in each patient (Fricton and Schiffman, 1986). According to Almeida *et al.* (2010) and Chaves *et al.* (2008) the CMI presents to the researcher the ease in understanding the results, as it presents numerical values. The CMI presented in this study higher value for patients with RA than for patients in the control group, corroborating with Cunha *et al.* (2007).

Chakr *et al.* (2017) report in their study that there was no statistical difference in treatment with biological and synthetic DMARDs. A similar finding was found in the present study. According to Passos (2016) DMARDs are drugs that act on cells of the immune system and substances they produce. With this, they can stimulate a new course for disease, differentiating their place of action and the recommendation of use. Mota *et al.* (2015) describes that biological agents are used in cases where the response is incomplete or in cases where there is no response with synthetic DMARDs. In the present study, Passos (2016) e Grigor (2004) observed that the use of DMARDs should be made early after the diagnosis of RA, demonstrating a better effectiveness. In the present study, it was not observed the time of the patient's diagnosis, which may justify the lack of statistical difference in all indices analyzed between the ages observed. Goeldner *et al.* (2011) emphasize the importance of early treatment. There was a relationship between higher ages and the use of synthetic DMARDs. Costa *et al.* (2014) report in their research that most of young people used biological drugs. However, there is no evidence that the use of methotrexate, a synthetic DMARD, is the gold standard for more advanced ages. However, there are no warnings for the use of biological drugs. It should only study the case correctly, complementing that there are few cases in the literature using biological DMARDs in patients with advanced age. It is observed in the study that patients

with RA present a greater degree of severity in TMD and present relationship with ageing. The synthetic and biological drugs do not present statistical difference, being the choice determined by the individuality of each case, and that the type of DMARD did not influence the degree of TMD severity.

Conclusion

Based on the presented results it is possible to conclude:

- RA was associated with ageing and seems to predispose the TMD, in addition to increasing the severity of functional mandibular limitation.
- Synthetic drug therapy was associated with ageing. The fact that individuals treated with synthetic medicine showed a lower CMI functional index suggests a greater efficacy of this type of drug, in relation to the biological drug.
- The results suggest that RA affects men earlier in relation to women and those functional symptoms have been more intense (functional index of CMI) in younger individuals.

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