v. 5, n. 29, 2025

International Journal of Health Science

Acceptance date: 15/08/2025

STUDY OF THE RELATIONSHIP BETWEEN DENTAL OCCLUSION AND OTALGIA – A CLINICAL STUDY

Rosiane Aparecida de Liz Sperb
Dentist graduated at Health Science School - Universidade do Vale do Itajaí (UNIVALI), SC, Brazil

Lethicia Kilian Martins Luiz
Dentistry student at Health Science School - Universidade do Vale do Itajaí (UNIVALI), SC, Brazil

Betsy Kilian Martins Luiz
Professor at Health Science School - Universidade do Vale do Itajaí (UNIVALI), SC, Brazil

Casimiro Manoel Martins Filho
Professor at Health Science School - Universidade do Vale do Itajaí (UNIVALI), SC, Brazil

Abstract: Introduction: The dysfunctions caused by malocclusion can affect, in addition to the structures of the stomatognatic system, structures of the auditory system, causing ear pain. These patients generally seek out an otolaryngologist to treat this pain, but no disease is found in the ear, which makes correct treatment and elimination of the ear pain almost impossible. This study had the purpose in determining the relationship between dental occlusion and otalgia using a deprogramming device on patients with ear symptoms. The subjects were 9 female dentate individuals attending the occlusion clinic of the dentistry course at the Universidade do Vale do Itajai, Santa Catarina Brazil. **Method:** The survey was conducted with patients of female sex between 28 to 60 years old, average 38 with full dental arch. In the selection process two criteria were used to form the casuistry: first the subject should present painful symptoms in the ear, strong indication of temporomandibular dysfunction and no ear pathology, confirmed by the evaluation of an otorhinolaryngologist specialist. Second to rule out any condition that would make the research unfeasible, such as pathologies that could mask the evolution of the clinical picture during muscle deprogramming. No pattern of race, sex, color, age, or socioeconomic condition was considered as an inclusion criterion. The method used to evaluate the efficiency of the device was the same as that proposed by Ramfjord & Ash (1984), due to its recognition within the scientific community. It was divided in five stages as follows: patient selection, creation of occlusal appliance, muscle deprogramming, diagnosis and treatment and systematization and analysis of data. **Results** Sixteen weeks after the installation of the occlusal appliance each patient was evaluated in eight sessions regarding the existence of ear pain, TMJ pain and noise, headache, and muscle pain. It was observed that there was a decline in symptoms from the first week of use of the occlusal appliance, reduction, or disappearance of otological symptoms and after 8 weeks 100%were asymptomatic. **Conclusion** It was concluded in this study, in view of the reduction in ear pain and other symptoms in 90% of the subjects in the first week of using the occlusal device and in 100% during the study period, the relationship between dental occlusion and ear pain present by 100% of the research subjects. This study was approved by the Universidade do Vale do Itajai, UNIVALI Research Ethics Committee.

Key words: Dental occlusion, Otalgia, Ear pain, Deprogramming device.

INTRODUCTION

The stomatognathic system is a complex system of the human body constituted of teeth, muscles, joints, ligaments, vessels, and nerves that in the event of malfunction of any of these structures can generate dysfunctions with severe consequences for the individual. These dysfunctions can also compromise the functioning of neighboring regions such as the auditory region and consequently the ear. In these cases, dysfunctions that compromise the temporomandibular joints, can provoke symptoms that affect the auditory system, head and neck and can to extend to all body regions. The individual has a sensation of pain or even a sign of discomfort in that region, but no problem is found or diagnosed in the referred location. This subject has attracted the attention of health professionals although there is no consensus on the relationship between malocclusion and associated symptoms. Considering the consequences for the individual this lack of consensus only delays or hinders diagnosis and treatment. The relationship between malocclusion and ear dysfunctions has been investigated since 1920 when the first works on the subjects were published. Since then, many studies have been carried out with

the aim of relating occlusal problems to hearing dysfunctions and even with signs and symptoms in other parts of the body such as the spine, the cervical region and even the chest, giving the sensation of a heart attack. Among the studies carried out to date, the dissections of cadavers of embryos adult fetuses and embryologic studies that prove the anatomical relationship of the ear with the stomatognathic system deserve special mention. Considering the absence of a relationship between the stomatognathic system and the ear goes against systemic view of the organism that is, they are dependent and interconnected. Such a reductionist view prevents the mapping of these relationships, compromising the goal of these relationships: well-being, and quality of life of the individual. In relation to this view, individuals compromising temporomandibular dysfunction usually present pain in the head and neck which cause limitation in the diary activity. Situation which compromises not only the physics health but also the emotional. Due to this view, individuals affected by temporomandibular dysfunction commonly present with headaches and neck pain which limit their performance in daily activities, condition that compromises not only the physics health but also mental health. Studies show that 60% of the general population, has some disorder of the masticatory system, and only 10% are diagnosed. It means that 50% of these individuals may have their clinic condition worsened due to lack of adequate treatment even though the signs and symptoms manifested in the ear are not indicative of temporomandibular joint disease (PASCOAL et. al, 2001). Despite the diversity of factors related to the etiology of dysfunctions and many studies still pointing to multifactorial causes, we cannot ignore malocclusion as a possible etiology. This study proposes the muscle deprogramming with the use of an occlusal devise to establish a relationship between pain in the ear and temporomandibular disorder.

METHOD

The method used to evaluate the efficiency of the occlusal appliance is the same used to Ramfjord and Ash (1984) due to its recognition and the acceptance within the scientific community. It is divided into 5 steps as follow: 1. Anamnesis and physical examination with the aim of confirming the temporomandibular dysfunction with ear symptoms. Two criteria were used in this phase, the presence of signs and symptoms in the ear and secondly the absence of ear disease. 2. Making of the occlusal appliance – Molding and plaster models of the upper and lower arches were obtained and mounted on a semi-adjustable articulator from the Gnatus brand. The upper model was positioned using the facebow, and the lower model was made by making an interocclusal record in wax. 3. Installation and adjustment of the appliance – The appliance was installed, and adjustments made during 2 to 3 visits, so that posterior bilateral contacts close to centric relation and canine-type lateral guides were obtained. Patients were instructed to use the device full-time or part time during the treatment period and according to their convenience, since daily activities are an impediment. 4. Systematization and analysis of data – The collected data were systematized in an Excel spreadsheet for a period of 16 weeks (tables 1 and 2). As the research was characterized by a qualitative exploratory study, two simple forms of statistical treatment were adopted. The first was the normalization of treatment data to standard weeks to reduce the noise generated by the irregularity of treatments as presented in the analysis of the research results. To compare the ear pain results obtained in this research with those of Martins Filho et al. (2002) a prediction analysis was adopted.

RESULTS

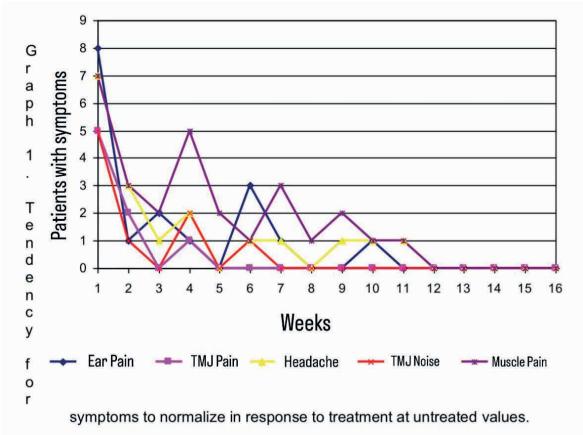
During 16 weeks after the installation of the occlusal appliance each patient was evaluated in 8 sessions in relation to ear pain, pain and noise in the TMJ, headache and muscle pain (tables 1 and 2). Data related to daily activities of each of the participants were also recorded to identify any fact that could interfere with the deprogramming. It was the case of subject 1 who, in W11, had muscle pain associated with physical activity performed the night before the appointment.

The subject played bowling, having made a physical effort beyond the usual

ANALYSIS OF RESULTS

TENDENCY OF EVOLUTION OF SYMPTOMS

The sum of subjects' symptoms, per week, can be seen in table 3. The lack of regularity in consultations generated a trend graph of symptoms evolution over the 16 weeks, with factors that interfere with its interpretation. This effect can be seen in graph 1 where the values alternate between zero and non-zero value. This effect could be eliminated by excluding the null values; however the most advisable approach is too smooth out the behavior of the trend in symptom evolution by normalizing the data.



Graph 1 Tendency for symptoms to normalize in response to treatment at untreated values.

DATA NORMALIZATION

To normalize the symptom evolution trend data, an interval of 3 weeks was established from the start date of treatment represented by W1, W4, W7, W10, W13, W16 (see tables 1 and 2). Normalization was performed based on the sum of symptom records, for the previously stipulated period, divided total number of patients. This function can be described as follows:

$$N = \sum S / \sum P$$

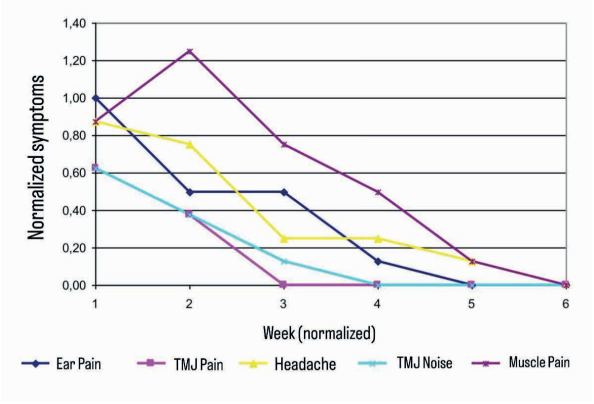
Where:

N = Normalized Value

$\sum S$ = Sum of Symptoms

$\sum P$ = Sum of Patients

The result of normalization can be seen in table 4 with the appropriate smoothing of the symptom reduction trend, as shown in graph 2.



Graph 2. Tendency of evolution of symptoms in response to treatment, in normalized values.

Still based on the normalized data, a symptom persistence graph was generated to visualize the subjects who took the longest to regress (table 6). This graph used the percentage of patients who presented symptoms in the standard week (graph 3).

Subject 1	T1			T2		T3	T4				T5		T6		T7	
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1															
TMJ pain	1															
Headache	1						1				1					
TMJ Noise	1			1		1										
Muscle pain	1			1			1				1					

Subject 2	T1	T2	T3	T4				T5	T6	T7						
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1															
TMJ pain																
Headache		1		1					1							
TMJ Noise																
Muscle pain			1	1				1	1	1						

Subject 3	T1	T2			T3	T4	T5		T6							
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1															
TMJ pain																
Headache	1															
TMJ Noise																
Muscle pain	1				1		1		1							

Subject 4	T1		T2	T3		T4	T5			T6		T8				
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1		1	1		1	1			1						
TMJ pain	1															
Headache	1															
TMJ Noise	1															
Muscle pain	1															

Subject 5	T1	T2		T3	T4	T5	T6									
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1															
TMJ pain	1	1		1												
Headache	1			1												
TMJ Noise	1	1		1												
Muscle pain	1			1	1	1	1									

Subject 6	T1	T2		T3			T4	T5		T6	T7	T8				
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1															

TMJ pain	1															
Headache	1									1						
TMJ Noise	1															
Muscle pain	1	1		1												

Table 1. Subject care control 1 to 6, Where Wn represents the week of treatment and Tn the consultations in which each subject was evaluated. In yellow, the weeks for data normalization are highlighted.

Subject 7	T1	T2	T3	T4		T5	T6	T7	T8							
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1	1	1			1										
TMJ pain	1	1														
Headache	1	1	1													
TMJ Noise	1															
Muscle pain	1	1	1	1												

Subject 8	T1	T2			T3	T4	T5									
Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1					1										
TMJ pain																
Headache	1	1				1										
TMJ Noise																
Muscle pain	1	1														

Table 2. Subject care control 7 a 8, Where Wn represents the week of treatment and Tn the consultations in which each subject was evaluated. In yellow, the weeks for data normalization are highlighted.

Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	8	1	2	1	0	3	1	0	0	1	0	0	0	0	0	0
TMJ pain	5	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Headache	7	3	1	2	0	1	1	0	1	1	1	0	0	0	0	0
TMJ Noise	5	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0
Muscle pain	7	3	2	5	2	1	3	1	2	1	1	0	0	0	0	0

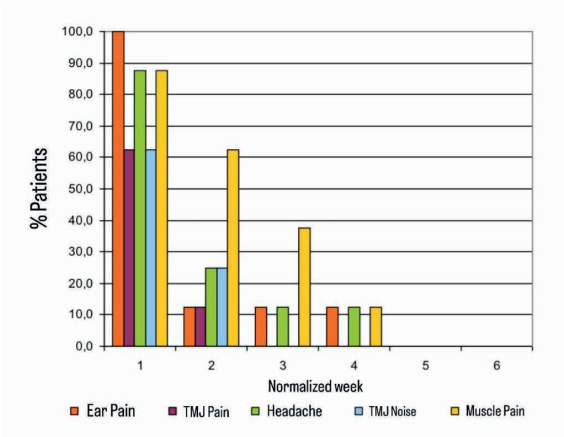
Table 3. Tendency towards normalization of symptoms (non-normalized data)

Symptoms	W1	W2	W3	W4	W5	W6	SW7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	1,00			0,50			0,50			0,13			0,00			0,00
TMJ pain	0,63			0,38			0,00			0,00			0,00			0,00
Headache	0,88			0,75			0,25			0,25			0,13			0,00
TMJ Noise	0,63			0,38			0,13			0,00			0,00			0,00
Muscle pain	0,88			1,25			0,75			0,50			0,13			0,00

Table 4. Tendency of evolution of symptoms (normalized data).

Symptoms	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Earache	100,0			12,5			12,5			12,5			0,0			0,0
TMJ pain	62,5			12,5			0,0			0,0			0,0			0,0
Headache	87,5			25,0			12,5			12,5			0,0			0,0
TMJ Noise	62,5			25,0			0,0			0,0			0,0			0,0
Muscle pain	87,5			62,5			37,5			12,5			0,0			0,0

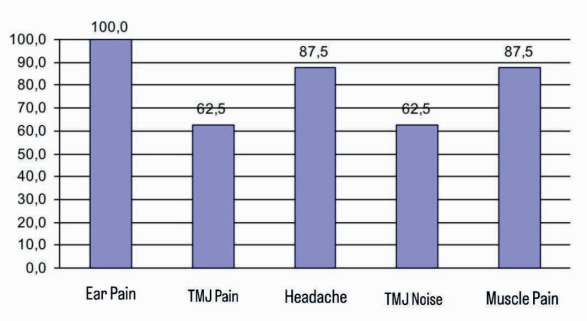
Table 6. Symptom persistence per standard week (normalized)



Graph 3. Persistence of symptms per standard weeks (normalized)

DISCUSSION

Subjects who have temporomandibular dysfunction also have other symptons in addition to those manifested in the ear, according to Rizzatti-Barbosa et al. (1998) and Pascoal et al. (2001). This fact can be seen in table 5 where 87.5% had muscle and/or headache at the beginning of treatment (W1) with headache being the main complaint, a fact reported by D'Antônio et al. (2000) e Guimarães et al. (2005). Also pain and/or noise in the ear were present in 62.5%.



Graph 4. Distribution of symptoms in (W1)

The presence of other symptoms in patients with TMJ is mentioned by Felicio (2004), however the author did not present a frequent distribution table by groups as shown in graph 1, which makes a detailed comparison with the findings of this work, impossible. Karacay and Merve (2023) investigated the differences between TMD subtypes in terms of clinical characteristics, dizziness, tinnitus and ear fulness in patients with temporomandibular disorders. They concluded that painful conditions were associated with dizziness in participants with TMDs. Naderi et al. (2023) evaluated the effect of TMD treatments on the otologic symptoms in forty patients who had no known otologic or other primary causes to explain their symptoms in the ear. More than 50% of the patients reported complete or partial recovery in the second follow up after a standard treatment protocol instructions and use of a full coverage stabilizing mandibular night guard for patients with parafunctional Habits.

Martins Filho et al. (2002) evaluated at the UNIVALI Occlusion Clinic, for 8 weeks 15 patients with ear pain who used Michigan--type occlusal appliances for neuromuscular deprogramming. Considering the important data for the discussion of this work, a comparative analysis was chosen. A regression analysis was used for the statistical prediction of missing values in both data series as shown in Table 6. This analysis was performed based on normalization for both data sets, through the following function:

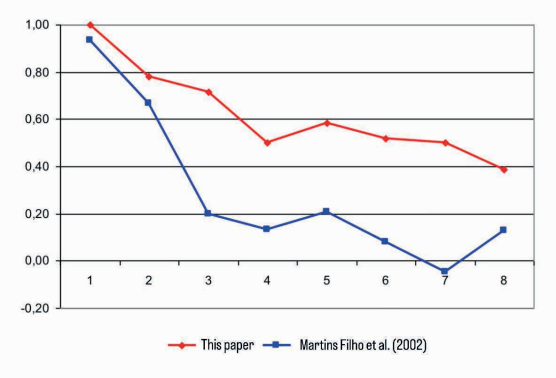
$$a = \bar{y} - b\bar{x} \qquad b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

Where: x e y is the sample means of the known values

	This research	Martins Filho et al. (2002)
W1	1,00	0,93
W2	0,78	0,67
W3	0,71	0,20
W4	0,50	0,13
W5	0,58	0,21
W6	0,52	0,08
W7	0,50	-0,05
W8	0,39	0,13

Table 6. Regression analysis (prediction) for both data sets.In yellow are the real data; in white, those obtained through the analysis.

When comparing the results of this research with those of Martins Filho et al. (2002), a similar evolution was observed in the results of the treatment of TMJ associated with otalgia (Graph 5). In both there was a decrease in symptoms from the first week of use of the device, and after 8 weeks 86,6% were asymptomatic. In the research in question, the figure was 100%.



Graph 5. Comparison between the Evolution of ear pain in this research, by normalized data, per week, and those of Martins Filho et al. (2002).

In some patients, differences in pain responses were observed depending on the level of stress. Fioretti at al. (2020) observed in a study of male and female patients with tinnitus that factors such as depression, anxiety and worry influenced the appearance and the level of the tinnitus distress, however they were enabled to define whether there was prevalence among the groups studied. This is common in people with chronic dysfunctions. Common physical changes are often aggravating stressful situations, such as headaches bruxism and tissue changes (Siqueira, Teixeira, 2001; Giordani, Nóbilo, 1995; Seraidan et al., 2005; Felício et al., 2004; Oliveira et al., 2003). According to the syndrome "*Excessive Somatic Concern* (ESC)", emotional stress are the main causes of pain (Parker, Chole, 1995; Seraidan et al., 2005). This is related to emotional stress of patients with TMD. In 3 subjects of this research, it was clear the influence of emotional factors on the return of symptoms and therefore the importance of evaluations in each consultation. Muscle pain was more persistent than other symptoms. This is explained by the response time to deprogramming, so muscle hyperactivity and the elimination of catabolites, the main causes of pain, also occur gradually. In the case of temporomandibular joint, when the hyperactive muscle is the lateral pterygoid, the articular disc moves forward and the bilaminar zone is compressed, making opening difficult and causing pain. As muscle activity and dysfunction are reduced and the mandible returns to its physiologic position, the occlusion appliance must be adjusted to this new relationship. (Okeson,1998). We observed that the deprogramming was efficient considering the evolution of symptoms in the first week of using the device. This result is also reported in the research by Giordani e Nóbilo (1995), Martins Filho et al. (2002), Saueressig et al. (2003) e Guimarães et al. (2005). Even in cases of chronic pain, when subjects had recurrence of symptoms, they were not of the same intensity.

CONCLUSION

The results of this research showed the efficiency of occlusal appliance in the muscular deprogramming of 8 subjects submitted to use for a period of 8 weeks.

All responded positively with the reduction or disappearance of symptoms throughout the 8 weeks of use. Symptoms in the ear or neighboring region, reported as ear pain, also disappeared.

REFERENCES

Almasan O, Leucuta DC, Dino C, Buduru S, Baciut M, Hedesiu M. Petrotympanic fissure architecture and malleus location in temporomandibular joint disorders. Tomography 2022, 8, 2460-2470 http://DOI.org/103390/tomography 8050204.

ANDRIGHETTO, A. R. **Avaliação cefalométrica radiográfica da posição craniocervical antes e após a desprogramação neuromuscular em pacientes com maloclusão de classe II de Angle**. Dissertação (Mestrado). Curso de Odontologia, Universidade de São Paulo, São Paulo, 2000.

ASH, M. M.; RAMFJORD, S. P.; SCHMIDSEDER, J. **OCLUSÃO**. São Paulo: Santos, 1998.

BARBOSA, C.M.R.; MARTINELLI, D.A.; BARBOSA, J.R. DE A. Pacientes portadores de zumbido e os sinais e sintomas de DCM. **RGO**, Porto Alegre, v.46, n.1, p.42-49, jan./mar. 1998.

BASTOS, A.S.M.; PATROCÍNIO, J. A. Otalgia odontogênica. **Folha Médica**, v.104, n.5, p.187-189, maio 1992.

D'ANTÔNIO, W.E.P.A. et al. Distúrbio temporomandibular como causa de otalgia: um estudo clínico. **Revista Brasileira de Otorrinolaringologia,** v.66, n.1, p.46-50, jan./fev. 2000.

FELÍCIO, C.M. de et al. Desordem temporomandibular: relações entre sintomas otológicos e orofaciais. **Revista Brasileira de Otorrinolaringologia**, São Paulo, v.70, n.6, p.46-50, nov./dez. 2004.

FIORETTI, A., NATALIE, E., RIEDL, D., MOSCHEN, R., EIBENSTEIN. A. Gender Comnparison of Psychological Comorbities in Tinnitus Patients- Result of a Cross-Sectional Study. Frontiers In Neuroscience, Roma, Itália 2020, vol.14 Jul 2020.

GIORDANI, A.; NÓBILO, K. A. Placa Estabilizadora de Michigan e a Sensação de Zumbido. **Rev Assoc Paul Cir Dent**, São Paulo, v.49, n.5, p.395-399, set./out. 1995.

GUIMARÃES, F. C.; NAVARRO, C. A.; COSTA, E. S. Abordagem interdisciplinar na terapêutica das desordens craniomandibulares: Caso Clínico. **Revista Serviço ATM**, v.5, n.1, p.45-49, jan./jun. 2005.

KARACAY, BC; KORKMAZ, MD. Investigation of Factors Associated with Dizziness, Tinnitus and Ear Fullness in Patients with Temporomandibular Disorders. J Orofacial Pain Headache, v.37, n.1, p.17-24, 2023.

KEERSMAEKERS, K.; DE BOEVER, J. A.; VAN DEN BERGHE, L. Otalgia in patients with temporomandibular joint disorders. **J Prosthet Dent.** Saint Louis, v.75, n.1, p.72-76, Jan. 1996.

KOMINSKY, M.; SOUZA JÚNIOR, R.S. de. Sintomas auditivos em pacientes portadores de desordens craniomandibulares. **Revista do Conselho Regional de Pernambuco**, v.1, n.1, p.44-48, abr.1998.

Nadery Y, Karami E, Chamani G, Amizadeh M, Rad M, Shabany M. Temporomandibular treatments are significant efficient in improving otologic symptoms. BMC Oral Health. 2023; 2-9.

MANFREDI, A.P.S.; SILVA, A.A. da; VENDITE, L.L. Avaliação da sensibilidade do questionário de triagem para dor orofacial e desordens temporomandibulares recomendado pela academia americana de dor orofacial. **Revista Brasileira de Otorrinolaringologia**, v.67, n.6, p.763-768, nov. 2001.

MARTINS FILHO, C.M.; BRANDÃO FILHO, E.; SALEH, H.Y.Inter-relação Otalgia e Interferência Oclusal. **Alcance/CCS**, Itajaí, Ano IX, n.2, p. 79-82, set 2002.

MARTINS FILHO, C.M.; ALMEIDA, S.M. Estudo histológico da inserção do músculo pterigoideo lateral ATM humana. Revista da APCD, V.56 N.5 Set/Out 2002

MEIRA, G. S. P. DTM X Problemas Otológicos. **SOBRACOM**, Porto Alegre, mar. 2004. Disponível em: <http://www.sobracom.com.br/artigos. Acesso em: 28 mar.2005.

MICHAEL HO & ASSOCIATES. / Disponível em: < http://www.dentalprofessional.com.au >. Acesso em: 06 ago.2006.

OKESON, J. P. **Dores buco faciais de bell**. 5. ed. São Paulo: Quintessence, 1998.

OLIVEIRA, A.S. et al. Impacto da dor na vida de portadores de disfunção temporomandibular. **J Appl Sci**, v.11, n.2, p.138-143, 2003.

PASCOAL, M.I.N. et al. Prevalência dos sintomas otológicos na desordem temporomandibular: estudo de 126 casos. **Revista Brasileira de Otorrinolaringologia**, São Paulo, v.67, n.5 set. 2001.

PARKER, W.S.; CHOLE, R. A. Tinitus, vertigo and temporomandibular disorders. **Am J Orthod Dentofacial Orthop**, Saint Louis, v.107, n.2, p.153-158, fev., 1995.

Pinheiro MLN, Costa MRM, Barbosa KGN, Nobrega DF. Sintomas otológicos da disfunção temporomandibular- uma revisão de literatura. Diversitas Journal. V4, n2, maio-ago 2019, p 686-96.

RAMFJORD, S. P.; ASH, M. M. **Oclusão**. 3.ed. Rio de Janeiro: Editora Interamericana, 1984. 422p.

RIZZATTI-BARBOSA, C.M.; MARTINELLI, D. A.; ALBERGARIA-BARBOSA, J.R. Pacientes portadores de zumbido e os sinais e sintomas de DCM. **RGO**, Porto Alegre, v. 46, n.1, p.42-49, jan./fev./mar 1998.

ROTH, R. H.; ROLFS, D. A. Functional occlusion for the orthodontist. **J Clin Orthod**, Boulder v.5, n.2, p.100-123, jan.1981.

SAUERESSIG, N.S.; KAYSER, F.G.; OLIVEIRA,F.L.de. Disfunções temporomandibulares e sua relação com o zumbido auditivo e dorsalgia – relato de caso clínico. **Jornal Brasileiro de Oclusão, ATM e Dor Orofacial**, Curitiba, v.3, n.9, p.21-25, jan./mar 2003.

SERAIDARIAN, P. I.; DUTRA, S. R.; MELGAÇO, C. A. Otalgia e desordens temporomandibulares. **Jornal Brasileiro de Oclusão, ATM e Dor Orofacial**, V. 5, N.2, p.102-112, 2005.

SIQUEIRA, J.T.T. de; TEIXEIRA, M.J. Dor musculoesquelética do segmento cefálico. **Revista Médica**, São Paulo, v.80, p.290-296, 2001.

TUZ, H.H.; ONDER, E.M.; KISNISCI, R.S. Prevalence of otologic complaints in patients with temporomandibular disorder. **Am J Orthod Dentofacial Orthop**, Saint Louis, v.123, n.6, p.620-623, Jun 2003