CLINICAL STUDY

PSYCHOTIC MEASUREMENTS OF PATIENTS WHO PRESENTED TO OUR CLINIC WITH SUBJECTIVE TINNITUS SYMPTOMS

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SUMMARY

Aim: The objective of this study is to evaluate the relation of between age, gender, hearing loss, depression and anxiety scores with tinnitus.

Materials and Methods: Patients having tinnitus complaint were evaluated at our otorhinolaryngology clinic, from June 2014 to December 2014, through a detailed interview complete otorhinolaryngological examination, the Turkish version of the Tinnitus Handicap Inventory (THI) and pure-tone audiometry (PTA), Beck Anxiety and Depression Scales, visual analog scale (VAS) (annoyance, ignorability, unpleasantness). The relation of between age, gender, hearing loss, depression and anxiety scores with tinnitus was analyzed. THI was classified in terms of: light, mild, moderate, severe and catastrophic on a scale of 0–16, 18–36, 38–56, 58–76 and 78–100, respectively. Two groups were created focusing on speech discrimination as over 88% and under 88%.

Results: 100 patients with subjective tinnitus symptom were enrolled in this study. Age varied from 19 to 81 (mean 52.2±14.9). Females with tinnitus had more anxiety than males (p=0.06). Tinnitus patients with normal hearing had higher ignorability scores compared to tinnitus patients with hearing loss (p=0.027). There was a significant difference in the fifth group of THI (catastrophic) regarding the anxiety and depression scores. There was no correlation between speech discrimination scores and THI, VAS scores, and Beck Anxiety and Depression scores.

Conclusion: We noted that findings in several studies vary widely, reflecting the idea that tinnitus patients are a heterogeneous group and that many factors determine the impact of tinnitus on the lives of patients.

Keywords: Tinnitus, hearing loss, anxiety, depression

SUBJEKTIF TINNITUS SEMPTOMLARI İLE KLİNİĞİMİZE BAŞVURAN HASTALARIN PSİKİYATRİK ÖLÇÜMLERİ KISALTILMIŞ BAŞLIK: SUBJEKTİF TİNNİTUS VE PSİKİYATRİK ÖLÇÜMLER

ÖZET

Amaç: Bu çalışmadaki amacımız tinnitus ile yaş, cinsiyet, işitme kaybı, depresyon ve anksiyete skorları arasındaki ilişkiyi araştırmaktır.

Materyal ve Metod: Otorinolarengoloji kliniğimize Haziran 2014 ve Aralık 2014 tarihleri arasında tinnitus şikayeti ile başvuran hastalara detaylı otorinolarengolojik muayene, Tinnitus Engellilik Anketinin Türkçe versiyonu (TEA), saf ses odyometrisi (SSO), Beck Anksiyete ve Depresyon Skalası, vizüel analog skala (VAS) (rahatsızlık verici, görmezden gelebilme, mutsuzluk) uygulanarak bu hastalar çalışmaya dahil edilmiştir. Tinnitus ile yaş, cinsiyet, işitme kaybı, depresyon ve anksiyete skorları arasındaki ilişki incelenmiştir. TEA skalası sonuçları sırasıyla beş ayrı şiddette değerlendirilir: 0-16, zayıf; 18-36, orta; 38-56, ılımlı; 58-76, şiddetli; 78-100, felaket. Hastalar konuşmayı ayırt etme skorlarına göre %88 altı ve %88 üstü olarak iki gruba ayrılmıştır.

Bulgular: Tinnitus şikayeti olan 100 hasta çalışmaya dahil edilmiştir. Yaş aralığı 19 ila 81 arasında değişmektedir (ort 52.2±14.9). Tinnitus şikayeti olan kadınların anksiyete oranı erkeklerden yüksek bulunmuştur (p=0.06). İşitmesi normal sınırlarda olan tinnitus hastaları işitme kaybı olan hastalar ile karşılaştırıldığında daha yüksek görmezden gelebilme skoruna sahiptir (p=0.027). Anksiyete ve depresyon skorları göz önüne alındığında TEA'nın beşinci grubunda (felaket) anlamlı farklılık görüldü. Konuşmayı ayırt etme skorları ile TEA, VAS skorları, Beck Anksiyete ve Depresyon skorları arasında bir ilişki bulunmamıştır.

Sonuç: Daha önce yapılan çalışmalarda farklı sonuçlar elde edilmiştir. Bu durum tinnitus hastalarının heterojen bir grup oluşturduğu ve tinnitus şikayetinin hastaların hayat kalitesi üzerinde farklı etkileri olduğu fikrini desteklemektedir.

Anahtar Sözcükler: Tinnitus, işitme kaybı, anksiyete, depresyon

INTRODUCTION

Tinnitus is one of the most common otologic problem, affecting 10% to 30% of the general population. This phenomenon can affect all age groups, but is more likely to affect individuals who are over the age of 60[1].

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Also, tinnitus can cause severe distress and negatively affect the quality of life in approximately 4% of the population[1,2].

Tinnitus can be classified as objective or subjective. Subjective tinnitus is considered as a phantom sensation experienced in the absence of corresponding auditory stimulus. Tinnitus can sound like hissing, roaring, pulsing, whooshing, chirping, whistling, ringing or clicking sound in one or both ears, or somewhere in the head[3]. Objective tinnitus can be heard through a stethoscope placed over the head and neck structures near the patient's ear[4].

Etiopathogenesis of tinnitus is complex and still not quite understood. Some leading theories include injured cochlear hair cells that discharge repetitively and stimulate auditory nerve fibers in a continuous cycle, spontaneous activity in individual auditory nerve fibers, hyperactivity of the auditory nuclei in the brain stem or a reduction in the usual suppressive activity of the central auditory cortex on peripheral auditory nerve activity[5].

The close connection of the auditory tract and the limbic system may lead to a stress reaction along with other cognitive disorders. Tinnitus can cause concentration and attention problems[6]. In the literature, there are many articles on the perception of tinnitus severity and psychological and general health problems like pain.[7] The perception of tinnitus normally extinguishes in a short time through the 'habituation' mechanism. However, in the case of emotional reinforcements caused by fear, anxiety, or tension, the continued perception of tinnitus is supported by the limbic system, primarily by amygdala; this establishes a vicious circuit that leads to the amplification (increased excitability) and the chronification (through neuronal plasticity mechanisms) of the signal[8]. The validity of this model is supported by neurobiological studies that tinnitus is a phenomenon similar to the perception of chronic pain[7]. This analogy is based on the concept that injury in peripheral structures, with long-term subjective impairment, causes modifications in central signal processing mechanisms[9]. Psychological processes seem to be of particular importance in determining the degree of subjective annoyance and disability due to tinnitus[10].

Different questionnaires have been specifically designed for the assessment of tinnitus-related psychological complaints and symptoms. The Tinnitus Handicap Inventory is most favored questionnaire, because of its ease of administration, incorporation of functional as well as emotional constructs, good construct validity, and strong internal consistency and test–retest reliability.[11]

The Beck Depression Inventory (BDI), which was first developed by Beck et al. in 1961[12], is probably the most used self-assessment method to study depression. The BDI is a 21-question multiple-choice self-report inventory that has four options. Participants are asked to choose the option that best expressed their emotional status in the last one week period. The maximum score is 63, and the cutoff value for the Turkish version is 17, which indicates a need for help[13]. The Beck Anxiety Inventory (BAI), created by Aaron T. Beck et al., is a 21-question multiple-choice self-report inventory that measures the severity of anxiety in adults.[14] The visual analog scale (VAS) is a visual graph used to determine the level of disturbance or discomfort caused by tinnitus, based on a scale from 1 to 10. Intensity and discomfort are the most valued items.[15]

With this study, we aimed to assess the correlation between audiometric data, and psychotic and acoustic measures associated with subjective tinnitus.

MATERIAL and METHODS

All subjects presented to our clinic because of a tinnitus problem. The study was approved by Baskent University Institutional Review Board and Ethics Committee between June 2014 to December 2014, 100 patients were enrolled in the study: The study consisted of 35 males and 65 females, with a mean age of 52.2±14.9 years (range: 19–81). We grouped the patients according to age as: Group 1: under 40 years, Group 2: 41–59 years, Group 3: over 60 years.

The exclusion criteria were the presence of one or more of the following: younger than 18 years of age, objective tinnitus, middle or external ear problem, otosclerosis, chronic otitis media, vestibular schwannoma, Meniere's disease, history of previous ear and neurologic surgery, history of temporal bone trauma, endocrinologic disease, psychiatric disorder and pregnancy. The tinnitus duration was noted. The first step was a full clinical otorhinolaryngological examination. After the examination, MRI scan of internal auditory meatus, cerebellopontine angle and brain was requested, the primary aim being to exclude cerebellopontine angle lesions and acoustic assessments of the patients were performed by odiological examination (Interacoustics AC 40, Clinical Audiometer, Denmark) and tympanometry (Interacoustics AZ T, Impedance Audiometer, Denmark, calibrated to ANSI S3.39-1987 standards) in a double walled sound-attenuated suite. PTA thresholds were measured in both ears at 125 to 8,000 Hz frequencies through earphones. (Amplifon Amplaid 460 audiometer, with conventional Telephonics 296 D 100-1 earphones). According to the speech discrimination scores, two groups were created as over 88% and under 88%. We categorized the duration of tinnitus complaint as: Group 1: tinnitus lasting less than one year; Group 2: 1–5 years; Group 3: more than five years.

Patients then filled out the Turkish version of the Tinnitus Handicap Inventory (THI), a 25-question questionnaire answered with "yes" (4 points), "no" (0 points) or "sometimes" (2 points). The scores were added to yield a classification of the tinnitus

handicap, from negligible (0 to 16), mild (18 to 36), moderate (38 to 56), severe (58 to 76) or catastrophic (78 to 100).

The VAS is a visual graph used to determine the level of disturbance or discomfort caused by tinnitus, on a scale from 1 to 10. Descriptive statistics were used for a 10-point visual analogue scale (VAS) for tinnitus ignorance (LD), annoyance (AN), and unpleasantness (UP).

The Beck Depression Inventory (BDI) was used to study depression. The BDI is a 21-question multiple-choice self-report inventory that has four options. Participants were asked to choose the option that best expressed their emotional status in the last one week period. The maximum score is 63 and the cutoff value for the Turkish version is 17, which indicates a need for help.

The Beck Anxiety Inventory (BAI), created by Beck et al., is a 21-question multiple-choice self-report inventory that measures the severity of anxiety in adults.

Routine blood test results of these patients was normal such as complete blood count, biochemical tests etc.

The Statistical Analysis System (SAS) software version 9.1 was used for statistical calculations. The statistical tests included Wilcoxon rank sum test and Kruskal-Wallis test. .Pearson's coefficient yielded the p values associated with the test statistics for numerical correlations (age, different means calculated based on pure-tone audiometry and the THI).

RESULTS

No significant correlation was found between gender and THI, VAS scores and depression scores except females with tinnitus had more anxiety than males (p=0.06).

Forty-four patient with tinnitus had normal hearing, 56 had hearing loss. No significant correlation was found between hearing loss and THI, VAS scores (annoyance, unpleasantness) and depression anxiety scores; only tinnitus patients with normal hearing had higher ignorability scores compared to tinnitus patients with hearing loss (p=0.027).

Seventy-five patients had bilateral tinnitus and 25 patients had unilateral. There was no significant difference between laterality of tinnitus and THI, VAS scores and Beck Anxiety and Depression scores.

According to the age distribution, there were 27 patients in Group 1; 40 in Group 2, , 33 in Group 3. There was a significant difference between the three groups based on VAS scores. VAS annoyance (p=0.004) and VAS unpleasantness (p=0.043) was higher in the third group compared to the first two groups. The VAS (p=0.016) ignorability was higher in the first group compared to the last two groups.

Regarding the THI , there was a significant difference in the catastrophic group regarding the anxiety and depression scores.

There was no correlation between the two groups due to THI, VAS scores, Beck Anxiety and Depression scores.

In analysis of the duration of tinnitus, Group 2 had the highest THI scores compared to Group 1 and 3 (p=0.031). There were no significant differences between Group 1 and Group 3.

We didn't observe a statistically significant difference between age groups of hearing loss patients in terms of THI, VAS, depression and anxiety. Score levels of THI, which is applied to tinnitus patients with different levels and different age subgroups, are classified as mild(0-36), moderate(38-56) and severe(58-100). According to this classification; annoyance, unpleasantness and anxiety values of patients who are included in 40-60 and over 60 age subgroups together with mild tinnitus were detected to be significantly lower than other groups. Patients in 40-60 age subgroup with severe tinnitus demonstrated significantly lower values in terms of ignorability. These results clarified that patients in 40-60 age subgroup with severe tinnitus are the most who suffer from tinnitus.

DISCUSSION

Tinnitus is an increasingly prevalent symptom present in approximately 10–30 % of the world population. Most patients are between 40 and 80 years of age; the prevalence above 60 reaches 33%. About 20% have moderate to severe impact in the quality of life but the factors associated with the tinnitus annoyance are not entirely known[16]. The U.S. Veterans Administration Benefits Report ranked tinnitus as the second most prevalent service-related disability17. Studies have been controversial on the effect of gender on the prevalence of tinnitus. Although some have described a slightly higher prevalence in females, others have suggested that the prevalence is higher in males[18–20]. In our study, the female ratio was nearly double of men.

In our study, we found no difference in the THI, VAS scores, and BDI between the males and

females. Only anxiety scores were significantly higher in women with tinnitus. But, we also know that incidence of anxiety is highly prevalent in the female population (20%) compared to that in the male population (10%)[21]. Reynolds et al.[22] showed that anxiety was found to be the main psychological problem in tinnitus patients. Based on the THI scores, our results showed that the level of tinnitus correlates with the severity of BDI and BAS. Belli et al.[23] found that the Beck Anxiety Inventory and Beck Depression Inventory scores were significantly higher in tinnitus patients than in normal control subjects. Anxiety disorders and somatoform disorders were significantly higher in tinnitus patients than in normal control subjects. They concluded that psychiatric symptoms such as symptoms of anxiety, depression or somatization among patients with tinnitus should alert clinicians for the presence of a chronic and complex psychiatric condition . Crocetti et al.[24] concluded that 35% of the patients had anxiety disorders , and 13% of the patients had a depressive mood who presented with tinnitus symptom. However, Ooms et al.[25] concluded that tinnitus does not appear to be a problem related to depression. This conclusion disagrees with most of the literature. Our results showed that there is a correlation with THI with BDI and BAS. Patient who have severe tinnitus had also higher depression and anxiety scores.

A normally functioning HPA-axis is a requirement for hearing, and clinical studies show that patients with tinnitus display signs of an impaired HPA-axis along with a higher degree of perceived stress, compared to non-tinnitus patients. The limbic system has been shown to be activated during tinnitus and this offers a neuroanatomical correlation for stress-related tinnitus as it is a key region for regulating stress responses. It is becoming more apparent that stress can increase the prevalence of hearing problems. More specifically, it has been shown that individuals with hearing problems have a worse ability to unwind and activate the parasympathetic system.[26] Neuroimaging studies confirm the existence of neural circuits that are activated both in depression and tinnitus. Studies of neuroendocrine function demonstrate alterations of the HPA-axis in depression and, more recently, in tinnitus. Studies addressing neurotransmission suggest that the dorsal cochlear nucleus, i.e., typically hyperactive in tinnitus, is also involved in the control of attention and emotional responses via projections to the locus coeruleus, the reticular formation and the raphe nuclei. Impaired hippocampal neurogenesis has been documented in animals with tinnitus after noise trauma, as in animal models of depression. These parallels in the pathophysiology of tinnitus and depression argue against comorbidity by chance and against depression as pure reaction on tinnitus. Instead, they stand for a complex interplay between tinnitus and depression[27-29].

In our study, we did not find a significant correlation between hearing loss and THI, VAS scores (annoyance, unpleasantness) and depression and anxiety scores. Only tinnitus patients with normal hearing has higher ignorability scores compared to tinnitus patients with hearing loss. We considered that the patients who have normal hearing can ignore tinnitus more easily.

Also we did not find a significant correlation between speech discrimination levels and THI, VAS scores (annoyance, unpleasantness, ignorability) and depression anxiety scores. We could not show a significant correlation between laterality of tinnitus and THI, VAS scores (annoyance, unpleasantness, ignorability), and depression and anxiety scores.

Hiller and Goebel[30] investigated the factors affecting tinnitus distress, and reported that tinnitus had a moderate relation with depression. These authors also suggested that hearing loss was a significant predictor. Rutter and Stein[31] reported that the relationship between hearing level and the depression in tinnitus patients was not significant. Searchfield et al.[32] observed that there was no significant relation between the Tinnitus Severity Index and hearing thresholds; however, tinnitus patients who had hearing disorder at low frequencies have shown a higher tinnitus handicap. This situation has been attributed to the heterogeneity of tinnitus sufferers and the multiple dimensions of tinnitus effects.

The results of Hasson et al.[33] demonstrated a clear and linear relationship between higher prevalence of hearing problems (hearing loss, tinnitus or both) and stress, ill health as well as poor sleep.

The influence of hearing loss on the degree of suffering caused by tinnitus remains uncertain[34]. Weisz showed that severe tinnitus was associated with hearing loss at high frequencies[35]. McKinney et al.[36] found that clinically important hearing loss in tinnitus patients was associated with anxiety and depression as a reaction to hearing loss, which could affect the impact of tinnitus. It is, thus, still uncertain whether hearing loss is only a trigger for the onset of tinnitus or it also predicts its severity and handicap . Searchfield et al. showed that low frequency hearing loss was correlated with increased annoyance due to tinnitus as assessed in the Tinnitus Handicap Questionnaire (THQ); the highest scores, however, were given to questions on hearing, rather than the

total THQ score[37]. In the same study, the Tinnitus Severity Index (TSI)—a questionnaire assessing how bothersome tinnitus is—did not correlate with any audiometric findings. Such poor correlation suggests that tinnitus patients are heterogeneous and several factors affect the impact of this symptom on the quality of life.

In our study, 27 of the patients were under 40 years old, 40 patients age were between 41−59 and 33 patients age were 60 and older. We did not find a significant correlation between age and THI, VAS scores (annoyance, unpleasantness) and depression anxiety scores. Only tinnitus patients under 40 years had significantly higher VAS ignorability scores compared to older age groups. We thought that patients who were under 40 years have a more busy life and most of them work at very noisy places so they can more easily ignore tinnitus, especially while working.

In the studies suggested that tinnitus is a common subaudible phenomenon that may be perceived in silent ambiances or during heightened auditory perception[33,38]. Thus, it may be inferred that older patients, having less work, remain longer in their homes, where silence and auditory attention could possibly be more relevant for increasing the perception of annoyance due to tinnitus. Brown found that subjects who do not work tend to present more tinnitus, but the author did not comment on this association[39].

We classified the duration of tinnitus symptom in terms of years. The patients who had tinnitus 1−5 years had higher THI scores. We thought that patients who had tinnitus less than one year is not bothered by this symptom as much. And, patients who has tinnitus more than five years are used to it.

A limitation of this study was the relatively small sample size however it could be pioneer for future studies.

SONUÇ

Tinnitus is one of the most annoying problems in the otorhinolaryngology clinic practice. Tinnitus may be accompanied by depression and anxiety. We noted that findings in several studies vary widely, reflecting the idea that tinnitus patients are a heterogeneous group and that many factors determine the impact of tinnitus on the lives of patients. Futher studies are needed for the association of psysicological problems and tinnitus and also Psychiatric treatment must be investigated for the tinnitus patients.

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