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PREVALENCE OF JOINT NOISES IN PATIENTS WITH TEMPOROMANDIBULAR DYSFUNCTION AND ITS ASSOCIATION WITH OCCLUSIVE-FUNCTIONAL PARAMETERS

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Abstract: Temporomandibular disorders (TMD) are a set of joint and muscle disorders in the orofacial region, characterized mainly by pain, limitation of mandibular movement and joint noises, the latter being the first sign of alteration in the joint. The objectives of this study are to verify the prevalence of joint noises in a population with TMD and to verify a possible association of joint noises with occlusal and mandibular functional parameters. The sample consisted of patients who sought treatment at the Faculty of Dentistry of the Universidade do Estado do Rio de Janeiro seeking treatment for TMD in 2016. The patients answered a questionnaire and underwent a clinical examination, according to the RDC/TMD (Research Diagnostic Criteria for Temporomandibular Disorders). The association between each of the parameters evaluated and the presence of joint noise was verified by Fisher's exact test and by the Mann-Whitney test (significance level of 0.05). Thirty-six patients participated in this study, 30 (83.3%) were female and 6 (16.7%) were male. The mean age was 43.58 ± 13.89 years. Twenty-seven patients had some TMJ noise, which corresponded to 75% of the sample examined. Of these, 18 (66.7%) had bilateral noise and 9 (33.3%) had unilateral noise. Click was the most predominant type of noise, observed in 17 (63%) patients with joint noise, and crepitus was observed in 10 (37%) of these patients. No association was found between the presence of joint noises and age, sex, mouth opening limitation, maximum mouth opening, overjet, midline deviation, mouth opening pattern, TMJ pain on palpation or bruxism.

Keywords: Ear-jaw articulation; Temporomandibular Joint Disorders; Temporomandibular joint dysfunction syndrome.

INTRODUCTION

Temporomandibular disorder (TMD) is defined as a set of disorders that involve the masticatory muscles, the temporomandibular joint (TMJ) and the structures associated with it. It is identified as the main cause of pain of non-dental origin in the orofacial region, including the head, face and related structures (SARTORETTO, 2012). The main signs and symptoms are pain, limitation of mandibular movement and joint noises (CONTI et al., 2000).

Joint noises are very frequent signs, both in symptomatic and asymptomatic individuals. A prevalence of 95% in patients with TMD has already been described (FIGUEIREDO et al., 2009). They are classified as clicking and crackling (GARCIA & MADEIRA, 1999). Their isolated presence does not necessarily indicate a dysfunction, but generally they present themselves as the first clinical sign of alteration in the temporomandibular joint (MORENO et al., 2002; WINOCUR et al., 2006).

Joint sounds are generally associated with intracapsular events (PRINZ, 1998). The possible causes of sounds are structural alterations, and the most frequent are hypermobility of the condyle-disk complex, displacement of the articular disc to the anterior, structural alterations of the articular surface, in addition to degenerative processes, which cause crackles (PRINZ, 1998). ; CONTI et al., 2000). They can also be originated by the perforation of the articular disc, causing direct bone contact of the condyle of the mandible with the articular fossa (LANDULPHO et al., 2003).

According to Landulpho et al. (2003), as it is one of the signs of temporomandibular disorder, joint sounds require monitoring and, sometimes, treatment, according to the appropriate assessment of the case. In most cases, however, no treatment is necessary if

there is no associated pain or limitation of mandibular function (MORENO et al., 2002).

Some studies have found a relationship between the presence of joint noises and some occlusal and mandibular functional factors, such as unilateral crossbite, bruxism, sliding from the centric relationship position to maximum habitual intercuspation greater than 1 mm (PULLINGER et al., 1988), opening increased maximum, increased anterior crowding and deeper overbites (RUNGE et al., 1989; KELLING et al., 1994). The topic is still controversial, as many studies have not found this correlation (MANFREDINI et al., 2017). Therefore, there is a need to know more deeply about the occlusal factors, because the occlusal instability can be a reason for the overload of the masticatory system. Thus, the objectives of this study are to verify the prevalence of joint noises in a population with TMD and to verify a possible association of joint noises with occlusal and mandibular functional parameters.

MATERIAL AND METHODS

This study is part of a research entitled "Efficacy of the myofascial manipulation technique - Stecco method - in the reduction of orofacial pain and Temporomandibular Disorders", developed at the Orofacial Pain, Temporomandibular Disorders and Occlusion clinic of the Faculty of Dentistry of the University of the State of Rio de Janeiro. of January (FO-UERJ). The study was approved by the Research Ethics Committee on June 6, 2018, whose opinion number is 2,695,361. The results regarding the treatments performed were published in the article: "*Facial Pain: RCT between Conventional Treatment and Fascial Manipulation®* for Temporomandibular *Disorders*" (SEKITO et al., 2022).

The sample of this study consisted of patients who sought treatment at the FO-UERJ in 2016 for TMD treatment. All patients had muscle and/or joint disorders in the orofacial region, associated with chronic pain, for more than four months. duration, and a value equal to or greater than 4 on the analog numeral scale (ENA). Other inclusion criteria were: being between 18 and 75 years old and signing an informed consent form (ICF), agreeing to become a research subject.

Patients who had the following conditions were excluded from the study: 1) syndromes that could affect the musculoskeletal system in any instance; 2) psychiatric alteration that characterized axis 2 of BELL; 3) associated fibromyalgia, with a previous diagnosis made by the physician; 4) associated rheumatological diseases, with previous diagnosis made by the doctor; 5) chemical dependence; 6) neurological disorders and neuropathies; 7) coagulopathies (INR less than 2); 8) multiple trauma; 9) edentulism without the use of prosthesis or with prosthesis without conditions of use; 10) severe arthrosis.

Patients answered a questionnaire and underwent a clinical examination, according to the RDC/TMD (*Research Diagnostic Criteria for Temporomandibular Disorders*). In the present study, the following parameters were evaluated in search of an association with the presence of joint noises: sex, age, maximum mouth opening, opening limitation, overjet, midline deviation, opening pattern, pain on palpation in the ATM and bruxism.

For measurements, a digital caliper was used. As "maximum mouth opening" was considered the amplitude of the maximum vertical opening movement that the patient was able to perform, without assistance, adding the interincisal measurement to the overbite measurement. A value smaller than 40 mm was considered as "opening limitation" (IKEBE et al., 2008). The "overbite" was considered normal if less than 4 mm, and increased if equal to or greater than 4 mm (MANFREDINI et al., 2014). To assess the

"opening pattern", the patient was asked to open their mouth three times, and the pattern that was repeated at least twice, straight or with deviation (regardless of whether the deviation was corrected or not) was considered. TMJ palpation was performed by a single calibrated examiner, with digital pressure of 0.5 kgf on the lateral pole, asking the patient whether this procedure caused him pain at the site. The presence of joint noise was evaluated by the same examiner, considering three repetitions of the opening and closing movement, with fingers over the joint, without the use of a stethoscope. Patients who answered affirmatively to at least one of the following questions were considered "with bruxism": "Have you ever noticed or has anyone told you that you grind or clench your teeth when you are sleeping?" or "During the day, do you grind or clench your teeth?".

The association between each of the parameters evaluated and the presence of joint noise was verified by Fisher's exact test. Measures of maximum mouth opening, overbite and midline deviation were compared between individuals with and without joint noises using the Mann-Whitney test. The significance level adopted was 0.05.

RESULTS

Thirty-six patients participated in this study, 30 (83.3%) were female and 6 (16.7%) were male. The mean age of the participants was 43.58 ± 13.89 years. Twenty-seven patients had some TMJ noise, which corresponded to 75% of the sample examined. Of these, 18 (66.7%) had bilateral noise and 9 (33.3%) had unilateral noise. Click was the most predominant type of noise, observed in 17 (63%) patients with joint noise, and crepitus was observed in 10 (37%) of these patients.

The presence of joint noise in the TMJ could not be associated with any of the variables studied (p>0.05), as shown in Table 1. Comparing the groups with and without joint noise, there was no difference in terms of age or to the values of maximum mouth opening, overbite or midline deviation (Table 2).

		Presence of joint noise		Total	*P*-value
		Without noise	With noise		
Gender	Female	9 (30%)	21 (70%)	30 (100%)	0,303
	Male	0 (0%)	6 (100%)	6 (100%)	
opening limitation	Without limitation	8 (25%)	24 (75%)	32 (100%)	0,702
	With limitation	1 (25%)	3 (75%)	4 (100%)	
Overbite	Normal	8 (29,6%)	19 (70,4%)	27 (100%)	0,396
	Increased	1 (11,1%)	8 (88,9%)	9 (100%)	
midline deviation	without deviation	3 (23,1%)	10 (76,9%)	13 (100%)	1,000
	with deviation	6 (26,1%)	17 (73,9%)	23 (100%)	
opening pattern	Right	2 (50%)	2 (50%)	4 (100%)	0,255
	with deviation	7 (21,9%)	25 (78,1%)	32 (100%)	
Pain on palpation in the TMJ	Without pain	1 (12,5%)	7 (87,5%)	8 (100%)	0,698
	With pain	8 (28,6%)	20 (71,4%)	28 (100%)	
Bruxism	Without bruxism	4 (40%)	6 (60%)	10 (100%)	0,226
	With bruxism	5 (19,2%)	21 (80,8%)	26 (100%)	

Tabela 1. Distribuição e análise de associação entre a presença de ruído articular e as variáveis estudadas (teste exato de Fisher)

	Presence of joint noise		*P*-Value
	Without noise	With noise	
Age (years)	43,33 ± 15,41	43,67 ± 13,66	0,921
maximum opening (mm)	46,56 ± 9,87	50,05 ± 7,73	0,295
Overbite (mm)	2,73 ± 1,22	2,94 ± 1,42	0,747
midline deviation (mm)	1,70 ± 1,49	1,16 ± 1,06	0,368

Table 2. Comparison between groups with and without articular noise using the Mann-Whitney test (mean ± standard deviation)

DISCUSSION

The prevalence of joint noise found in the present study (75%) is similar to that found in other studies that used samples with TMD, in which it is expected to find a higher prevalence than in the general population. Conti et al. (2000) found a prevalence of 62.5% in patients with TMD. Figueiredo et al. (2009) reported a prevalence of 95%.

Although the population evaluated in this study is small, it was found that the high prevalence of joint sounds in women agrees with findings from previously carried out epidemiological studies. Bracco et al. (1997) and Christensen et al. (1992) found that 79% of the patients who presented joint noises were female. In the present study, the percentage of women in the group with joint noise was 77.8%, but no association was found between the presence of noise and gender (p=0.303). The fact that the sample had few men (only 9) may have masked a preference for females in noise. It is known that women have a significantly higher prevalence of TMD symptoms (including joint noises) than men (CAMACHO et al., 2014; LUNG et al., 2018).

The same reasoning can be followed when considering the relationship between the presence of joint noises and the pattern of mouth opening. As the number of individuals with a straight opening pattern was small (only 4), no association was found between the two variables (p=0.255). The presence of noises was expected to be associated with deviations during mouth opening, since an important cause of clicking is the anterior displacement of the articular disc, which also causes deviations in opening (GOTO et al., 2005).

Zhang et al. (2020) reported 30.2% of subjects with mouth opening limitation and 69.8% without mouth opening limitation. On the other hand, the sample of the present study found 25% of subjects without opening limitation and 75% with opening limitation and some type of joint noise, which can be attributed not only to age, but also to other patterns such as the country in which each survey was developed. As for the maximum opening measure, Conti et al. (2015) found an average of 40.5 mm in individuals with joint noise, while the present study found 46.56 mm in patients without noise and 50.05 mm in patients with noise. Despite not showing statistical significance (p=0.295), this difference may be clinically relevant.

In this study, the presence of bruxism was evaluated only through patient reports, with a prevalence of 72.2%. However, other clinical signs such as tooth wear were not evaluated, which may have resulted in different results from reality. In a pilot cross-sectional study by Costa et al. (2017), 43.1% of those evaluated reported having a habit of grinding their teeth, while 17.6% had associated tooth wear. However, the authors report that the value may be due to the sample size, since other studies have indicated a higher prevalence. This high prevalence may be associated with

emotional and stress factors.

Keeling et al. (1994) stated that deeper overbites increase the risk of presenting joint noises. Like these authors, the present study found a high percentage of patients with increased overbite, equivalent to 88.9%. However, it was not possible to find an association between increased overbite and the presence of joint noises (p=0.396).

Regarding the midline deviation, in the present study, 73.9% of patients presented a midline deviation of approximately 1.16 mm. Similarly, Zhang et al. (2020) found a high prevalence of patients with deviation, which was equivalent to 65.3% of the patients analyzed.

A study by Bisi et al. (2010) showed that of the 58 patients analyzed, 39 (67%) had clicking noise, of which the bilateral occurrence was 29 (74%) and unilateral in 10 (26%) cases. This result reinforces the data obtained in the present study, in which 18 patients (66.7%) had bilateral noise and 9 (33.3%) had unilateral noise, with a higher prevalence of bilateral involvement to the detriment of unilateral involvement.

In the present study, the assessment of joint noise was performed by digital palpation, without the use of auscultation with a stethoscope, a fact that may have underestimated the prevalence of noise. In a comparative study using manual palpation and computerized vibratography of the TMJ, Conti et al. (2000) observed in their results a prevalence of 62.5% of joint sounds, concluding that the identification and classification are difficult even when obtained by computerized devices and that the calibration of the evaluators can improve the identification of joint sounds.

CONCLUSION

The prevalence of joint noises in the studied sample was 75%, with the click being the most prevalent type of noise. No association was found between the presence of joint noises and age, sex, mouth opening limitation, maximum mouth opening, overjet, midline deviation, mouth opening pattern, TMJ pain on palpation or bruxism.

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