

Risk Profile of Patients with Tinnitus and TMJ Dysfunction

Boris Borisov

Department of Prosthetic Dental Medicine, Faculty of Dental medicine - Varna, Bulgaria
doctor_bb[at]abv.bg

Abstract: Tinnitus is a perception of sound that can be generated by pathological changes in various levels of the acoustic system. The aim of study was to establish a risk profile of patients with tinnitus and TMD and to determine the relative share of patients with TMD and tinnitus problems. The subject of the study were 150 patients with TMD and tinnitus, who were examined. Bruxism is considered a risk factor for TMJ dysfunction, and its presence increases the risk of such dysfunction by about 21 times (OR = 20,952 (2,702-162,469); $p < 0.001$). The most common cause of TMJ dysfunction is bruxism, followed by various joint TMJ diseases.

Keywords: risk profile, tinnitus, TMJ, TMD, temporomandibular joint, dysfunction

1. Introduction

Tinnitus is a perception of sound that can be generated by pathological changes in various levels of the acoustic system, changes in the vascular or velo-palatal muscles, as well as changes in the temporomandibular joint (TMJ). For this reason, tinnitus is not considered a disease in itself, but only a symptom with many etiological factors. It is considered a manifestation of various diseases, including TMJ dysfunction [1]. It can manifest as a simple noise without clinical complaints or intense enough to interfere with the social activities of the individual, making it a socially significant disease [2,3, 4]. Up to 50% of tinnitus cases are of unknown etiology, but are increasingly associated with temporomandibular joint dysfunction (TMJ).

According to a number of studies, more than a third of TMD patients report tinnitus [5, 6]. There are different etiological theories about the origin of tinnitus in patients with temporomandibular dysfunction [7]. It is suggested that excessive muscle contraction associated with bruxism may be the cause of hyperactivity and tension in the masticatory muscles and the subsequent abnormal activity of the Eustachian tube [8].

2. Problem Definition

The aim of the present study was to establish a risk profile of patients with tinnitus and temporomandibular joint dysfunction and to determine the relative share of patients with temporomandibular dysfunction and tinnitus problems.

3. Methodology

The subject of the study were 150 patients with TMD and tinnitus, who were examined at the University Medical and Dental Center and the Audovestibular Laboratory at the Faculty of Dental Medicine - Varna at the Medical University - Varna for a period of two years.

Each patient is given a detailed ambulatory card created for the purposes of the study. It includes data on the etiological factor for the occurrence of TMD: bruxism, presence of joint

disease, prosthetic treatment and edentulousness, and questions related to tinnitus and its consequences.

The analysis of the results of the survey was used to create the risk profile of patients with tinnitus and TMJ dysfunction. A statistical method (Odds Ratio) is applied, allowing a hierarchy of results. The relative share of patients with TMD and tinnitus problems was calculated.

4. Results & Discussion

The analyzes conducted so far have identified several key factors that are associated with an increased risk of TMD. The greatest strength is the presence of parafunction (bruxism) (Table 1). Bruxism is considered a risk factor for TMJ dysfunction, and its presence increases the risk of such dysfunction by about 21 times (OR = 20,952 (2,702-162,469); $p < 0.001$).

Table 1: Risk profile of patients with tinnitus and TMD dysfunction

Factor	OR	95 % CI	P value
Parafunction - bruxism	20.952	2.702-162.469	< 0.001
Temporomandibular joint disease	3.477	1.241-9.741	0.018
Prosthetic treatment performed	2.54	1.003-6.407	< 0.05
Complete edentulousness	2.124	1.030-4.381	< 0.05

In Table. 2 presents the relative share of patients with temporomandibular dysfunction who have problems with tinnitus. The table shows that with the greatest severity of tinnitus, TMD is associated with the risk factor - parafunction (bruxism, bruxomania), followed by the presence of joint disease. Third is the lack of prosthetic treatment, if necessary, and complete edentulousness.

Table 2: Relative share of patients with TMD and tinnitus problems (n = 43)

Questions	Number %
I feel the tinnitus from waking to falling asleep	7/16.3%
Because of the tinnitus, I'm afraid I have a serious health problem	22/51.2%
If the tinnitus continues, it's not worth living	2/4.7%
Because of the tinnitus I am more irritable in the family and with friends	24/55.8%
I am afraid that the tinnitus may damage my physical health	20/46.5%
I have a hard time resting because of the tinnitus	19/44.2%
Often the tinnitus is so annoying that I can't ignore it	22/51.2%
I find it harder to fall asleep because of the tinnitus	14/32.6%
I feel exhausted because of the tinnitus	17/39.5%
I often wonder if the tinnitus will ever go away	18/41.9%
I am a victim of that tinnitus	6/14.0%
The tinnitus affects my concentration	23/53.5%

According to the analysis of the completed questionnaires, the largest percentage of patients with tinnitus (55.8%) complain of greater irritability when they are in their social environment. Complaints about difficulty concentrating (53.5%) followed, and an equal number said that noise was so unpleasant that they could not ignore it and even linked it to a serious health problem (51.2%). According to 46.5% of patients, tinnitus could severely damage their physical health. 44.2% find it difficult to rest due to the presence of tinnitus. Many patients with tinnitus doubt whether this noise will ever disappear - 41.9%. According to 39.5%, the tinnitus is the reason for their exhaustion. 32.6% reported sleep problems due to tinnitus. All-day tinnitus is typical for 16.3%. 14% feel victimized by this tinnitus, and 4.7% think it is not worth living if the tinnitus continues.

Our results coincide with those of most authors, according to whom bruxism is the basis of temporomandibular dysfunction [9, 10, 11]. Our results differ from other findings, according to which various temporomandibular joint diseases or traumatic injuries leading to laterognathia and other problems in the occlusion and thus violating the occlusal relationship, are the main cause of temporomandibular dysfunction [12,13].

Impaired quality of life in patients with tinnitus is discussed by most authors working on the study problem [14, 15, 16]. Each of them gives a different predominance over the different nuances of this quality of life. According to our study, mostly commented on irritability and lack of concentration. While other authors point to sleep disturbances and feelings of exhaustion are the main complaints of patients with tinnitus [17, 18].

5. Conclusion

The most common cause of TMJ dysfunction is bruxism, followed by various joint TMJ diseases. TMD-related tinnitus significantly impairs quality of life, with the largest proportion of patients reporting increased irritability in their social environment and fearing that this noise poses a serious threat to their health.

References

- [1] Milkov M., Andreeva R. Pathogenesis and treatment of tinnitus in patients with dental disorders. *International Bulletin of Otorhinolaryngology*, 1/2020, 31-33
- [2] Negrila-Mezei A, Enache R, Sarafoleanu C. Tinnitus in elderly population: clinic correlations and impact upon QoL. *J Med Life*. 2011; 4: 412–416. PMID: 22514575
- [3] Omidvar S, Jafari Z, Mahmoudian S, Khabazkhoob M, Ahadi M, Yazdani N. The relationship between ultra-high frequency thresholds and transient evoked otoacoustic emissions in adults with tinnitus. *Med J Islam Repub Iran*. 2016;30(1):1088-1098
- [4] De Ridder D, Vanneste S, Kovacs S, Sunaert S, Menovsky T, van de Heyning P, Moller A. Transcranial magnetic stimulation and extradural electrodes implanted on secondary auditory cortex for tinnitus suppression. *Journal of Neurosurgery*. 2011;114(4):903-911
- [5] Bhatia PL, Gupta OP, Agrawal MK, Mishr SK. Audiological and vestibular function tests in hypothyroidism. *Laryngoscope*. 1977; 87: 2082–2089. PMID: 926972
- [6] Kovaleski WC, De Boever J. Influence of occlusal splints on jaw position and musculature in patients with temporomandibular joint dysfunction. *The Journal of Prosthetic Dentistry*. 1975;33(3):321-327
- [7] Riga M, Xenellis J, Peraki E, Ferekidou E, Korres S. Aural symptoms in patients with temporomandibular joint disorders: Multiple frequency tympanometry provides objective evidence of changes in middle ear impedance. *Otology & Neurotology*. 2010;31(9):1359-1364
- [8] Morais AA, Gil D. Tinnitus in individuals without hearing loss and its relationship with temporomandibular dysfunction. *Braz J Otorhinolaryngol*. 2012;78(2):59-65
- [9] Camparis CM, Formigoni G, Teixeira MJ et al. Sleep bruxism and temporomandibular disorder: clinical and polysomnographic evaluation. *Arch Oral Biol* 2006; 51(9): 721–728
- [10] Fernandes G, Siqueira JT, Godoi Goncalves DA, Camparis CM. Association between painful temporomandibular disorders, sleep bruxism and tinnitus. *Brazilian Oral Research*. 2014;28(1):1-7
- [11] Bader G, Lavigne GJ. Sleep bruxism: an overview of an oromandibular sleep movement disorder. *Sleep Med Rev* 2000; 4(1): 27–43
- [12] Mohlin BO, Derweduwén K, Pilley R, Kingdon A, Shaw WC, Kenealy P. Malocclusion and temporomandibular disorder: a comparison of adolescents with moderate to severe dysfunction with those without signs and symptoms of temporomandibular disorder and their further development to 30 years of age. *Angle Orthod*. 2004;74:319-27
- [13] Myrhaug H. The incidence of ear symptoms in cases of malocclusion and temporo-mandibular joint disturbances. *Br J Oral Surg*. 1964;2(1):28-32
- [14] Newman CW, Jacobson GP, Spitzer JB. Development of the tinnitus handicap inventory. *Arch Otolaryngol*. 1996;122(2):143-148

- [15] Nicolas-Puel C, Faulconbridge RL, Guitton M, Puel JL, Mondain M, Uziel A.Characteristics of tinnitus and etiology of associated hearing loss: a study of 123 patients. *Int Tinnitus J.* 2002;8(1):37-44
- [16] Nondahl DM, Cruickshanks KJ, Huang GH, et al.Tinnitus and its risk factors in the Beaver Dam offspring study. *Int J Audiol.* 2011; 50(5):313–20.
- [17] Okeson JP.Management of Temporomandibular Disorders, The Kentucky Dental Association March 3, 2016 Louisville, Kentucky
- [18] Park RJ, Moon JD.Prevalence and risk factors of tinnitus: the Korean National Health and Nutrition Examination Survey 2010–2011, a cross-sectional study. *Clin Otolaryngol.* 2014; 39(2):89–94.