

Aural symptoms in temporomandibular disorder patients

Ahmad A Al-Tuhafi
BDS, MSc (Assist Lect)

Department of Oral and maxillofacial Surgery
College of Dentistry, University of Mosul

ABSTRACT

The prevalence of aural symptoms in 100 patients with temporomandibular disorder (TMD) were investigated and compared with control group of 100 subjects without clinical manifestation of TMD. The relationship between otologic symptoms and severity of TMD signs was also evaluated.

Examination of temporomandibular joint (TMJ) included maximum mouth opening, clicking, crepitation, locking, luxation, deviation of midline, masticatory muscle tenderness, and TMJ tenderness. All patients of the two groups were questioned about feeling of ear complaints, including otalgia, tinnitus, and hearing loss.

It was found that 48% of TMD patients complained of one or more aural symptoms compared with 13% of the controls. There was a highly significant difference between the two groups ($p < 0.01$).

The prevalences of otalgia, tinnitus, and hearing loss in TMD patients were 36%, 27%, and 4% respectively. While in the control group the prevalences were otalgia 6%, tinnitus 10%, and hearing loss 1%. There were highly significant differences between the two groups regarding otalgia and tinnitus ($p < 0.01$).

The evaluation of the relationship between aural symptoms and TMD signs, yielded a significant positive correlation between otalgia with clicking, number of tender muscles, and TMJ tenderness. While it reversibly correlated with mouth opening. Tinnitus was found to be positively correlated with clicking and number of tender muscles.

From the results of this research, dentist and otolaryngologist must act as a team in recognizing and diagnosing TMD and the otolaryngologists should refer patients with otalgic complaint without apparent ear diseases to a specialist in TMD for further evaluation.

Key Words: Otalgia, tinnitus, hearing loss, temporomandibular disorder.

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INTRODUCTION

Temporomandibular disorder (TMD) is characterized by various signs and symptoms of pain and dysfunction, most of which have been extensively studied.⁽¹⁾ These complaints could include adjacent anatomic structures such as mandible, neck, face, head, and the ear.⁽²⁾

Aural symptoms that include otalgia, tinnitus, and hearing loss are not uncommon among TMD patients.⁽³⁻⁵⁾ This association was first reported in 1920 by Wright,⁽⁶⁾ who described deafness due to the position of the mandible and temporomandibular joint (TMJ). In 1925, Decker⁽⁷⁾ reported some patients with deafness due to

retrusion of the condyles. While Costen,⁽⁸⁾ in 1934, described a syndrome of ear and sinus symptoms related to disturbed function of the TMJ. Recent studies have noted otologic complaints more often in patients with TMD than in those without TMD.^(9, 10)

Different theories had been proposed to explain the appearance of aural symptoms in TMD patients. Costen⁽⁸⁾ assumed that loss of vertical dimension can lead to an over closure and retro-displacement of the condyles, causing a compression of the auditory structures like the auriculotemporal nerve and the Eustachian tube. While Pinto⁽¹¹⁾ found that several structures of the TMJ region were connected to the malleus via the petrotympanic fissure. This in turn led him to believe that excursion of the disc and condyle during mandibular movement could induce mobility of the malleus and alter the tension of the tympanic membrane. Contrary to Costen⁽⁸⁾ and Pinto,⁽¹¹⁾ who assumed that there is an anatomical relation between aural symptoms and TMD, Myrhaug⁽¹²⁾ was one of the first authors who believed that neuromuscular dysfunctions were responsible for aural symptoms. During surgery for otosclerosis, he detected contractions of the tensor tympani muscle under the operating microscope. These contractions were stimulated voluntarily by grinding and clenching movements of the jaws. Thus, Myrhaug suggested that neuromuscular dysfunctions of the masticatory muscles might trigger alterations in the sound conducting apparatus. Ash and Pinto⁽³⁾ similarly postulated that hypertonia of the internal pterygoid muscle caused by neuromuscular dysfunction can produce a reflex hypertonia of the tensor tympani and the tensor veli palatini muscles. This may result in an ineffective opening of the Eustachian tube and poor ventilation of the middle ear cavity.

The aims of this research were to investigate the prevalence of aural symptoms including otalgia, tinnitus, and hearing loss in TMD patients and to determine whether these symptoms are more frequent in TMD patients than in normal subjects without clinical manifestation of TMD. The research was also designed to evaluate if there is possible relationship between otologic complaints and severity of TMD signs.

MATERIALS AND METHODS

The research was carried out with a total of 100 patients who had a diagnosis of TMD referred to the Oral Medicine Division, Department of Oral and Maxillofacial Surgery at Mosul University, College of Dentistry. The diagnosis of TMD was made according to Sarnat and Laskin.⁽²⁾

The patients were examined clinically regarding their TMD problems. The examination of TMJ included maximum mouth opening, clicking, crepitation, locking, luxation, deviation of midline, masticatory muscle tenderness, and TMJ tenderness.

For evaluation of statistical relationship: Clicking, crepitation, TMJ tenderness, otalgia, tinnitus, and hearing loss were scored 0 when absent, 1 for unilateral, and 2 for bilateral. While locking and luxation were scored 0 when absent and 1 if presents.

The control subjects were randomly selected from those patients attending to Oral Diagnosis Clinic at Mosul University, College of Dentistry for dental treatment. They were consisted of 100 age- and sex-matched subjects with no current, or history, of TMD problems. All patients of the two groups were questioned about feeling of ear complaints, including otalgia, tinnitus, and hearing loss.

Statistical analyses were done using MINITAB (version 13.20) computer software. Association between two variables was performed with the chi-square test. The strength and direction of linear correlation was tested with Spearman Correlation Coefficient. Significant levels of $p < 0.05$ and $p < 0.01$ were established as significant and highly significant respectively.

RESULTS

Table (1) illustrates the distribution of TMD and control groups by age and sex. One hundred patients with TMD were included in this research; 38% of them were male and the remaining 62% were female. Their age was ranged from 12–54 years with mean age of 25.2 years. The control group was consisted of 100 sex- and age-matched individuals with range of age between 14–55 years and mean age of 24 years.

Table (1): Age and sex distribution in temporomandibular disorder group and control group

Group	Sex	Age in Years					Total	Mean of Age
		10-19	20-29	30-39	40-49	≥ 50		
Temporomandibular Disorder	Male	6	23	4	3	2	38	25.2
	Female	8	26	15	9	4	62	
Control	Male	7	23	5	2	2	39	24
	Female	8	25	15	9	4	61	

Table (2) shows the percentage of each aural symptom in TMD and control groups. It was found that 48% of TMD patients complained of one or more aural symptoms compared with 13% of the controls. There was a highly significant difference between the two groups ($p < 0.01$). There were remarkable differences in otalgia and tinnitus symptoms between the two groups ($p < 0.01$).

The relationship between aural symptoms and TMD signs is shown in Table (3). There was a significant positive correlation between otalgia with clicking, number of tender muscles, and TMJ tenderness. While it reversibly correlate with mouth opening.

Tinnitus was found to be positively correlated with clicking and number of tender muscles.

Table (2): The percentage of aural symptoms in temporomandibular disorder and control groups

Aural symptom	Temporomandibular Disorder	Control
Otalgia	36	6
Tinnitus	27	10
Hearing Loss	4	1
One Symptom or More	48	13
Otalgia:	$\chi^2=27.125$ df=1	Highly significant ($p < 0.01$)
Tinnitus:	$\chi^2=9.584$ df=1	Highly significant ($p < 0.01$)
Hearing loss:	$\chi^2=1.846$ df=1	Not significant ($p > 0.05$)
One symptom or more:	$\chi^2=28.895$ df=1	Highly significant ($p < 0.01$)

Table (3): Spearman Correlation Coefficient between aural symptoms and temporomandibular disorder signs

Temporomandibular Disorder Signs	Aural Symptoms		
	Otalgia	Tinnitus	Hearing Loss
Mouth Opening (in mm)	-0.54*	-0.24	0.02
Clicking	0.65*	0.32*	0.34
Creptitation	0.23	0.1	0.22
Locking	-0.03	0.03	0.01
Luxation	0.12	-0.22	0.22
Number of Tender Muscle	0.68*	0.55*	0.3
Temporomandibular Joint Tenderness	0.74*	0.22	-0.15

* Indicated significant correlation at $p \leq 0.05$.

DISCUSSION

This research revealed that 48% of TMD patients had one or more aural symptoms. This finding is relatively compati-

ble with that of Lam *et al.*,⁽¹⁰⁾ who found otologic complaints in 59.9% of the TMD patients; while Tuz *et al.*⁽¹³⁾ found higher result, up to 77.5%. On the other hand Cia-

ncaglini *et al.*⁽¹⁴⁾ recorded a prevalence of 12.6% which is too lower than the findings of this research.

The differences in the occurrence rates of subjective otologic symptoms could be due to the lack of constant or persistent ear symptoms, the failure to use audiometric tests, and the variation in patient's age in the studied samples.⁽¹⁰⁾

This research have noted aural complaint in TMD patients more often than those without TMD and the difference was statistically significant ($p < 0.01$). This agrees with other researches.^(9, 10, 15) The otologic symptoms found in control group may be due to some ear problems.⁽¹⁰⁾

In the present investigation the percentage of otalgia in patients with TMD was 36%, as shown in Table (2). This is compatible with that of Keersmaekers *et al.*,⁽¹⁶⁾ who found a prevalence of 42%, but this finding was in disagreement with other researches in the literature which reported a prevalence between 3.5–21%.^(1, 14, 17, 18) On the other hand Tuz *et al.*⁽¹³⁾ found that half of TMD patients complained of ear pain. This difference can probably be explained by differences in patient material.

Statistically, the TMD patients had greater earache complaint than control group ($p < 0.01$). Tuz *et al.*⁽¹³⁾ found the same result.

Studies of the general population revealed a prevalence of tinnitus from 14% to 32%.^(13, 19–21)

The prevalence of tinnitus in the TMD patients seems to be greater than that found in the general population. In this investigation, the percentage of tinnitus in TMD patients (27%) falls within the range of values mentioned by other researchers,^(4, 5, 13, 14, 17) which were varying from 31% to 59%.

The difference between TMD and control group was statistically significant. This is in agreement with the result of Tuz *et al.*⁽¹³⁾ The feeling of tinnitus in TMD patient may be explained by that TMD may irritate auriculotemporal nerve, triggering a somatosensory pathway-induced disinhibition of dorsal cochlear nucleus activity in the auditory pathway resulting in tinnitus.⁽¹⁹⁾

Hearing loss was found in 4% of TMD patients in this research. The record-

ed prevalence of hearing loss complaints in TMD patients varies in the literature. Many researches reported range between 15–32%.^(4, 5, 13, 14, 17) However, only few studies are supported by audiometric documentation. Rubinstein⁽²²⁾ suggested that subjective complaints are not correlated with the objectively assessed level of hearing loss. Eustachian tube dysfunction had been implicated as a cause of hearing loss in TMD patients.⁽¹⁶⁾

It was found that otalgia remarkably correlated with clicking, number of tender muscles, and TMJ tenderness. While it reversibly correlated with mouth opening, since limitation of mouth opening may be occurred due to muscle spasm.⁽²⁾ Ciancaglini *et al.*⁽¹⁴⁾ showed that earache increased with increasing severity of arthropathy.

Tinnitus was found to be positively correlated with clicking and number of tender muscles. The results of Ren and Isberg⁽²³⁾ revealed a significant correlation between internal derangement of the TMJ and tinnitus.

The significant correlation between otalgia and tinnitus with the number of tender masticatory muscles may confirm the hypothesis of Myrhaug⁽¹²⁾ and Ash and Pinto,⁽³⁾ who said that spasm in the masticatory muscles of TMD patients may cause reflex spasm of the muscles tensor palatini and significant changes in Eustachian tube function causing otologic complaints.

CONCLUSIONS

The aural symptoms are more frequent in TMD patients than normal subjects. These symptoms correlate with some signs of TMD.

From the results of this research, dentist and otolaryngologist must act as a team in recognizing and diagnosing TMD and the otolaryngologists should refer patients with otalgic complaint without apparent ear diseases to a specialist in TMD for further evaluation.

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