

Proceeding Paper

# Treatment of Patients with Somatic Tinnitus Attributed to Temporomandibular Disorder: A Case Report <sup>†</sup>

Paula Moleirinho-Alves <sup>1,2,\*</sup> , Pedro Cebola <sup>1,3</sup> , André Almeida <sup>1,2,3</sup>, Haúla Haider <sup>1</sup> and João Paço <sup>1</sup>

<sup>1</sup> Cuf Tejo Hospital, 1350-352 Lisboa, Portugal; pedro.cebola@cuf.pt (P.C.); andre.mariz.almeida@cuf.pt (A.A.); haula.f.haider@cuf.pt (H.H.); joao.paco@cuf.pt (J.P.)

<sup>2</sup> PaMNEC—Grupo de Patologia Médica, Nutrição e Exercício Clínico, CiiEM—Centro de Investigação Interdisciplinar Egas Moniz, 2829-511 Almada, Portugal

<sup>3</sup> Egas Moniz Higher Institute of Health Science, 2829-511 Almada, Portugal

\* Correspondence: paula.m.alves@cuf.pt; Tel.: +351-966-457-961

† Presented at the 5th International Congress of CiiEM—Reducing inequalities in Health and Society, Online, 16–18 June 2021.

**Abstract:** Tinnitus is a common symptom described in patients with temporomandibular disorders (TMDs), affecting quality of life and frequently causing distress. Somatic or somatosensory tinnitus can be attributed to the somatic system of the temporomandibular or cervical spine. Due to the multifactorial etiology of TMD, its management should be based on a multidisciplinary approach. Dentists and physical therapists may play a role in the individual and multimodal management of such patients. The aim of this case study is to analyse the effects of the conservative multidisciplinary management of tinnitus in patients with coexisting tinnitus, TMD and bruxism.

**Keywords:** tinnitus; TMD; dentists; physiotherapy; otolaryngologist; multidisciplinary team



**Citation:** Moleirinho-Alves, P.; Cebola, P.; Almeida, A.; Haider, H.; Paço, J. Treatment of Patients with Somatic Tinnitus Attributed to Temporomandibular Disorder: A Case Report. *Med. Sci. Forum* **2021**, *5*, 22. <https://doi.org/10.3390/msf2021005022>

Academic Editors: Helena Barroso and Cidália Castro

Published: 21 July 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Temporomandibular disorders (TMDs) present a range of signs and symptoms, which include pain in the masticatory muscles and joints and limitations in the range of mandibular movement. However, patients with TMD may also have other associated symptoms, especially otological symptoms such as tinnitus [1]. The definition of tinnitus can be described as the conscious perception of and the reaction to a sound in the absence of a corresponding external acoustic stimulus, commonly described as a “phantom” perception. It is considered to be a symptom and not a disease in itself [2]. Its etiology is multifactorial and, in addition to hearing loss or sound trauma, it can also be associated with the somatic system of the cervical spine or temporomandibular area, namely the temporomandibular joint (TMJ) and/or chewing muscles. This tinnitus is called somatic or somatosensory and has been described in 36–43% of a population with subjective tinnitus. The frequent coexistence of tinnitus and temporomandibular disorders (TMD) has already been demonstrated in scientific literature [3]. A recent review reported that the prevalence of tinnitus is higher in patients with TMD (35.8% to 60.7%) when compared to patients without TMD (9.7% to 26.0%) with an odds ratio of 4.45 [1]. The aim of this case study is to analyze the effects of conservative multidisciplinary management of tinnitus in patients with coexisting tinnitus, TMD and bruxism.

## 2. Materials and Methods

A 27-year-old male patient with tinnitus and myalgia in the masticatory muscles self-reported awake and sleep bruxism. The patient was initially evaluated by an otolaryngologist and the patient can positively correlate the beginning of the manifestation of the painful symptoms with tinnitus. Pain intensity is measured with a numeric pain rating scale (NPRS) and tinnitus is assessed with the Tinnitus Handicap Inventory (THI).

The Tinnitus Handicap Inventory is a reliable and valid questionnaire to evaluate tinnitus-related disability in patients with tinnitus. The THI consists of 25 items. In the THI, scores of 0, 2, or 4 are assigned to each answer, and thus the total score ranges from 0 to 100. Higher THI scores indicate a greater handicap from tinnitus, and five categories are used: no handicap (0–16), mild handicap (18–36), moderate handicap (38–56), severe handicap (58–76), and catastrophic handicap (78–100) [4]. The Portuguese version of the THI total has a very good internal consistency with a Cronbach's alpha coefficient of 0.86 [5]. The treatment plan consisted of cognitive-behavioural therapy with a first appointment based on education and habit recognition and modification, and the patient was medicated with muscle relaxants, provided with an occlusal stabilization splint, and performed stretching techniques and therapeutic exercises. All the assumptions of the Helsinki Declaration have been fulfilled and informed consent was approved by the ethics commission of Egas Moniz Higher Institute of Health Science (process number 675).

### 3. Results and Discussion

During the initial assessment, the NPRS of the left masseter was seven and that of the left temporalis was four. The THI score was 42, which indicated a moderate handicap. Four weeks after the beginning of the treatment plan, the patient referred to the absence of tinnitus and myalgia in the masticatory muscles and a greater awareness of awake bruxism. These findings are in agreement with those verified by other authors and suggest that the approaches for patients with somatic tinnitus should be multimodal [6]. In patients with tinnitus, as well as TMD or bruxism, improvement in tinnitus seems to be achieved by controlling TMJ complaints [3]. It is necessary to use the best available TMD treatment option to gain maximal improvement in tinnitus complaints. Multimodal therapies seem to be an appropriate approach for these patients.

**Institutional Review Board Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Egas Moniz Higher Institute of Health Science (protocol code 675, 13 February 2019).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Conflicts of Interest:** The authors declare no conflict of interest.

### References

1. Plaza-Manzano, G.; Delgado-de-la-Serna, P.; Díaz-Arribas, M.J.; Rodrigues-de-Souza, D.P.; Fernández-de-Las-Peñas, C.; Alburquerque-Sendín, F. Influence of Clinical, Physical, Psychological, and Psychophysical Variables on Treatment Outcomes in Somatic Tinnitus Associated with Temporomandibular Pain: Evidence From a Randomized Clinical Trial. *Pain Pract.* **2021**, *21*, 8–17. [[CrossRef](#)] [[PubMed](#)]
2. Haider, H.F.; Hoare, D.J.; Costa, R.F.P.; Potgieter, I.; Kikidis, D.; Lapira, A.; Nikitas, C.; Caria, H.; Cunha, N.T.; Paço, J.C. Pathophysiology, Diagnosis and Treatment of Somatosensory Tinnitus: A Scoping Review. *Front. Neurosci.* **2017**, *11*, 207. [[CrossRef](#)] [[PubMed](#)]
3. Michiels, S.; van der Wal, A.C.; Nieste, E.; Van de Heyning, P.; Braem, M.; Visscher, C.; Topsakal, V.; Gilles, A.; Jacquemin, L.; Hesters, M.; et al. Conservative therapy for the treatment of patients with somatic tinnitus attributed to temporomandibular dysfunction: Study protocol of a randomised controlled trial. *Trials* **2018**, *19*, 554. [[CrossRef](#)] [[PubMed](#)]
4. Wakabayashi, S.; Oishi, N.; Shinden, S.; Ogawa, K. Factor analysis and evaluation of each item of the tinnitus handicap inventory. *Head Face Med.* **2020**, *16*, 4. [[CrossRef](#)] [[PubMed](#)]
5. Oliveira, V.; Menezes, R.F. Avaliação da incapacidade resultante dos zumbidos: Versão portuguesa do Tinnitus Handicap Inventory (THI). In *Livro de Resumos da XI Conferência Internacional de Avaliação Psicológica: Formas e Contextos*; Psiquilíbrios: Braga, Portugal, 2006; p. 30.
6. Serna, P.D.; Plaza-Manzano, G.; Cleland, J.; Fernández-de-las-Peñas, C.; Martín-Casas, P.; Díaz-Arribas, M. Effects of Cervico-Mandibular Manual Therapy in Patients with Temporomandibular Pain Disorders and Associated Somatic Tinnitus: A Randomized Clinical Trial. *Pain Med.* **2020**, *21*, 613–624. [[CrossRef](#)] [[PubMed](#)]