Journal of Advances in Medicine and Medical Research

Volume 35, Issue 22, Page 76-87, 2023; Article no.JAMMR.107406
ISSN: 2456-8899
(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614, NLM ID: 101570965)

Association between Comorbidities and Subtypes of Temporomandibular Dysfunction: An Observational Study

Luciana e Silva Nobre [a], Luciane Lacerda Franco Rocha Rodrigues [a], Thiago Bezerra Leite [b,c*], Ana Eugênia Sousa Campos [a], Emmanuel Arraes de Alencar Júnior [b], Anelise Luna de Carvalho [a], Gabriel Braga da Veiga Pessoa [d], Catiana Secundino Ralin de Araújo [b], and António Sérgio Guimarães [a]

[a] São Leopoldo Mandic College of Dentistry, Orofacial Pain Laboratory, Campinas, SP, Brazil.
[b] Pharmacy, Dentistry and Nursing College, Federal University of Ceará, Fortaleza, Brazil.
[c] Leão Sampaio University Center, Juazeiro Do Norte, Brazil.
[d] Federal University of Rondonia, Porto Velho, Brazil.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2023/v35i225248

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/107406

Original Research Article

Received: 25/07/2023
Accepted: 01/10/2023
Published: 12/10/2023

**Corresponding author: E-mail: thiagobezerraleite@gmail.com;*

ABSTRACT

Aims: Temporomandibular disorder (TMD) has an important relationship with a compromised general health status, which is why the present study evaluated the presence of comorbidities in individuals diagnosed with TMD, identifying the TMD subtype, whether muscle and/or joint, and verifying the most frequent comorbidities related to TMD subtypes, relating them to human body systems.
Materials and Methods: We selected 270 individuals in the city of Fortaleza/CE, aged between 18 and 70 years old. The individuals were evaluated using the DC/TMD instrument. In addition, a questionnaire to quantify comorbidities was applied.
Results: Regarding the subtype of TMD in the sample under study, it was observed that the most prevalent was muscle/joint (53.3%; n = 144), followed by muscle (46.3%; n = 125) and last to articulate (0.4%; n = 1). No important correlations were identified ($p > 0.05$) when we compared TMD subtypes with gender and age variables. When asked about the presence of diseases, it was shown that the nervous system (n = 89; 33%) and sensory (n = 84; 31.1%) were the ones with the highest prevalence among comorbidities.
Conclusion: all TMD subtypes were found in the sample, predominantly mixed TMD. Several comorbidities were found, especially in the nervous and sensory systems. No correlations were found between the presence of comorbidities and gender or age.

Keywords: Comorbidity; diagnosis; temporomandibular joint disorders.

1. INTRODUCTION

Temporomandibular Disorders (TMDs) include various neuromuscular and musculoskeletal conditions of the Temporomandibular Joint (TMJ) and associated structures. According to the American Academy of Orofacial Pain (AAOP), the current definition is a collective term that encompasses a range of clinical problems involving the muscles of mastication, TMJ, and associated structures [1].

TMD affects 5-12% of the general population and is the second most frequent cause of pain and musculoskeletal limitation, preceded only by low back pain [2]. It is often associated with symptoms of other chronic pain disorders and comorbidities. Individuals with TMD are more likely to have other joint pain compared to those without TMD [3].

Comorbidity is considered when two diseases have correlation and temporal continuity, with the possibility of them appearing simultaneously, or one preceding the other with an association that is more than casual. There is a positive association between the number of comorbidities and the intensity/duration of TMD pain. The influence occurs mutually and leads to direct effects on the signs and symptoms reported by the patient [4,5].

The identification of comorbidities in patients being treated for TMD has direct implications for the elaboration of the treatment to be proposed, and must be done since the initial examination in the patient's anamnesis and reported separately. There are situations in which only when both conditions, TMD and comorbidity, are treated, the patient improves [4-6].

Treatment success and TMD control will therefore not be obtained in isolation, making further studies necessary to correlate this disorder with the present comorbidities. This research evaluated the presence of comorbidities in individuals diagnosed with TMD, of subtypes of temporomandibular disorders (TMD), classified by DC/TMD, and verified the association between comorbidities and TMD subtypes.

2. MATERIALS AND METHODS

2.1 Study Population, Sampling Plan, and Sample Calculation

This is a cross-sectional, observational research of quantitative nature. The sample consisted of individuals of both sexes, aged between 18 and 70 years of age, who attended the TMD clinic of the Specialized Dental Center of the State of Ceará (CEO-CENTRO), located in Fortaleza - CE- Brazil for treatment. We considered all patients attended on this specialized clinic at the moment of the study.

The inclusion criteria were patients of both sexes aged between 18 and 70 years of age,

diagnosed with TMD, and who signed the Free and Informed Consent Form. Exclusion criteria were patients with any inability to complete forms and answer questions asked during the interview, as well as patients who refused to participate in the survey.

2.2 Methodology for Data Collection

Initially, the participants treated at CEO received the Free and Informed Consent Form. Then, the examiner assessed the patient according to the DC/TMD (Axis 1); diagnosing the present TMD subtype(s). Soon after, the patient was asked about the existence of other pathologies, which were allocated in a questionnaire, according to the corresponding human body system.

Participants were assessed using the DC/TMD instrument (Axis I) to diagnose the presence and define subtypes of TMD. After the application of the DC/TMD (Axis I), the patients were asked to report other present diseases. The examiner recorded the reported diseases in the corresponding system: cardiovascular, respiratory, digestive, nervous, sensory, endocrine, excretory, urinary, reproductive, musculoskeletal, immunological, lymphatic, and integumentary. Next, data were tabulated regarding the diagnosis of TMD subtypes and the system corresponding to the comorbidity, collected in the anamnesis, for comparative purposes and verification of which system would be more related to the presence of TMD.

2.3 Analysis of Results

The results obtained were tabulated and submitted to a descriptive statistical analysis to assess the prevalence of TMD subtypes and the most frequent comorbidities reported by the patient. The comorbidities found were related to the TMD subtypes, as well as the distribution between sexes and between age groups, with data tabulated by decades. Data were tabulated in Microsoft Office Excel® software and exported to SigmaPlot software version 11.0. Clinical-demographic data were expressed in absolute frequency and percentage, and quantitative data as mean and standard deviation. Spearman correlation and the Chi-square test were used, where the value of $p < 0.05$ was adopted as statistically significant.

3. RESULTS

A total of 270 patients were selected, of which 88.5% (n = 239) were female and 11.5% (n = 31) were male (Table 1), with an age mean of 43 ± 12.9 years (p = 0.48; Kolmogorov-Smirnov test).

After dividing the range by decades, the most prevalent age was between 39 and 48 years old (27%; n = 73), followed by 49 to 58 years old (24.4%; n = 66) and 29 to 38 years old (18, 9%; n = 51) (Table 1). A significant difference was found ($p < 0.05$; Chi-square test) when comparing age by age group.

Regarding the subtype of TMD in the study sample, it was observed that the most prevalent was joint/muscular (53.3%; n = 144), followed by muscular (46.3%; n = 125) and finally joint (0.4%; n = 1) (Table 2).

Table 3 represents the correlation between sex (r = -0.11) and age (r = 0.03) variables with TMD subtype. No important correlations were identified ($p > 0.05$) when comparing TMD subtypes with sex and age variables.

When questioned about the presence of diseases, it was shown that the nervous (n = 89; 33%) and sensory (n = 84; 31.1%) systems were the ones with the highest prevalence among comorbidities; however, disorders in the lymphatic (n = 1; 0.4%), excretory (n = 4; 1.5%), and urinary (n = 4; 1.5%) systems were rarely reported by the study sample (Table 4).

Table 5 highlights the correlation between comorbidities and TMD subtype, showing that joint/muscular TMD was the most prevalent, followed by muscular, both in the nervous and sensory systems.

No important correlations (moderate or strong) were observed when comparing comorbidities regarding sex (Table 6). In females, the most prevalent comorbidities were in the nervous (n = 82; 30.4%) and sensory (n = 76; 28.1%) systems, and in males, in the cardiovascular (n = 9; 3.3 %) and sensory systems (n = 8; 3%).

Table 1. Sample age group

Variables	
Age	%
Up to 28 years	16.3%
29 – 38 years	18.9%
39 – 48 years	27.0%
49 – 58 years	24.4%
59 – 68 years	11.1%
69 – 78 years	01.1%

Caption: p < 0.05 (Chi-square test).
**Age group that showed the biggest difference when compared to other age groups.*

Table 2. Data distribution in relation to TMD subtype

Subtypes	%
Joint and Muscular	53.3%
Articulate	0.4%
Muscular	46.3%

Caption: p < 0.05 (Chi-square test)

Table 3. Correlation between sex, age and TMD subtype

	TMD			r	P
Variables	**Muscular**	**Joint**	**Joint/ Muscular**		
Sex					
Female	106 (39.3%)	1 (0.4%)	132 (48.9%)	-0.11	0.08
Male	19 (7%)	0	12 (4.4%)		
Age					
Up to 28 years	24 (9%)	0	20 (7.5%)	0.03	0.61
29 – 38 years	22 (8.2%)	0	29 (10.9%)		
39 – 48 years	32 (12%)	1 (0.4%)	40 (15%)		
49 – 58 years	29 (10.9%)	0	37 (13.9%)		
59 – 68 years	14 (5.2%)	0	16 (6%)		
69 – 78 years	2 (0.7%)	0	1 (0.4%)		

Caption : TMD = temporomandibular disorder. Number of subjects followed by relative frequency in percentage (%); r = Spearman correlation, P = Chi-square.

Table 7 demonstrates the correlation between age and comorbidities, noting that there were no important correlations (moderate or strong) in the study sample. The only exception was the cardiovascular system, which showed a weak correlation (r = 0.37). The ages at which the comorbidities had the greatest influence were from 39 to 48 years old and from 49 to 58 years old in the nervous and sensory systems.

4. DISCUSSION

This study aimed to evaluate the prevalence of comorbidities in individuals with TMD, identifying the human body system and relating it to the subtype of TMD, be it muscle and/or joint. The research was composed of individuals of both sexes, aged between 18 and 70 years, who were diagnosed with TMD. In the sample, a total of 88.5% (n = 239) were female and 11.5% (n = 31) male, with a mean age of 43 ± 12.9 years, thus predominating the age group between 39 and 48 years, different from the results found in other studies [5,6], in which women in the 20-40 years age group have more TMD symptoms, the present study may have differed due to the disparity between the number of men and women collected.

Regarding the subtype of TMD in the study sample, it was observed that the most prevalent was muscular/joint (53.3%; n = 144), followed by muscular (46.3%; n = 125), and lastly joint (0.4%; n = 1). In this research, instruments such as the DC/TMD questionnaire and a form for surveying comorbidities were used. Other studies with similar outcomes are found by Progiante [7], which in 1643 found symptoms of pain in 36.2% of the sample, with 29.5% muscle pain, and 6.5% joint pain. Ismail [8] observed in a sample composed of 92 individuals a prevalence of 30.4% of muscular TMD, 67.4% joint/muscular, and 2.2% of joint. In the review carried out by Reis [9],patients with muscle TMD are more anxious and depressed than patients with other TMD subtypes, showing that the high prevalence of muscle problems can either influence or be influenced by comorbidities of a psychosomatic nature. In the study by Lei [10], he adds that sleep and quality of life related to oral health are also associated with painful subtypes, having a considerable influence on these symptoms.

The various comorbidities and conditions of bodily pain in TMD have been associated with generalized alterations in pain processing. In the present study, the main comorbidities found were related to the nervous (n = 89; 33%) and sensory (n = 84; 31.1%) systems, which were the ones with the highest prevalence among comorbidities, while disorders in the lymphatic (n

= 1; 0.4%), excretory (n = 4; 1.5%) and urinary (n = 4; 1.5%) systems were rarely reported by the sample under study, with no significant correlations between age or sex and comorbidities. Individuals with TMD reported multiple pain comorbidities, especially those of muscular origin, coexisting with other clinical conditions, a situation pointed out by several studies [11,12]. In the study by Gonçalves [10] TMD subtypes were related to frequently reported situations, such as headache, with myofascial and joint/muscular TMD being strongly associated with these episodes, a situation not found in joint TMD. In order to have a more accurate correlation, Klasser [13] did not consider joint/muscular TMD, observing a greater number of comorbidities in muscular TMD, with psychological and neurological conditions being the most frequent ones. In the present study, all TMD subtypes were found in the sample, predominantly joint/muscular TMD, as previously mentioned, which were compared to comorbidities related to human body systems and not to specific situations.

Table 4. Reported comorbidities

Comorbidities	n	Fr	P
Cardiovascular			
Yes	61	22.6%	<0.05
No	209	77.4%	
Respiratory			
Yes	32	11.9%	<0.05
No	238	88.1%	
Digestive			
Yes	55	20.4%	<0.05
No	215	79.6%	
Nervous			
Yes	89	33%	<0.05
No	181	67%	
Sensory			
Yes	84	31.1%	<0.05
No	186	68.9%	
Endocrine			
Yes	29	10.7%	<0.05
No	241	89.3%	
Excretory			
Sim	4	1.5%	<0.05
Não	266	98.5%	
Urinary			
Yes	4	1.5%	<0.05
No	266	98.5%	
Reproductive			
Yes	8	3%	<0.05
No	262	97%	
Skeletal Muscle			
Yes	40	14.8%	<0.05
No	230	85.2%	
Immunological			
Yes	43	15.9%	<0.05
No	227	84.1%	
Lymphatic			
Yes	1	0.4%	<0.05
No	269	99.6%	
Integumentary			
Yes	5	1.9%	<0.05
No	265	98.1%	

Caption : n = number of subjects; Fr = relative frequency in percentage; P = p-value, Binomial Test.

Table 5. Correlation between comorbidities and TMD subtype

	TMD			r	P
Variables	**Muscular**	**Articulate**	**Muscular/ Articulate**		
Cardiovascular					
Yes	34 (12.6%)	0	27 (10%)	-0.10	0.10
No	91 (33.7%)	1 (0.4%)	117 (43.3%)		
Respiratory					
Yes	17 (6.3%)	0	15 (5.6%)	-0.05	0.42
No	108 (7%)	1 (0.4%)	129 (47.8%)		
Digestive					
Yes	27 (10%)	0	28 (10.4%)	-0.03	0.67
No	98 (36.3%)	1 (0.4%)	116 (43%)		
Nervous				0,04	0,54
Yes	39 (14,4%)	0	50 (18,5%)		
No	86 (7%)	1 (0,4%)	94 (34,8%)		
Sensory					
Yes	38 (14.1%)	0	46 (17%)	0.02	0.78
No	87 (32.2%)	1 (0.4%)	98 (36.3%)		
Endocrine					
Yes	16 (5.9%)	0	13 (4.8%)	-0.06	0.32
No	109 (40.4%)	1 (0.4%)	131 (48.5%)		
Excretory					
Yes	2 (0.7%)	0	2 (0.7%)	-0.01	0.89
No	123 (45.6%)	1 (0.4%)	142 (52.6%)		
Urinary					
Yes	2 (0.7%)	0	2 (0.7%)	-0.01	0.89
No	123 (45.6%)	1 (0.4%)	142 (52.6%)		
Reproductive					
Yes	6 (2.2%)	0	2 (0.7%)	-0.10	0.10
No	119 (44.1%)	1 (0.4%)	142 (52.6%)		
Skeletal Muscle					
Yes	17 (6.3%)	0	23 (8.5%)	0.04	0.58
No	108 (40%)	1 (0.4%)	121 (44.8%)		
Immunological				7-0.02	
Yes	21 (7.8%)	0	22 (8.1%)		0.74
No	104 (38.5%)	1 (0.4%)	122 (45.2%)		
Lymphatic					
Yes	0	0	1 (0.4%)	0.05	0.35
No	125 (46.3%)	1 (0.4%)	143 (53%)		
Integumentary					
Yes	3 (1.1%)	0	2 (0.7%)	-0.04	0.54
No	122 (45.2%)	1 (0.4%)	142 (52.6%)		

Caption : TMD = temporomandibular disorder. Number of subjects followed by relative frequency in percentage (%); r = Spearman correlation, P = Chi-square.
Source: Own authorship

Several other pieces of evidence point to the relationship between comorbidities and TMD, especially regarding the muscular subtype, indicating that this subtype is more associated with comorbidities, as is the case in this study. They also report that there is a bigger relationship between muscular TMD and situations of anxiety, depression and suicidal ideation, promoting an increased risk of chronic facial pain [8,9,14-16].

It is a consensus that TMD is a condition more associated with the female sex. In the present study, most individuals were of this sex, however it has not influenced the correlations [6,17]. Other studies that evaluated comorbidities and TMD

also used the DC as an instrument, as well as the present study, and observed that painful comorbidities, such as migraine, chronic fatigue syndrome, irritable bowel syndrome and intestinal cystitis, had a positive association with presence of TMD. Moreover, a strong relationship with the presence of chronic depression is described as a risk factor for the TMD onset, especially in elderly and female patients [4,8,17-19].

Individuals with TMD are up to 5 times more likely to develop other joint pain. Other comorbidities have a close relationship with the symptoms worsening and should be monitored, such as: sinus disease, tinnitus, headache, eye disorders, fatigue, dizziness, genitourinary disorders, fibromyalgia, and xerostomia. Low back pain conditions and chronic pelvic pain are also often associated with TMD [3,4,7,12,20-26].

Table 6. Correlation between comorbidities and sex

	TMD		**r**	**P**
Variables	**Female**	**Male**		
Cardiovascular				
Yes	52 (19.3%)	9 (3.3%)	0.06	0.36
No	187 (69.3%)	22 (8.1%)		
Respiratory				
Yes	29 (10.7%)	3 (1.1%)	-0.02	0.69
No	210 (77.8%)	28 (10.4%)		
Digestive				
Yes	49 (18.1%)	6 (2.2%)	-0.01	0.88
No	190 (70.4%)	25 (9.3%)		
Nervous				
Yes	82 (30.4%)	7 (2.6%)	-0.08	0.19
No	157 (58.1%)	24 (8.9%)		
Sensory				
Yes	76 (28.1%)	8 (3%)	-0.04	0.50
No	163 (60.4%)	23 (8.5%)		
Endocrine				
Yes	26 (9.6%)	3 (1.1%)	-0.01	0.84
No	213 (78.9%)	28 (10.4%)		
Excretory				
Yes	4 (1.7%)	0	-0.05	0.47
No	235 (87%)	31 (11.5%)		
Urinary				
Yes	4 (1.5%)	0	-0.05	0.47
No	235 (87%)	31 (11.5%)		
Reproductive				
Yes	8 (3%)	0	-0.06	0.30
No	231 (85.6%)	31 (11.5%)		
Skeletal Muscle				
Yes	38 (14.1%)	2 (0.7%)	-0.08	0.16
No	201 (74.4%)	29 (10.7%)		
Immunological				
Yes	38 (14.1%)	5 (1.9%)	0.00	0.97
No	201 (74.4%)	26 (9.6%)		
Lymphatic				
Yes	0	1 (0.4%)	0.17	<0.05
No	239 (88.5%)	30 (11.1%)		
Integumentary				
Sim	5 (1.9%)	0	-0.05	0.42
No	234 (86.7%)	31 (11.5%)		

Caption : number of subjects accompanied by the relative frequency in percentage (%); r = Spearman correlation, P = Chi-square.

Table 7. Correlation between comorbidities and age

	Age (Years)						r	P
Variables	**Up to 28**	**29 – 38**	**39 – 48**	**49 – 58**	**59 - 68**	**69 - 78**		
Cardiovascular								
Yes	1 (0.4%)	3 (1.1%)	18 (6.7%)	21 (7.9%)	14 (5.2%)	3 (1.1%)	0.37	0.00
No	43(16.1%)	48 (18%)	55 (20.6%)	45 (16.9%)	16(6%)	0		
Respiratory								
Yes	6 (2.2%)	10 (3.7%)	6 (2.2%)	8 (3%)	2 (0.7%)	0	-0.08	0.17
No	38 (14.2%)	41 (15.4%)	67(25.1%)	58 (21.7%)	28 (10.5%)	3 (1.1%)		
Digestive								
Yes	7 (2.6%)	9 (3.4%)	15 (5.6%)	16(6%)	6 (2.2%)	1 (0.4%)	0.06	2.29
No	37 (13.9%)	42 (15.7%)	58 (21.7%)	50 (18.7%)	24 (9%)	2 (0.7%)		
Nervous								
Yes	9 (3.4%)	18 (6.7%)	29 (10.9%)	25 (9.4%)	6 (2.2%)	2 (0.7%)	0.05	0.46
No	35 (13.1%)	33 (12.4%)	44 (16.5%)	41 (15.4%)	24 (9%)	1 (0.4%)		
Sensory								
Yes	13 (4.9%)	15(5.6%)	30 (11.2%)	18 (6.7%)	7 (2.6%)	1 (0.4%)	-0.03	0.58
No	31 (11.6%)	36 (13.5%)	43 (16.1%)	48 (18%)	23 (8.6%)	2 (0.7%)		
Endocrine								
Yes	1 (0.4%)	1 (0.4%)	6 (2.2%)	11 (4.1%)	7 (2.6%)	2 (0.7%)	0.26	0.00
No	43 (16.1%)	50 (18.7%)	67 (25.1%)	55 (20.6%)	23 (8.6%)	1 (0.4%)		
Excretory								
Yes	0	0	1 (0.4%)	1 (0.4%)	1 (0.4%)	1 (0.4%)	0.13	0.04
No	-44 (16.5%)	-51 (19.1%)	72 (27%)	65 (24.3%)	29(10.9%)	2 (0.7%)		
Urinary								
Yes	0	1 (0.4%)	1 (0.4%)	1 (0.4%)	1 (0.4%)	0	0.05	0.43
No	-44(16.5%)	50 (18.7%)	72 (27%)	65 (24.3%)	29(10.9%)	-3 (1.1%)		
Reproductive								
Yes	1 (0.4%)	3 (1.1%)	3 (1.1%)	1(0.4%)	0	0	-0.07	0.25
No	43 (16.1%)	48 (18%)	70 (26.2%)	65 (24.3%)	-30 (11.2%)	-3 (1.1%)		
Skeletal Muscle								
Yes	0	5 (1.9%)	10 (3.7%)	16 (6%)	8 (3%)	1 (0.4%)	0.25	0.00
No	-44 (16.5%)	46 (17.2%)	63 (23.6%)	50 (18.7%)	22 (8.2%)	2 (0.7%)		

	Age (Years)						r	P
Variables	**Up to 28**	**29 – 38**	**39 – 48**	**49 – 58**	**59 - 68**	**69 - 78**		
Immunological								
Yes	8(3%)	8(3%)	11 (4.1%)	12 (4.5%)	2 (0.7%)	2 (0.7%)	-0.02	0.79
No	36(13.5%)	43 (16.1%)	62 (23.2%)	54 (20.2%)	28 (10.5%)	1 (0.4%)		
Lymphatic								
Yes	0	0	1 (0.4%)	0	0	0	-0.00	0.98
No	-44 (16.5%)	-51 (19.1%)	72 (27%)	-66 (24.7%)	-30 (11.2%)	-3 (1.1%)		
Integumentary								
Yes	1 (0.4%)	2 (0,7%)	1 (0.4%)	1 (0.4%)	0	0	-0.06	0.30
No	43 (16.1%)	49 (18.4%)	72 (27%)	65 (24.3%)	-30 (11.2%)	-3 (1.1%)		

Caption : number of subjects accompanied by the relative frequency in percentage (%); r = Spearman correlation, P = Chi-square.

Although most studies indicate a relationship between TMD and some comorbidity [20-26,27], as well as in the present study, when relating these comorbidities by systems and not by specific conditions, found no association between the incidence of TMD and pathologies of the endocrine, cardiovascular system or hematological systems, sleep apnea and history of hospitalization for surgery or serious illnesses, suggesting that despite some specific comorbidities have a greater influence on the appearance and perpetuation of TMD symptoms, such as poor sleep, there is no differentiation between the systems, suggesting that the overall compromised health status, regardless of the system, may be more relevant in the process. However, more studies must be carried out for better conclusions.

The results of this study indicate and reinforce that TMD symptoms are related to comorbidities. Finally, knowledge of the presence of other conditions is fundamental in order to achieve better targeting and better results in the treatment of this disorder, with the ideal medical diagnosis of comorbidities to identify these conditions.

5. CONCLUSION

In the present study, all TMD subtypes were found in the sample, with a predominance of joint/muscle TMD. Several comorbidities were found, mainly related to the nervous and sensorial systems, being necessary more studies to evaluate the influence that each comorbidity has in relation to the appearance or perpetuation of TMD symptoms. Although in the literature there is a predominance of symptoms in women aged between 20 and 40 years, studies paired by gender and number should be carried out.

CONSENT

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The procedures for carrying out this research respected the guidelines and norms that regulate research involving human beings approved by resolution 466/12, of the National Health Council (CNS) of the Brazilian Ministry of Health. It was submitted to the Ethics Committee in Research (CEP) involving human beings of the São Leopoldo Mandic Dental Research Center, Campinas-São Paulo- Brazil. 2.431.538.

ACKNOWLEDGEMENTS

We acknowledge the participants of the study and Centro de Especialidades de Odontolígica (CEO-CENTRO) for support this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. De Leeuw R, Klasser GD. Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management. 6.ed. Chicago: Quitessence; 2018.
2. Pereira JRFJ, Gonçalves DAG. Diagnostic Criteria for Temporomandibular Disorders: Assessment Instruments (Brazilian Portuguese). Inform; 2019.
3. Ren K. Grand Challenges in Musculoskeletal Pain Research: Chronicity, Comorbidity, Immune Regulation, Sex Differences, Diagnosis, and Treatment Opportunities. Front Pain Res (Lausanne). 2020;1:575479.
4. Fan X, Fu G, Wang L, Shen W, Zhang Y. A bibliometric analysis and visualization of tension-type headache. Front Neurol. 2022;13:980096.
5. Contreras EFR, Fernandes G, Ongaro PCJ, Campi LB, Gonçalves DAG. Systemic diseases and other painful conditions in patients with temporomandibular disorders and migraine. Braz Oral Res. 2018;23;32:e77.
6. Tchivileva IE, Ohrbach R, Fillingim RB, Lin FC, Lim PF, Arbes SJ Jr, Slade GD. Clinical, psychological, and sensory characteristics associated with headache attributed to temporomandibular disorder in people with chronic myogenous temporomandibular disorder and primary headaches. J Headache Pain. 2021;22(1):42.
7. Progiante P, Pattussi M, Lawrence H, Goya S, Grossi P, Grossi M. Prevalence of Temporomandibular Disorders in an Adult Brazilian Community Population Using the Research Diagnostic Criteria (Axes I and II) for Temporomandibular Disorders (The Maringá Study). Int J Prosthodont. 2015; 28(6):600–9.

8. Ismail F, Eisenburger M, Lange K, Schneller T, Schwabe L, Strempel J, et al. Identification of psychological comorbidity in TMD-patients. Cranio. 2016;34(3): 182–7.
9. Reis PHF, Laxe LAC, Lacerda-Santos R, Münchow EA. Distribution of anxiety and depression among different subtypes of temporomandibular disorder. A systematic review and meta-analysis. J Oral Rehabil. 2022;49(7):754-767.
10. Lei J, Yap AU, Zhang M, Fu KY. Temporomandibular disorder subtypes, emotional distress, impaired sleep, and oral health-related quality of life in Asian patients. Community Dent Oral Epidemiol. 2021;49(6):543-549.
11. Miller VJ, Karic VV, Ofec R, Nehete SR, Smidt A. The temporomandibular opening index, report of headache and TMD, and implications for screening in general practice: an initial study. Quintessence Int. 2014;45(7):605–12.
12. De-Pedro-Herraez M, Mesa-Jimenez J, Fernandez-de-las-Penas C, De-la-Hoz-Aizpurua J. Myogenic temporomandibular disorders: Clinical systemic comorbidities in a female population sample. Med Oral Patol Oral y Cir Bucal. 2016;1(21):784–92.
13. Klasser GD, Bassiur J, de Leeuw R. Differences in reported medical conditions between myogenous and arthrogenous TMD patients and its relevance to the general practitioner. Quintessence Int (Berl). 2014;45(2):157–67.
14. Schnabl D, Sandbichler P, Neumaier M, Girstmair J, Barbieri F, Kapferer-Seebacher I, Steiner R, Laimer J, Grunert I. Dental Students' Oral Health-Related Quality of Life and Temporomandibular Dysfunction-Self-Rating versus Clinical Assessment. Healthcare (Basel). 2021;9(10):1348.
15. Sipilä K, Mäki P, Laajala A, Taanila A, Joukamaa M, Veijola J. Association of depressiveness with chronic facial pain: a longitudinal study. Acta Odontol Scand. 2013;71(3-4):644-9.
16. Bertoli E, de Leeuw R. Prevalence of Suicidal Ideation, Depression, and Anxiety in Chronic Temporomandibular Disorder Patients. J Oral Facial Pain Headache. 2016;296–301.
17. Lin S-L, Wu S-L, Ko S-Y, Lu C-H, Wang D-W, Ben R-J, et al. Dysthymia increases the risk of temporomandibular disorder. Medicine (Baltimore). 2016;95(29):e4271.
18. Lorduy KM, Liegey-Dougall A, Haggard R, Sanders CN, Gatchel RJ. The Prevalence of Comorbid Symptoms of Central Sensitization Syndrome Among Three Different Groups of Temporomandibular Disorder Patients. Pain Pract. 2013; 13(8):604–13.
19. Florencio LL, de Oliveira AS, Carvalho GF, Dach F, Bigal ME, Fernández-de-las-Peñas C, et al. Association Between Severity of Temporomandibular Disorders and the Frequency of Headache Attacks in Women With Migraine: A Cross-Sectional Study. J Manipulative Physiol Ther. 2017;40(4):250–4.
20. Pezzoli M, Ugolini A, Rota E, Ferrero L, Milani C, Pezzoli L, et al. Tinnitus and its relationship with muscle tenderness in patients with headache and facial pain. J Laryngol Otol. 2015; 19;129(7):638–43.
21. Visscher CM, Ligthart L, Schuller AA, Lobbezoo F, Jongh A de, van Houtem CMHH, et al. Comorbid Disorders and Sociodemographic Variables in Temporomandibular Pain in the General Dutch Population. J Oral Facial Pain Headache. 2015;29(1):51–9.
22. Costa YM, Conti PCR, de Faria FAC, Bonjardim LR. Temporomandibular disorders and painful comorbidities: clinical association and underlying mechanisms. Oral Surg Oral Med Oral Pathol Oral Radiol. 2017;123(3):288–97.
23. Ayouni I, Chebbi R, Hela Z, Dhidah M. Comorbidity between fibromyalgia and temporomandibular disorders: a systematic review. Oral Surg Oral Med Oral Pathol Oral Radiol. 2019;128(1):33–42.
24. Manfredini D. Tinnitus in Temporomandibular Disorders patients: any clinical implications from research findings? Evid Based Dent. 2019;20(1):30–1.
25. Skog C, Fjellner J, Ekberg E, Häggman-Henrikson B. Tinnitus as a comorbidity to temporomandibular disorders—A systematic review. J Oral Rehabil. 2019;46(1):87–99.
26. Khan K, Muller-Bolla M, Anacleto Teixeira Junior O, Gornitsky M, Guimarães AS, Velly AM. Comorbid conditions associated with painful temporomandibular disorders in adolescents from Brazil, Canada and France: A cross-sectional study. J Oral Rehabil. 2020;47(4):417–24

27. Sanders AE, Slade GD, Bair E, Fillingim RB, Knott C, Dubner R, et al. General Health Status and Incidence of First-Onset Temporomandibular Disorder: The OPPERA Prospective Cohort Study. J Pain. 2013;14(12):T51–62

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/107406