Original Article / Çalışma - Araştırma

Effects of sleep bruxism related tinnitus on quality of life

Uyku bruksizmine bağlı tinnitusun yaşam kalitesi üzerine etkileri

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ABSTRACT

Objectives: This study aims to analyze the subjective and objective characteristics of tinnitus in sleep bruxism patients.

Patients and Methods: The study included 57 patients (12 males; 45 females; mean age 33.89±12.50 years; range 19 to 55 years) with sleep bruxism and tinnitus (sleep bruxism group) and 24 patients (6 males, 18 females; mean age 43.75±16.19 years; range 21 to 58 years) only with tinnitus (control group). Sleep bruxism was diagnosed by the diagnostic criteria of American Academy of Sleep Medicine. Patients were performed pure tone audiometry to detect hearing thresholds at standard and high frequencies. Tinnitus frequency and loudness were assessed. Subjective aspects of tinnitus were identified by tinnitus handicap inventory.

Results: The statistical analysis revealed that the sleep bruxism group had significantly lower hearing thresholds except 1000 Hz and 2000 Hz. Tinnitus frequency was between 3000 Hz and 18000 Hz in sleep bruxism group while it was between 6000 and 16000 Hz in control group with no statistically significant difference (p=0.362). Sleep bruxism group had significantly lower tinnitus loudness and tinnitus handicap inventory scores in comparison to control group (p=0.024 and p=0.000, respectively).

Conclusion: Tinnitus caused by sleep bruxism and temporomandibular joint issues has higher frequency and lower loudness compared to patients with only tinnitus.

Keywords: Bruxism; frequency; hearing; tinnitus handicap inventory; tinnitus.

ÖZ

Amaç: Bu yazıda uyku bruksizmi olan hastalarda tinnitusun öznel ve nesnel özellikleri incelendi.

Hastalar ve Yöntemler: Çalışmaya uyku bruksizmi ve tinnitusu olan 57 hasta (12 erkek; 45 kadın; ort. yaş 33.89±12.50 yıl; dağılım 19-55 yıl) (uyku bruksizmi grubu) ile sadece tinnitusu olan 24 hasta (6 erkek, 18 kadın; ort. yaş 43.75±16.19 yıl; dağılım 21-58 yıl) (kontrol grubu) dahil edildi. Uyku bruksizmi tanısı Amerikan Uyku Tıbbı Akademisi diyagnostik kriterlerine göre konuldu. Hastalara saf ses odyometri uygulanarak standart ve yüksek frekanslardaki işitme eşikleri belirlendi. Tinnitus frekansı ve şiddeti değerlendirildi. Tinnitusun öznel yönleri tinnitus engel dökümü ile belirlendi.

Bulgular: İstatistiksel değerlendirme uyku bruksizmi grubunda işitme eşiklerinin 1000 Hz ve 2000 Hz dışında anlamlı olarak daha düşük olduğunu gösterdi. Tinnitus frekansı uyku bruksizmi grubunda 3000 Hz ile 18000 Hz arasında iken kontrol grubunda 6000 Hz ile 16000 Hz arasındaydı ve farklılık istatistiksel olarak anlamlı değildi (p=0.362). Uyku bruksizmi grubunda tinnitus şiddeti ve tinnitus engel dökümü puanları kontrol grubuna göre anlamlı olarak daha düşüktü (sırasıyla p=0.024 ve p=0.000).

Sonuç: Uyku bruksizmi ve temporomandibüler eklem sorunlarına bağlı tinnitus yüksek frekanslıdır ve sadece tinnitusu olan hastalara göre daha az şiddetlidir.

Anahtar Sözcükler: Bruksizm; frekans; işitme; tinnitus engel dökümü; tinnitus.

Available online at
www.kbbihtisas.org
doi: 10.5606/kbbihtisas.2015.99810
QR (Quick Response) Code

Received / *Geliş tarihi:* January 21, 2015 Accepted / *Kabul tarihi:* June 04, 2015

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Subjective tinnitus is a perception of sound in the absence of apparent stimulus. It affects nearly 14% of the population and is directly proportional to age.[1,2] Tinnitus may be related to otological, neurological, and traumatic causes, adverse effects of drugs, iatrogenic, and temporomandibular disorders (TMDs).[3]

The American Academy of Sleep Medicine defined sleep bruxism (SB) as stereotyped movement disorder occurring during sleep and characterized by tooth grinding and/or clenching.[4] It can cause damage of teeth, periodontium or oral mucosa, muscle problems of masticatory region, headache, neck problems, TMDs, tinnitus and vertigo.[5] Bruxism has a tendency to increase in highly developed societies as a result of increasing stressors. It is more common in females and may be seen in younger patients.[6-10]

In the temporomandibular joint - disordered population tinnitus prevalence is between 12-68%.[11-14] Although this is a common problem, it has not been studied in detail. The mechanism of tinnitus and factors influencing it have not yet been revealed.[13] This study aims to analyze subjective and objective characteristics of tinnitus in SB patients.

PATIENTS AND METHODS

Institutional Review Board approval was obtained from the Ethical Committee of Okmeydanı Training and Research Hospital. Fifty-seven patients (12 males; 45 females; mean age 33.89±12.50 years; range 19 to 55 years) admitted to the Okmeydanı Oral and Dental Health Center for bruxism and who had tinnitus were included in the study. A total 131 ears of 81 patients were evaluated. Sleep bruxism was diagnosed by the diagnostic criteria of the American Academy of Sleep Medicine[4] Twenty-four patients (6 males, 18 females; mean age 43.75±16.19 years; range 21 to 58 years) who were admitted to our department with tinnitus were included as the control group. All of the patients underwent complete otolaryngological examination. All of the tympanic membranes were evaluated microscopically and all of the patients were evaluated by tympanometry to exclude middle ear problems. Vitamin B12, zinc, and lipid levels were examined and patients with problems were excluded. Patients who had tympanic membrane perforation, otitis media with effusion, otosclerosis, tympanosclerosis, and hearing problems were also excluded. Moreover patients who worked at noisy jobs, who had facial trauma history, and malocclusion of the temporomandibular joint were excluded. Patients underwent pure tone audiometry in order to compare hearing thresholds at standard frequencies and high frequencies. Tinnitus frequency and loudness was assessed as described by Andersson.[15] Frequency was detected by matching paradigm and loudness was also evaluated at the tinnitus frequency in sensation level via pure tone audiometry. Patients were also asked to complete the tinnitus handicap inventory to compare psychosocial effects of tinnitus in both groups. The tinnitus handicap inventory is a 25-item tool developed by Newman et al.[16] and designed to measure effects of tinnitus on daily life. Each question was numbered as 0, 2, and 4, where 0 represented no problem, 4 represented a severe problem and 2 represented sometimes. Results were graded 0-16, slight or no handicap (grade 1); 18-36, mild handicap (grade 2); 38-56, moderate handicap (grade 3); 58-76, severe handicap (grade 4); and 78-100: catastrophic handicap (grade 5).

RESULTS

There was no statistically significant difference between groups regarding gender distribution

Table 1. Characteristics of the sleep bruxism and control groups

	Tinnitus							
	Right uniliateral		Left unilateral		Bilateral		*Total*	
	n	%	n	%	n	%	n	%
Sleep bruxism	6	10.5	9	15.8	42	73.7	57	100.0
Control	9	37.5	6	25.0	9	37.5	24	100.0
Total	15	18.5	15	18.5	51	63.0	81	100.0

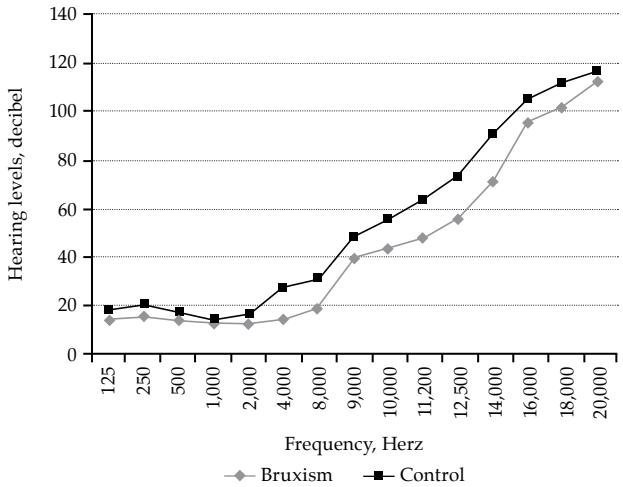

Figure 1. *Hearing levels of the patients (air conduction).*

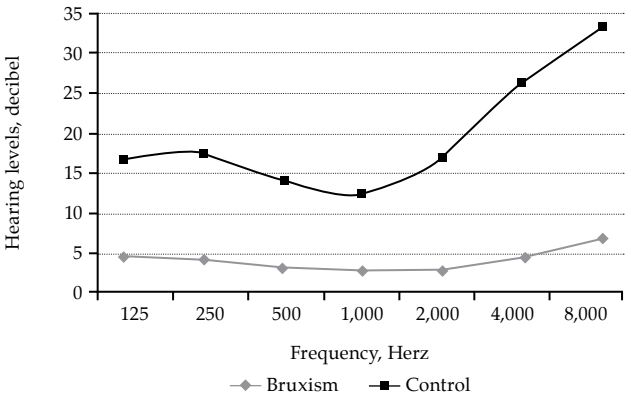

Figure 2. *Hearing levels of the patients (bone conduction).*

(p=0.698) but there was a statistically-significant difference between ages (p=0.012).

Table 1 illustrates the distribution of tinnitus in both groups. Bilateral tinnitus was significantly higher in sleep bruxism (p=0.004).

Average values of pure tone audiometry are given in Figure 1. The statistical analysis revealed the SB group had significantly lower hearing thresholds except 1000 and 2000 Hz. Hearing thresholds of air and bone conduction are given in Figure 1 and 2.

The tinnitus pitch was between 3000 Hz and 18000 Hz in the SB group. It was between 6000 and 16000 Hz in the control group. The difference was not statistically significant (p=0.362). Tinnitus loudness scores are given in Table 2. The sleep bruxism group had significantly lower scores in comparison to the control group (p=0.024) (Table 2).

The SB group had significantly lower tinnitus handicap inventory (THI) scores and grades compared to the control group p=0.000; p=0.000 respectively (Table 3).

DISCUSSION

It is known that TMD are related to tinnitus.[14,17-19] Although the exact mechanism of tinnitus has not been discovered, it has been proposed that neural plasticity especially somatosensory inputs to the cochlear nucleus cause it.[20,21] On the other hand, the association of tinnitus and SB is not clear. Camparis et al.[22] found that tinnitus frequency was higher in patients with SB and chronic facial pain. Although they did not find any difference in structural alterations among patients with SB with tinnitus and without tinnitus groups, pain in the cervical and masticatory regions was higher in the SB with tinnitus group. Fernandes et al.[13] analyzed the association between painful TMD, SB and tinnitus. They found that self-reported tinnitus was associated with SB but at a lower rate compared to self-reported tinnitus associated with TMD. But the highest ratio was obtained in the group that had TMD+SB. In addition

Table 2. Frequency and loudness of tinnitus

	n	Mean±SD	*p*
Tinnitus loudness			
Sleep bruxism	99	63.33±24.33	0.024
Control	33	74.09±20.06	
Tinnitus frequency			
Sleep bruxism	99	11060.61±3315.45	0.362
Control	33	10454.55±3243.66	

SD: Standard deviation; Independent samples t-test; p<0.05.

Table 3. Results of tinnitus handicap inventory and tinnitus grade

	n	Mean±SD	*p*
Tinnitus handicap inventory			
Bruxism	57	29.68±14.89	0.000
Control	24	61.25±18.07	
Tinnitus grade			
Bruxism	57	2.16±0.88	0.000
Control	24	3.75±0.85	

SD: Standard deviation; Independent samples t-test; p<0.05.

they stated that SB could not have been directly related to tinnitus by associated with painful TMD.[13]

Previous studies revealed that 58-80% of patients with TMD had SB[23,24] and SB patients had painful TMD and other myofascial pain syndromes more frequently.[25] Our study also supports these findings; 44 of 57 patients had pain in the masticatory region without obvious TM joint problem.

The present study revealed that there was a difference in audiometric results of tinnitus patients with SB and without SB. Although both of the groups were composed of patients without hearing problems, thresholds were lower in the SB group except 1000 and 2000 Hz. The significance was very strong at higher frequencies except 16000 Hz. On the other hand, there was no difference in tinnitus frequency. Both of the groups had high frequency tinnitus and majority of the patients had only one sound in both groups. Six patients in the SB group and three in the control group had more than one frequency. Only one patient in the SB group had tinnitus at 3000 Hz. Morais and Gil[26] found that mean pitch was 8.6 kHz and mean loudness was 35 dB in TMD patients. Similarly, Kanji and Koza-Shangase[27] concluded that tinnitus that occurred in TMD patients had high frequency. They also stated that TMD patients matched their tinnitus at lower intensity. We also found that tinnitus loudness was lower in the SB group and the mean frequency in our study was 11060 kHz in the SB group.

The THI was used to evaluate subjective effects of tinnitus and we found that SB patients had lower scores. This result was consistent with the result of tinnitus loudness levels. Morais and Gil[26] found that the mean THI score was 25 in their study. We had a similar THI score. But they stated that as the pitch increased, the THI score lowered.

The present study showed that the SB group had a lower mean age, which reflects the effect of another mechanism other than control group. As tinnitus is related to increased age, the control group was older. In addition, we detected that bilateral tinnitus was higher in the SB group. That might be related to bilateral muscular activity or joint damage.

The limited number of patients and lack of polysomnographic data are the main limitations of our study.

Results of the present study confirmed that SB, TMD and tinnitus are associated with each other. Tinnitus associated with SB and TMD had higher frequency and lower intensity compared to tinnitus without them. In addition, it caused less effects on quality of life.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

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