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Comparison of tinnitus and psychological aspects between the younger and older adult patients with tinnitus

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ABSTRACT

Objective: To explore the differences in various tinnitus-related features and psychological aspects between the younger and older adult patients with tinnitus.
Methods: We retrospectively reviewed the clinical data of the adult patients who visited our tinnitus clinic in 2013 and completed full tinnitus assessment including audiometry, tinnitus matching, standardized tinnitus questionnaires, and psychometric questionnaires. The younger group included patients aged 20–45 years ($n = 64$), and the older group, those older than 65 years ($n = 76$). Clinical features, hearing levels, matched tinnitus pitches and loudness, self-report tinnitus severity scores, Beck depression inventory scores, and stress scores were compared between the groups.
Results: Tinnitus duration was longer in the older group ($p = 0.002$). Mean PTAs were 16 dB HL in the younger, and 38 dB HL in the older groups ($p < 0.001$). Eighty-nine percent of the younger patients had normal hearing, while 82% of the older patients had hearing loss ($p < 0.001$). Matched tinnitus loudness was greater in the older group (64 dB HL vs. 36 dB HL, $p < 0.001$). All of the self-report tinnitus, depression, and stress scores did not differ between the groups.
Conclusion: The older patients seemed to be more receptive to tinnitus. The majority of older tinnitus patients had concomitant hearing loss, and thus hearing rehabilitation should be considered preferentially for tinnitus management in this age group. Subjective tinnitus severity, depressive symptoms, and the stress levels were similar between the younger and older tinnitus patients. Therefore, treatment could be planned based upon the comprehensive understanding of the tinnitus characteristics and psychological aspects in each patient irrespective of age.

1. Introduction

Tinnitus is a prevalent symptom in the adult population. Most epidemiologic studies have estimated tinnitus prevalence at 10–15% of the adult population. Approximately 1–2% are severely affected and 0.5% are unable to lead a normal life [1–5]. Tinnitus distress interferes with daily life in severely affected individuals, but the cure remains a challenging territory so far. The difficulties in successful management of tinnitus partly lie in heterogeneous clinical features and multiple etiologies as well as in limited understanding of the neural pathophysiology [1]. Potential risk factors for tinnitus are currently known, the most frequently described of which include hearing loss and noise exposure. Other factors such as ototoxic drugs, otitis media, head injury, smoking, hypertension, dyslipidemia, depression, and migraine have been suggested in community-based studies [2,4,6–8]. Important relations between tinnitus and mental health including anxiety and depression have been reported in cross-sectional population

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studies although a cross-sectional study makes causal relationship impossible to determine [8,9]. Tinnitus might cause psychological distress to worsen symptoms of anxiety/depression and anxiety/depression can exacerbate tinnitus leading to a vicious cycle.

Tinnitus is commonly thought to increase in prevalence with age, but this may not be the case through the entire lifespan [4]. The prevalence of frequent tinnitus has been documented to peak in one's 60s [8,10]. In a population-based longitudinal study of older adults, the 10-year cumulative incidence of new cases of tinnitus was 12.7%, but the participants tended to show improvement during the study [7]. While many community-based studies have investigated tinnitus in the older populations, the aged tinnitus sufferers who seek a professional help and attend tinnitus clinics have been minimally characterized in the current literature. Furthermore, characterization of tinnitus patients in the age subgroups may provide guidelines on the specified treatment approaches. The primary objective of this study was to explore the differences in various tinnitus-related features and psychological aspects between the younger and older adult patients with tinnitus focusing on the elderly.

2. Materials and methods

2.1. Subjects and audiometry

We reviewed the medical records of the patients who came to our otology clinic with the chief complaint of continuous or frequent tinnitus and completed full tinnitus assessment in 2013. This retrospective study was approved by the Institutional Review Board of The Catholic University of Korea Seoul St. Mary's Hospital. Those who had the following underlying diseases that can cause tinnitus but require specific treatment thereof were excluded from the study: middle ear disease, sudden sensorineural hearing loss, Meniere's disease, retrocochlear lesion, and psychiatric diseases. Patients aged 20–45 years were selected for the younger adult group, and those older than 65 years, for the older adult group. All subjects were evaluated through a standardized initial interview, a full otolaryngologic examination, audiometric tests, tinnitus matching test, and validated tinnitus and psychometric questionnaires. To test auditory function, pure tone/speech/impedance audiometry, otoacoustic emission, and auditory brainstem response testing were performed. Pure-tone thresholds were acquired in a well-standardized manner (GSI 61, Grason-Stadler, MN, USA). The reported pure-tone average (PTA) was calculated using 0.5-, 1-, 2-, and 3-kHz air conduction thresholds and rounded to the nearest whole number. Using the same equipment, tinnitus was matched for pitch and loudness. The degree of hearing loss was categorized as follows: PTAs of 0–25 dB HL indicated normal hearing; 26–40 dB HL, mild hearing loss; 41–70 dB HL, moderate; 71–90 dB HL, severe; >90 dB HL, profound.

2.2. Tinnitus and psychological evaluation

Patients were asked to rank their subjective perception of loudness (LD), annoyance (AN), awareness (AW), and effect on life (EOL) on average over the last month on a visual analogue scale (VAS) of 0 to 10 (100 for AW), and to complete the validated 25-item Tinnitus Handicap Inventory (THI) questionnaire [11]. AW represented the percentage of time when the patients are aware of tinnitus during the total awake time. THI scores of 0–16 indicated no handicap; 18–36, mild handicap; 38–56, moderate handicap; 58–100, severe handicap [12]. They were also screened for depressive symptoms using the Beck Depression Inventory (BDI). The severity of depression was classified according to the suggested standard cut-off scores: 0–9 indicated minimal depression; 10–16, mild; 17–29, moderate; 30–63, severe [13,14]. The validated Korean version of Brief Encounter Psychosocial Instrument (BEPSI-K) [15], originally developed by Frank and Zyznaski [16] is a five-item questionnaire designed to measure stress levels and the negative effects of stress on health. Patients rated each item on a five-point Likert scale and the total score ranging from 0 to 25 was divided by 5 for the BEPSI-K score. A high stress level was defined as a score of $\geq$2.5 in this study.

2.3. Statistical analysis

The following indices were compared between the younger and older adult groups: (1) clinical and audiological features (sex, tinnitus location, tinnitus classification, the duration between the onset and initial interview, PTA, and the degree of hearing loss), (2) tinnitus measures (matched tinnitus pitch/loudness, scores of LD/AW/AN/EOL/THI, and the degree of tinnitus distress by THI), and (3) psychological measures (BDI, BEPSI-K, and the degrees of depression and stress). Statistical analyses were performed using SPSS 18.0 software (IBM Corp., Armonk, NY): t test for continuous variables and chi-square test for categorical variables. Linear by linear association test was applied for the degrees of PTA, THI, BDI, and BEPSI-K. A two-tailed p value of <0.05 was considered to be significant.

3. Results

The younger adult group comprised 64 patients who met the inclusion criteria (44 men and 20 women aged 20–45 years, mean 36.9 years), and the older adult group, 76 patients (41 men and 35 women aged 65–82 years, mean 70.0 years). Sex and tinnitus location were not significantly different in the ratios between the groups. In both groups, the majority of patients had subjective tinnitus, but the proportional difference was statistically significant (89.9% in the younger vs. 97.4% in the older adult groups, $p = 0.012$). Tinnitus duration was 15.5 ± 3.7 (mean $\pm$ SEM) months in the younger and 34.0 ± 8.3 months in the older adult groups with significant difference ($p = 0.045$). Forty-eight percent of the younger patients visited the clinic within 3 months from the onset of tinnitus and 17%, after 1 year. In contrast, 43% of the older patients visited the clinic after 1 year and 29%, within 3 months. The difference was significant between the two groups ($p = 0.002$). PTAs were 16.0 ± 1.8 dB HL in the younger, and 38.3 ± 1.9 dB HL in the older adult groups ($p < 0.001$). Mean pure-tone thresholds showed significant differences at all frequencies from 0.5 to 8 kHz between the groups (all $ps < 0.001$) (Fig. 1). Eighty-nine percent of the younger patients had normal hearing, while 81.6% of older

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