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Otologic Symptoms and Quality of Life in Individuals with Temporomandibular Disorders: A Cross-Sectional Study

Damla Torul[1] Mehmet Melih Ömezli [1] Muhammed Furkan Yılmaz[1]

[1]Department of Oral and Maxillofacial Surgery, Ordu University, Ordu, Turkey

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Abstract

Objective: Temporomandibular disorder (TMD) occurs as a result of alterations in the masticatory muscles and temporomandibular joint (TMJ). Otologic symptoms such as earache, hearing loss, and tinnitus may be observed in TMD patients and may impair quality of life (QOL). This paper aims to evaluate the frequency of otological symptoms, and their association with QOL in TMD patients.

Methods: The archival records of patients who applied to the Maxillofacial Surgery Clinic of Ordu University with TMD complaints between December 2022 and August 2023 were reviewed retrospectively. Demographic data, otological symptoms such as tinnitus, hearing loss, and earache, and Visual Analog Scale (VAS) scores regarding QOL and masticatory efficacy were recorded.

Results: One hundred-four patients (83 females, 21 males), with a mean age of 35.75 ± 15.09 years were included. No significant differences were observed among patients with/without earache, tinnitus, and hearing loss in terms of QOL and masticatory efficiency scores ($p > 0.05$), except significant difference between patients with/without tinnitus in terms of QOL ($p < 0.01$). No significant differences were observed between genders in QOL and masticatory efficiency scores ($p > 0.05$).

Conclusion: The frequency of otologic symptoms in TMD patients is high and tinnitus significantly impacts the QOL. For the optimum management of TMD patients with otological symptoms a multidisciplinary approach with dental clinicians and otolaryngologists should be performed.

Keywords: Otolaryngology, Quality of Life, Temporomandibular Disorders, Tinnitus

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Address for correspondence/reprints:

Muhammed Furkan Yılmaz

Telephone number: +90 (452) 226 52 85

E-mail: mfy6652@gmail.com

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INTRODUCTION

Temporomandibular disorder (TMD) is a musculoskeletal disorder that affects the temporomandibular joint (TMJ), masticatory muscles, and surrounding bone/soft tissue components (1,2). TMD is more frequently seen between the second and fourth decade, and predominantly in women (3,4). TMD prevalence is reported to be >5%. TMD is suggested to have multifactorial etiology and may be associated with parafunctional habits, hormonal effects, trauma, and internal derangements (2,5). TMD symptoms include pain, joint noise, limitation, and deviation in mandibular movements. Otological symptoms like earache, hearing loss, tinnitus, vertigo, fullness, and dizziness may also be observed (6,7).

The earlier reports about the relationship between TMJ and otological symptoms were reported by Wright and Manson in the early 1920s (8,9). Wright mentioned that hearing loss may develop as a result of posterior displacement of the condyles due to the abnormal relationship between the maxilla and mandible (8). Manson corrected the position of the mandible using dentures in a patient with buzzing in the ears and improved the patient's hearing (9). Decker evaluated 6 cases of hearing loss in 1925 and stated that after the relationship between the maxilla and mandible was restored correctly, hearing improved in all patients except 1 case (10). Goodfriend established a relationship between the tinnitus incidence and dysfunction in the stomatognathic system in 1933 (11,12).

In the following years, various pathophysiological mechanisms have been reported to explain the relationship between TMD and otological symptoms. Costen et al. named the association of otological complaints and temporomandibular dysfunction as Costen's Syndrome in 1934 and suggested that temporomandibular deformity leads to eustachian tube compression, the chorda tympani and/or auriculotemporal nerve compression, leading to the development of otological symptoms (13,14). Myrhaug et al. stated that as a result of biting anomalies, the tensor tympani-tensor veli palatini muscles, stimulated by the 5th cranial nerve, are affected along with the masticatory muscles. It has been reported that tensor tympani contraction affects the tympanic membrane (15). Through anatomical dissections, Pinto suggested a tiny ligament between the neck of the malleus to the capsule of the temporomandibular joint, joint disc, and sphenomandibular ligament. It has been stated that this ligament can move the ossicular chain and tympanic membrane in patients in whom the TMJ capsule or disc moves (16). Komori stated that this tiny ligament consists of 2 ligamentous structures. However, no movement was found in these structures that could lead to otological symptoms (17). Loughner stated that the

anterior malleolar ligament might cause middle ear damage through the sphenomandibular ligament, and this possibility is higher than the disco-malleolar ligament (18).

The frequency of otological symptoms in TMD patients has been evaluated in many studies (19-24). However, studies evaluating the relationship between otological symptoms and quality of life (QOL) are limited and focused on tinnitus (25,26). The purpose of this study was to evaluate the frequency of otological symptoms and their relationship with QOL in patients with TMD.

METHODS

In this study with a cross-sectional design, the archival records of patients admitted to the Maxillofacial Surgery Clinic between December 2022 and August 2023 with TMD complaints were analyzed retrospectively. The study design was approved by the University Ethics Committee (No:2023/259) and was conducted in accordance with the ethical standards specified in the Helsinki Declaration. Patients with complete archival records were included, while the records of patients who had undergone surgery in the maxillofacial region, who had received radiotherapy and/or chemotherapy, who had undergone neurosurgical operation, and who had undergone otorhinolaryngology-related operations were excluded.

The archival records of the patients were examined and demographic data, otologic symptoms (tinnitus, hearing loss, ear pain), QOL, and masticatory efficiency data were recorded. The otological symptoms of the patients were recorded based on the patient reports during the examination process. Patients were asked whether they had ear pain, hearing loss, and tinnitus and yes or no answers were recorded in the patient chart. Similarly, QOL and chewing efficiency were evaluated during clinical examination using the 0-100-point Visual Analog Scale (VAS) in which 0 indicated the lowest QOL and masticatory efficiency, while 100 showed the highest QOL and chewing efficiency.

Statistical Analysis

Statistical analyses were performed with SPSS (version 20.0, IBM Corp, Armonk, NY). The normality of the data was evaluated with Kolmogorov-Simirnov test. The data were presented for continuous variables as mean±standard deviation. Numbers/percentages were given for categorical variables. The Mann-Whitney U test was used to compare VAS scores among genders and patients with /without otologic symptoms. $p<0.05$ was considered as significant.

RESULTS

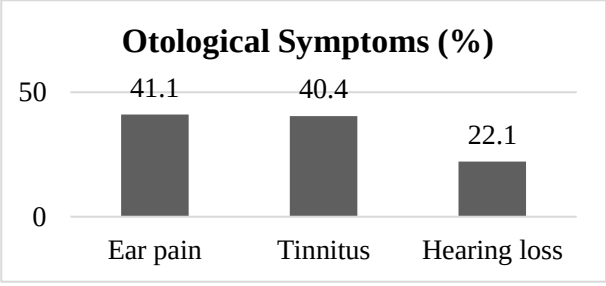
One-hundred-four patients (83 females, 21 males) with a mean age of 35.75 ± 15.09 years were included in the study. While 52 patients

(40%) reported no otological symptoms, 62 patients (60%) reported at least one of the otological symptoms (Table 1). The most frequent otological symptom was earache (n = 43, 41.1%), followed by tinnitus (n = 42, 40.4%) and hearing loss (n = 23, 22.1%) (Graph 1).

No significant differences were observed among patients with/without earache, tinnitus, and hearing loss in terms of QOL and masticatory efficiency scores ($p > 0.05$), except significant difference between patients with/without tinnitus in terms of QOL ($p < 0.001$) (Table 2). Between genders regarding QOL and masticatory efficiency no significant differences were observed ($p > 0.05$) (Table 3).

Table 1. Demographic characteristics of patients and prevalence of otological symptoms

Demographic Data		
Age (year)		35.75 ± 15.09
Gender	**Female (n)**	83
	Male (n)	21
Otological Symptoms		
n (%)		62 (60)



Graph 1. Distribution of patients regarding otological symptoms

Table 2. Comparison of quality of life and masticatory efficiency scores according to otological symptoms

Otologic Symptoms		VAS score		P*
Ear pain	**no**	VAS-q	54.34 ± 26.85	0.087
	yes	VAS-q	45.81 ± 24.99	
	no	VAS-m	55.98 ± 29.56	0.244
	yes	VAS-m	49.06 ± 28.45	
Hearing loss	**no**	VAS-q	51.91 ± 25.74	0.493
	yes	VAS-q	46.95 ± 28.51	
	no	VAS-m	52.28 ± 29.41	0.592
	yes	VAS-m	56.08 ± 29.5	
Tinnitus	**no**	VAS-q	57.74 ± 24.92	**<0.001**
	yes	VAS-q	40.59 ± 25.80	
	no	VAS-m	56.61 ± 28.33	0.157
	yes	VAS-m	47.97 ± 30.34	

*: Mann Whitney U test, VAS-q: Quality of life, VAS-m: Masticatory efficiency

Table 3. Comparison of quality of life and masticatory efficiency scores according to gender

VAS/Gender		VAS score	P*
VAS-q	Female	49.21 ± 27.38	0.269
	Male	57.14 ± 21	
VAS-m	Female	51.50 ± 28.97	0.297
	Male	59.52 ± 30.57	

DISCUSSION

The frequency of otological symptoms in patients with TMD and their relationship with QOL and masticatory efficiency were evaluated in the present study. Otological symptoms were observed in 60% of patients presenting with TMD. The most common otological symptoms were earache (41.1%) and tinnitus (40.4%), followed by hearing loss (22.1%).

The presence of otological symptoms in patients with TMD has been evaluated in many studies and different results have been obtained

(20-24). Cooper et al. found that 79% of the patients with TMD evaluated had otological symptoms. Otalgia and tinnitus were the most common symptoms with 53%, while hearing loss was found in 22% of patients (21). Tüz et al. observed that 77.5% of patients with TMD had at least one otological symptom and the most common symptoms were otalgia (50%) and tinnitus (45.5%), respectively. Hearing loss was found in 23.5% of the patients (22). Kusdra et al. studied the relation between otological symptoms and TMD and discovered that 87% of TMD patients developed such symptoms. The most common symptoms were tinnitus (42%) and ear fullness (39%) (20). Felicio et al. reported otological symptoms in individuals with TMD as ear fullness (90%), earache (65%), and tinnitus (60%), respectively (24). Toledo et al. published a systematic review including 8 studies and reported the most frequent otological symptoms associated with TMD as ear fullness (74.8%), ear pain (55.1%), and tinnitus (52.1%), respectively (23). The presence of otological symptoms in patients with TMD may vary in different studies. It is thought that the diagnosis of TMD and otological symptoms using different methods is the probable cause of this result.

Tinnitus can be defined as an imaginary auditory experience that develops in the absence of external auditory stimuli (27). In this study, tinnitus was seen in 40.4% of the patients presenting to the clinic with TMD. Chole et al. reported tinnitus in 59% of the patients in the TMD group and found that TMD was significantly associated with tinnitus (28). In other studies, tinnitus in TMD patients was reported to be 36.6% (29) and 30.4% (30). In a systematic review of 22 studies, Skog et al. found that the frequency of tinnitus in TMD patients ranged from 3.7% to 70% (31).

In this study, the relation between otological symptoms and QOL was evaluated using the VAS, and a significant difference was seen in terms of QOL in patients with and without tinnitus. In the literature, studies evaluating the effect of otological symptoms on QOL are limited (25,26). Lacerda et al. explored the relationship between tinnitus and QOL in patients with TMD with the Tinnitus Handicap Inventory (THI) and reported that tinnitus had a moderate effect on QOL (25). Calderon et al. evaluated the relationship between tinnitus and pain intensity and QOL in their study. The Oral Health Impact Profile (OHIP) scale was used to assess QOL, and it was reported that pain was more effective on QOL than tinnitus (26).

Some limitations need to be considered when interpreting the results. The sample size was too limited to generalize the findings, and the distribution of data by gender was unbalanced. Due to the retrospective design of the study, otological symptoms were evaluated through archival records, and audiological tests were not used. The timing of the occurrence of TMD and otological symptoms could not be

determined. VAS is used for the evaluation of masticatory efficiency which is a subjective method.

CONCLUSION

The present study suggests that the frequency of otologic symptoms in TMD patients is high and tinnitus has a significant effect on the QOL. For the optimum management of TMD patients with otological symptoms a multidisciplinary approach with dental clinicians and otolaryngologists should be performed.

Ethics Committee Approval: Approval for the study was obtained Ordu University Clinical Research Ethics Committee with the decision number 2023/259.

Peer-review: Externally peer-reviewed

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