Gender Differences Affecting Psychiatric Distress and Tinnitus Severity

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Objective: This study evaluated gender differences in the relationship between psychiatric distress and subjective tinnitus severity.

Methods: This cross-sectional study included 134 female and 114 male patients who visited the otology outpatient clinic at Seoul St. Mary’s Hospital for tinnitus from February to July 2015. Patients completed a series of instruments, including the Tinnitus Handicap Inventory, Beck Depression Inventory, Korean version of Brief Encounter Psychosocial Instrument (BEPSI-K), and visual analogue scales assessing various tinnitus characteristics (loudness, awareness, annoyance, and effect on life).

Results: Tinnitus severity did not significantly differ between the gender groups (p=0.632), and it correlated significantly with tinnitus characteristics and psychiatric distress. Partial correlations between tinnitus severity and depressive symptoms were stronger in males (r=0.411, p<0.01) than in females (r=0.304, p<0.01) while controlling for duration of tinnitus and tinnitus characteristics. However, stress (BEPSI-K) was positively correlated with tinnitus severity in only males (r=0.463, p<0.01). A multiple regression analysis revealed that effect of tinnitus on life, depressive symptoms, and stress were significantly associated with tinnitus severity in males, whereas only tinnitus annoyance and depressive symptoms were associated with tinnitus severity in females.

Conclusion: Tinnitus severity was significantly correlated with depressive symptoms and stress, and there were gender differences in the relationship between tinnitus severity and psychiatric components. It is necessary to be vigilant of psychiatric symptoms among patients with tinnitus who visit the otology outpatient clinic, especially for male patients.

KEY WORDS: Tinnitus; Depression; Psychological stress; Sex.

INTRODUCTION

Tinnitus refers to a phantom auditory sensation—that is, an auditory phenomenon without the presence of external sound—described as sounds of peeping, chirping, blowing wind, etc.¹ While common among elderly adults, the exact prevalence rate has been shown to vary across studies and populations. In general population studies, the point prevalence of tinnitus was 19.7% in South Korea² and 25.3% in the United States³. In another study, about 80% of adults experience tinnitus symptoms at one point in their lifetime.⁴ Although tinnitus is a primarily transient sensation, it remains unremitting in 6% of the general population.⁵

Tinnitus can have an adverse effect on individuals’ work life and quality of life, and may be accompanied by additional symptoms such as stress, sleep disturbance, anxiety, agitation, and depression; it may even lead to suicide.⁶ A large-scale interview study in the United States showed that out of about 21.4 million individuals, those with tinnitus tended to have higher anxiety or depressive symptoms (anxiety, 26.1%; depressive symp-
toms, 25.6%) compared to individuals without tinnitus (anxiety, 9.2%; depressive symptoms, 9.1%). Conversely, tinnitus distress might be influenced by comorbid psychiatric symptoms such as depressed mood and anxiety. Accordingly, there appears to be a reciprocal relationship between tinnitus severity and psychiatric symptoms, which needs to be investigated in more detail. While there are a number of studies examining the various forms of psychiatric distress that appear to result from tinnitus, few studies have attempted to explore the association between tinnitus severity and psychiatric distress.

Gender is recognized as one of the most important risk factors of psychiatric disease, particularly depression. However, previous studies have had conflicting results about the relation between gender and tinnitus severity. Some studies have shown no difference in tinnitus distress by gender, whereas other studies have reported significant gender differences. Given the possible reciprocal relationship between tinnitus and psychiatric symptoms, it is conceivable that, like with psychiatric symptoms, there are gender differences in tinnitus. In fact, Gomaa et al. found that depression, anxiety, and stress differed by gender among patients with tinnitus. However, they only compared the differences in depression, anxiety, and stress scores according to gender, and did not analyze the association between tinnitus severity and psychiatric distress in tinnitus patients separately for men and women, to see how this association differs by gender. Therefore, it seems meaningful to evaluate differences in the association between psychiatric symptoms and severity of tinnitus between males and females.

Stress is known to have a relationship with tinnitus severity and its relevant secondary symptoms. A correlation between stress and tinnitus has been reported in numerous previous studies. The ability to cope with stress varies according to numerous individual characteristics, including gender. For instance, one study reported that when exposed to repetitive stress, females showed significantly greater heart rate and negative affect than did males, indicating that females may be more vulnerable to the negative outcomes of repetitive stress than males. Accordingly, we examined gender differences in the association of tinnitus severity with stress as well as psychiatric symptoms.

The purpose of this study was to empirically investigate gender differences in the relationship between psychiatric distress and subjective tinnitus severity. We specifically investigated whether depressive symptoms—one of the most common psychiatric symptoms clinically observed in patients with tinnitus—and stress intensity are independent factors related to tinnitus severity in both genders.

METHODOLOGY

Study Populations

This study included 248 patients who visited the otology outpatient clinic at Seoul St. Mary’s Hospital with a complaint of tinnitus on their first visit between February and July 2015. We excluded all patients who had been previously diagnosed with a psychiatric disorder such as major depressive disorder, bipolar disorder, anxiety disorder, schizophrenia, or substance use disorder by psychiatrists (according to Diagnostic and Statistical Manual of Mental Disorders); who had severe and/or uncontrolled medical and neurological disease; and who were pregnant or breastfeeding (females only). Written informed consent was obtained from all participants before the survey, and approval was obtained from the institutional review board of Seoul St. Mary’s Hospital (No, KC16RISI 0470).

Evaluation of TinnitusSeverity and Characteristics

The subjective severity of tinnitus-related distress was evaluated using the Tinnitus Handicap Inventory (THI), a self-report questionnaire created by Newman et al. It contains 25 items, each with three answer options: “yes” (4 points), “sometimes” (2 points), and “no” (0 points). These scores are summed, and the total score ranges from 0 to 100. These scores can be used to classify participants as having normal (0-16), mild (18-36), moderate (38-56), and severe (58-100) tinnitus. This classification has been used in previous studies in South Korea. The scale contains 3 subscales: functional (11 items), emotional (9 items), and catastrophic (5 items). The original version of the scale has good internal consistency reliability (Cronbach’s alpha=0.93), as does the Korean translation (Cronbach’s alpha=0.95). The visual analog scale (VAS) is a well-known method of assessing the subjective characteristics of chronic pain.
and has been used to measure subjective tinnitus characteristics. Using VASs along with the THI may be helpful for evaluating subjective levels of particular psychoacoustic characteristics of tinnitus (e.g., loudness) not covered by the THI as continuous variables (as opposed to yes or no responses). For this reason, several previous studies on tinnitus have applied both the THI and VASs together to examine tinnitus-related distress. Patients are asked to indicate the level of certain tinnitus characteristics (loudness, awareness, annoyance, and effect on life) that they were experiencing at the point surveyed on a VAS from ranging from 0 to 10 (or 0 to 100 for awareness).

In addition, we checked the tinnitus location and associated subjective hearing loss for each patient.

Evaluation of Psychiatric Distress

Psychiatric distress was evaluated using two self-report questionnaires: the Beck Depression Inventory-I (BDI-I), which assesses depressive symptoms, and the Korean version of Brief Encounter Psychosocial Instrument (BEPSI-K), which assesses stress level. The BDI-I was created by Beck et al. to evaluate depressive symptoms; it is a 21-item self-report questionnaire consisting of three subscales: negative attitude, performance difficulty, and somatic elements. Each item is rated on a scale of 0 to 3. The total scores are classified as no depression (0-9) and mild (10-15), moderate (16-23), and severe (24-63) depression. The internal consistency of the Korean version of the BDI-I in a previous study was 0.78 (Cronbach’s alpha) in the general population and 0.85 among depressed individuals.

The BEPSI-K is an self-administered instrument for measuring stress; it comprises five items, each rated on a scale of 1 to 5. We used the total score in our analysis, with higher scores indicating higher stress. Subjects are asked to indicate the severity of stress experienced in the past month. The instrument was created by Frank and Zyzanski and later adapted into Korean and validated; the BEPSI-K has a test-retest reliability and Cronbach’s alpha of 0.68 and 0.80, respectively.

Statistical Analysis

We compared the demographic and clinical features of the gender groups using the chi-square test or independent t test. The relationships between age, duration of tinnitus, THI, VAS, BDI-I, and BEPSI-K scores were analyzed using Pearson’s correlation coefficient separately for the gender groups. We also performed a partial correlation analysis between psychiatric distress (i.e., BDI-I and BEPSI-K) and tinnitus severity (THI) for both gender groups, controlling for duration of tinnitus and VAS scores (which were positively correlated with tinnitus severity in the Pearson’s correlation analysis).

Multiple linear regression analysis using the stepwise method was performed to examine the associations of psychiatric distress and tinnitus severity in the gender groups. We set THI score as the dependent variable, and BDI and BEPSI-K scores, duration of tinnitus, VAS scores, location of tinnitus, and presence of hearing loss as independent variables. There was no significant multicollinearity among the variables. All significance tests

### Table 1. Comparison of demographic and clinical characteristics between the male and female groups

| Variable                  | Male (n=114) | Female (n=134) | p value |
|---------------------------|-------------|----------------|---------|
| Age (yr)                  | 52.2±13.4   | 55.8±14.5      | 0.046*  |
| Duration of tinnitus (mo) | 42.1±81.2   | 29.1±64.5      | 0.162   |
| VAS score                 |             |                |         |
| Tinnitus loudness         | 4.6±2.3     | 4.7±2.4        | 0.761   |
| Tinnitus awareness        | 62.3±31.4   | 63.2±34.4      | 0.840   |
| Tinnitus annoyance        | 5.3±2.6     | 5.6±2.9        | 0.318   |
| Effect of tinnitus on life| 5.1±1.7     | 5.5±2.8        | 0.211   |
| THI total score           | 38.3±25.9   | 43.0±25.9      | 0.169   |
| THI grades                |             |                | 0.632   |
| Normal                    | 28 (24.6)   | 25 (18.7)      |         |
| Mild                      | 34 (29.8)   | 40 (29.9)      |         |
| Moderate                  | 24 (21.1)   | 33 (24.6)      |         |
| Severe                    | 26 (22.4)   | 16 (26.9)      |         |
| With hearing loss         | 52 (45.6)   | 53 (39.0)      | 0.480   |
| Location of tinnitus      |             |                | 0.564   |
| Both                      | 50 (43.9)   | 50 (37.3)      |         |
| One side                  | 58 (50.9)   | 77 (57.5)      |         |
| Head                      | 6 (5.3)     | 7 (5.2)        |         |
| BDI                       | 8.7±9.8     | 11.6±9.3       | 0.022*  |
| BEPSI-K total score       | 10.0±4.1    | 9.8±3.6        | 0.663   |
| Comorbid medical disorder |             |                | 0.100   |
| Hypertension              | 20 (17.5)   | 22 (16.4)      |         |
| Diabetes                  | 4 (3.5)     | 4 (3.0)        |         |
| Hypertension + diabetes   | 1 (0.9)     | 10 (7.5)       |         |
| None                      | 89 (78.1)   | 98 (73.1)      |         |

Values are presented as mean±standard deviation or number (%). VAS, visual analog scale; THI, Tinnitus Handicap Inventory; BDI, Beck Depression Inventory; BEPSI-K, Korean version of Brief Encounter Psychosocial Instrument.

*p<0.05 for independent t test or chi-square test.
were 2-tailed and conducted with an alpha level of 5%. All statistical analyses were conducted using SPSS Statistics ver. 24.0 (IBM Co., Armonk, NY, USA).

**RESULTS**

Comparison of Demographic and Clinical Characteristics between Males and Females

The demographic and clinical features of subjects are presented in Table 1. There were 134 female (54.0%) and 114 male (46.0%) subjects, ranging in age from 20 to 82 years old. The mean age of the female group (55.8±14.5 years) was significantly higher than was that of the male group (52.2±13.4 years; p=0.046). For THI severity, the proportion of subjects with mild tinnitus was highest for both sexes (29.8% in male, 29.9% in female), and there was no significant difference between the gender groups (p=0.632). Clinical characteristics—including location of tinnitus, duration of tinnitus, accompanied hearing loss and comorbid medical disorder—did not differ significantly between the gender groups, nor did the VAS scores for subjective tinnitus characteristics (loudness, awareness, annoyance, and effect on life). The mean BDI-I score of the female group (11.6±9.3, classified as mild depression) was significantly higher than was that of the male group (8.7±9.8, classified as normal; p=0.022). The BEPSI-K scores of the male group were higher than were those of the female group, but not significantly (p=0.663).

Correlations and Partial Correlations between Tinnitus Severity, Characteristics, and Psychiatric Distress in Both Gender Groups

In the correlation analysis, THI scores were found to be positively correlated with VAS scores of loudness, awareness, annoyance, and effect on life, as well as with BDI-I and BEPSI-K scores, in both gender groups. However, age was not significantly correlated with THI in either gender group, and the duration of tinnitus was significantly and positively correlated with THI scores only in the female group (Tables 2, 3).

In the partial correlation analysis controlling for duration of tinnitus and VAS scores, the positive correlation between THI and BDI-I scores remained significant for both gender groups (male: r=0.411, p<0.01; female: r=0.304, p<0.01). The coefficient was stronger for the male group than for the female group. However, BEPSI-K scores were positively correlated with THI scores only in the male group (r=0.463, p<0.01) (Table 4).

Association between Tinnitus Severity and Psychiatric Distress

Finally, we examined the possible influencing factors of THI using stepwise multiple regression analysis (Table 5). Among males, VAS scores of effect of tinnitus on life, BDI-I, and BEPSI-K scores were significantly associated with THI scores, whereas in females, only VAS scores of tinnitus annoyance and BDI-I were associated with THI scores. These results indicated that severe depressive symptoms were associated with tinnitus severity in both sexes, but stress intensity was associated with tinnitus se-

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**Table 2. Correlation between tinnitus severity/characteristics and psychiatric distress in the male group**

| Variable | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. THI total score | 1   | -0.131 | 0.169 | 0.463** | 0.415** | 0.751** | 0.782** | 0.606** | 0.598** |
| 2. Age (yr) | -0.131 | 1 | 0.167 | 0.026 | 0.109 | -0.080 | -0.061 | -0.020 | -0.220* |
| 3. Duration of tinnitus (mo) | 0.169 | 0.167 | 1 | 0.330** | 0.240* | 0.244** | 0.221* | 0.091 | 0.024 |
| 4. VAS scores of tinnitus loudness | 0.463** | 0.026 | 0.330** | 1 | 0.517** | 0.681** | 0.681** | 0.315** | 0.275** |
| 5. VAS scores of tinnitus awareness | 0.415** | 0.109 | 0.240* | 0.517** | 1 | 0.590** | 0.567** | 0.306** | 0.245** |
| 6. VAS scores of tinnitus annoyance | 0.751** | -0.080 | 0.244** | 0.681** | 0.590** | 1 | 0.911** | 0.449** | 0.388** |
| 7. VAS scores of effect of tinnitus on life | 0.782** | -0.061 | 0.221* | 0.681** | 0.567** | 0.911** | 1 | 0.493** | 0.426** |
| 8. BDI | 0.606** | -0.020 | 0.091 | 0.315** | 0.306** | 0.449** | 0.493** | 1 | 0.547** |
| 9. BEPSI-K | 0.598** | -0.220* | 0.024** | 0.275** | 0.245 | 0.388** | 0.426** | 0.547** | 1 |

THI, Tinnitus Handicap Inventory; VAS, visual analog scale; BDI, Beck Depression Inventory; BEPSI-K, Korean version of Brief Encounter Psychosocial Instrument.

*p<0.05, **p<0.01 for Pearson correlation.
Table 3. Correlation between tinnitus severity/characteristics and psychiatric distress in the female group

| Variable                              | Correlation                                                                 |
|                                      | 1          | 2          | 3          | 4          | 5          | 6          | 7          | 8          | 9          |
|                                      |            |            |            |            |            |            |            |            |            |
| 1. THI total score                   | 1          | 0.155      | 0.251**    | 0.388*     | 0.391**    | 0.618**    | 0.624**    | 0.395**    | 0.287**    |
| 2. Age (yr)                          | 0.155      | 1          | 0.222**    | 0.196*     | 0.323**    | 0.147      | 0.145      | 0.121      | −0.034     |
| 3. Duration of tinnitus (mo)         | 0.251**    | 0.222**    | 1          | 0.209*     | 0.147      | 0.144      | 0.152      | 0.118      | 0.304**    |
| 4. VAS scores of tinnitus loudness  | 0.388**    | 0.196*     | 0.209*     | 1          | 0.458**    | 0.645**    | 0.588**    | 0.190*     | 0.247**    |
| 5. VAS scores of tinnitus awareness | 0.391**    | 0.323**    | 0.147      | 0.458**    | 1          | 0.505**    | 0.453**    | 0.175      | 0.167      |
| 6. VAS scores of tinnitus annoyance | 0.618**    | 0.147      | 0.144      | 0.645**    | 0.505**    | 1          | 0.916**    | 0.257**    | 0.260**    |
| 7. VAS scores of effect of tinnitus on life | 0.624**    | 0.145      | 0.152      | 0.588**    | 0.453**    | 0.916**    | 1          | 0.241**    | 0.247**    |
| 8. BDI                               | 0.395**    | 0.121      | 0.118      | 0.190*     | 0.175      | 0.257**    | 0.241**    | 1          | 0.445**    |
| 9. BEPSI-K                           | 0.287**    | −0.034     | 0.304**    | 0.247**    | 0.167      | 0.260**    | 0.247**    | 0.445**    | 1          |

THI, Tinnitus Handicap Inventory; VAS, visual analog scale; BDI, Beck Depression Inventory; BEPSI-K, Korean version of Brief Encounter Psychosocial Instrument.

* p < 0.05, ** p < 0.01 for Pearson correlation.

Table 4. Partial correlation between tinnitus severity and psychiatric distress

| Variable                              | Male (n=114) | Female (n=134) |
|                                      | B           | SE          | β           | t       | p value |
|                                      | Male        | Female      |             |         |         |
| BDI                                   | 0.411**     | 0.304**     |             |         |         |
| BEPSI-K total score                  | 0.463**     | 0.100       |             |         |         |

BDI, Beck Depression Inventory; BEPSI-K, Korean version of Brief Encounter Psychosocial Instrument.

* p < 0.01 for partial correlation, controlling for duration of tinnitus and visual analog scale scores.

Table 5. Summary of multiple linear regression analysis for Tinnitus Handicap Inventory in both gender groups

| Variable                              | B           | SE          | β           | t       | p value |
|                                      | Male        | Female      |             |         |         |
| VAS scores of effect of tinnitus on life | 5.598   | 0.596      | 0.598      | 9.388   | <0.001** |
| BEPSI-K                               | 1.435      | 0.412      | 0.228      | 3.485   | 0.001** |
| BDI                                   | 0.486      | 0.180      | 0.187      | 2.703   | 0.008*  |
| VAS scores of tinnitus annoyance      | 4.906      | 0.701      | 0.540      | 7.002   | 0.000** |
| BDI                                   | 0.660      | 0.200      | 0.255      | 3.307   | 0.001*  |

B, unstandardized beta coefficients; SE, standard error; β, standardized beta coefficients; t, t-score; p, significance value; VAS, visual analog scale; BEPSI-K, Korean version of Brief Encounter Psychosocial Instrument; BDI, Beck Depression Inventory.

* p < 0.05, ** p < 0.01 for multiple regression analysis.

DISCUSSION

The purpose of this study was to determine whether there are gender differences in the relationship between psychiatric distress and tinnitus severity. We found that tinnitus characteristics, depressive symptoms, and stress were positively correlated with tinnitus severity in both genders. The duration of tinnitus showed a positive correlation with tinnitus severity only in women, which is consistent with the results of a previous study showing a correlation between tinnitus duration and severity in middle-aged and elderly patients. However, this previous study reported gender differences in this correlation (whereby the correlation was stronger for females than for males) only in younger patients with tinnitus (<45 age of years). In the present study, the male group was significantly younger than was the female group, which might have led to the observed gender differences.

We also found gender differences in the associations of depressive symptoms and stress with the severity of tinnitus only in men.

In the multiple regression analysis, while depressive symptoms were significantly associated with tinnitus severity in both males and females, stress was associated with tinnitus severity only in males. Additionally, the correlation of tinnitus severity with depressive symptoms and stress was more pronounced in males than in females when controlling for tinnitus duration and characteristics.

Previous studies have shown that tinnitus questionnaire scores, including THI scores, were significantly correlated with self-report tools for measuring depressive symptoms, including the BDI,46,44-45 Furthermore, many studies have reported that females show a greater prevalence of depression and are more affected by stress than are males.46,16,27

However, in the present study, stress was significantly associated with tinnitus severity only in males, whereas
depressive symptoms were associated with it in both males and females. Similar to these findings, Gomaa et al.\(^2\) found that males were more commonly affected than were females by depression, anxiety, and stress. In the correlation results, stress had a stronger positive correlation with depressive symptoms than with tinnitus severity in females, whereas stress had a stronger positive correlation with tinnitus severity than with depressive symptoms. These findings might suggest that women experience stress as feelings of depression or negative mood, while men might experience it in some other way. There are also differences in stress coping style between males and females,\(^47\) as well as cultural differences in males’ expression of a depressed mood.\(^46\) Studies of the gender differences in stress coping strategies found that women tend to use an emotion-focused method, whereas men are more likely to deal with stress via problem-focused methods.\(^47\) Previous studies also acknowledge that there are gender differences in emotional expressiveness, likely related to social processes such as differing gender roles, status and power imbalances between males and females, differing socialization histories between males and females, and cultural factors in the Asian population.\(^49\)

With regard to stress, our findings accord with the biological model of tinnitus. This model explains that tinnitus symptoms might be activated or worsen as a result of activation of the hypothalamic pituitary adrenal axis, which is associated with the stress response, and may be affected by genetic/epigenetic predispositions to stress.\(^50\)

Considering our results, assessing the depressive symptoms and stress intensity using a screening tool such as the Patient Health Questionnaire-9\(^51\) or Clinically Useful Depression Outcome Scale\(^52\) in all tinnitus patients, especially men, might help them get better help. Particularly, these results might help in formulating guidelines on the psychological evaluation and management of patients with tinnitus, which not only can lead to earlier diagnosis and intervention for psychiatric symptoms, but may also help improve tinnitus severity.

Nevertheless, this study had several limitations. First, this study is difficult to generalize to all patients because of the small sample size and the fact that we recruited all subjects from the otorhinolaryngology department of a single university hospital. Multicenter studies with a large sample are needed to confirm our findings. Second, assessing depressive symptoms and stress relied on self-report questionnaires. In the future, standardized structured clinical interviews by psychiatrists should be used to assess psychiatric distress. Third, we did not evaluate anxiety symptoms. Although depressive symptoms are the most common psychiatric symptoms among patients with tinnitus,\(^29\) anxiety symptoms have also been found to relate to the severity of tinnitus.\(^9,13,53,54\) Finally, we cannot make conclusions on the causal relations between psychiatric distress and tinnitus severity. Although multiple regression analysis was used to infer the causal relationships between psychiatric distress and tinnitus severity, these inferences can be further supported through a prospective longitudinal case control study.

Despite these limitations, this study was able to confirm gender differences in the relationship between psychiatric distress and tinnitus severity among patients with tinnitus. It is necessary to be alert to the psychiatric symptoms of patients with tinnitus who visit clinicians. Furthermore, considering the gender differences, administering self-report scales for psychological symptoms such as depressed mood and stress to male patients is strongly recommended at otology outpatient clinics. This could help reduce tinnitus symptoms successfully, thereby contributing to improved psychological well-being.

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REFERENCES

1. Eggermont JJ, Roberts LE. The neuroscience of tinnitus. Trends Neurosci 2004;27:676-682.
2. Park KH, Lee SH, Koo JW, Park HY, Lee KY, Choi YS, et al. Prevalence and associated factors of tinnitus: data from the Korean National Health and Nutrition Examination Survey 2009-2011. J Epidemiol 2014;24:417-426.
3. Shargorodsky J, Curhan GC, Farwell WR. Prevalence and characteristics of tinnitus among US adults. Am J Med 2010;123:711-718.
4. Møller AR. Epidemiology of tinnitus in adults. In: Møller AR, Langguth B, Röder D, Kleinjung T, editors. Textbook of tinnitus. New York: Springer; 2011. p.29-37.
5. Heller AJ. Classification and epidemiology of tinnitus. Otolaryngol Clin N Am 2003;36:239-248.
6. Møller AR. Tinnitus: presence and future. Prog Brain Res
2007;166:3-16.
7. Bhattacharya N, Lin HW. Relationships between tinnitus and the prevalence of anxiety and depression. Laryngoscope 2017;127:466-469.
8. Langguth B. A review of tinnitus symptoms beyond 'ringing in the ears': a call to action. Curr Med Res Opin 2011;27:1635-1643.
9. Andersson G, Carlbring P, Kaldo V, Ström L. Screening of psychiatric disorders via the internet. A pilot study with tinnitus patients. Nord J Psychiatry 2004;58:287-291.
10. Kennedy V, Wilson C, Stephens D. Quality of life and tinnitus. Audiol Med 2004;2:29-40.
11. Scott B, Lindberg P. Psychological profile and somatic complaints between help-seeking and non-help-seeking tinnitus subjects. Psychosomatics 2000;41:347-352.
12. Stobik C, Weber RK, Münke TF, Walter M, Frommer M. Evidence of psychosomatic influences in compensated and decompensated tinnitus. Int J Audiol 2005;44:370-378.
13. Zöger S, Svedlund J, Holgers KM. Psychiatric disorders in tinnitus patients without severe hearing impairment: 24 month follow-up of patients at an audiological clinic. Audiology 2001;40:133-140.
14. Vallianatou NG, Christodoulou P, Nestoros JN, Helidonis E. Audiologic and psychological profile of Greek patients with tinnitus: preliminary findings. Am J Otolaryngol 2001;22:33-37.
15. Salk RH, Hyde JS, Abramson LY. Gender differences in depression in representative national samples: meta-analyses of diagnoses and symptoms. Psychol Bull 2017;143:783-822.
16. Pinto PC, Sanchez TG, Tomita S. The impact of gender, age and hearing loss on tinnitus severity. Braz J Otorhinolaryngol 2010;76:18-24.
17. Meric C, Gartner M, Collet L, Chéry-Croze S. Psychopathological profile of tinnitus sufferers: evidence concerning the relationship between tinnitus features and impact on life. Audiol Neurootol 1998;3:240-252.
18. Erlandsson SJ, Holgers KM. The impact of perceived tinnitus severity on health-related quality of life with aspects of gender. Noise Health 2004;6:18-24.
19. Seydel C, Haupt H, Olze H, Szczepek AJ, Mazurek B. Gender and chronic tinnitus: differences in tinnitus-related distress depend on age and duration of tinnitus. Ear Hear 2013;34:661-672.
20. Hiller W, Goebl G. Factors influencing tinnitus loudness and annoyance. Arch Otolaryngol Head Neck Surg 2006;132:1323-1330.
21. Stouffer JL, Tyler RS. Characterization of tinnitus by tinnitus patients. J Speech Hear Res 1990;33:439-453.
22. Gornaa MA, Elmagd MH, Elbadry MM, Kader RM. Depression, anxiety and stress scale in patients with tinnitus and hearing loss. Eur Arch Otorhinolaryngol 2014;271:2177-2184.
23. Budd RJ, Pugh R. Tinnitus coping style and its relationship to tinnitus severity and emotional distress. J Psychosom Res 1996;41:327-335.
24. D’Amelio R, Archonti C, Scholz S, Falkai P, Plinkert PK, Delb W. [Psychological distress associated with acute tinnitus]. HNO 2004;52:599-603. German.
25. Härter M, Maurischat C, Weske G, Laszig R, Berger M. [Psychological stress and impaired quality of life in patients with tinnitus]. HNO 2004;52:125-131. German.
26. Olderog M, Langenbach M, Michel O, Brusis T, Köhle K. [Predictors and mechanisms of tinnitus distress - a longitudinal analysis.] Laryngorhinootologie 2004;83:5-13. German.
27. Seydel C, Haupt H, Szczepke AJ, Klapp BF, Mazurek B. Long-term improvement in tinnitus after modified tinnitus retraining therapy enhanced by a variety of psychological approaches. Audiol Neurootol 2010;15:69-80.
28. Schmaus BJ, Laubmeier KK, Boquiren VM, Herzer M, Zakowski SG. Gender and stress: differential psychophysiological reactivity to stress reexposure in the laboratory. Int J Psychophysiol 2008;69:101-106.
29. Udupi VA, Uppunda AK, Mohan KM, Alex J, Mahendra MH. The relationship of perceived severity of tinnitus with depression, anxiety, hearing status, age and gender in individuals with tinnitus. Int Tinnitus J 2013;18:29-34.
30. Newman CW, Jacobson GP, Spitzer JB. Development of the Tinnitus Handicap Inventory. Arch Otolaryngol Head Neck Surg 1996;122:143-148.
31. Newman CW, Sandridge SA, Jacobson GP. Psychometric adequacy of the Tinnitus Handicap Inventory (THI) for evaluating treatment outcome. J Am Acad Audiol 1998;9:153-160.
32. Kim KS, Kim JH, Yoon YH. The characteristics of tinnitus and its relationship to depression from tinnitus acquired from military service. Korean J Otorhinolaryngol-Head Neck Surg 2012;55:757-763.
33. Kim JH, Kim JH, Cho SI, Park SH, Kim SH, Choo IH, et al. Psychiatric characteristics according to tinnitus severity. Korean J Biol Psychiatry 2015;22:7-13.
34. Kim JH, Lee SY, Kim CH, Lim SL, Shin JN, Chung WH, et al. Reliability and validity of a Korean adaptation of the Tinnitus Handicap Inventory. Korean J Otorhinolaryngol-Head Neck Surg 2002;45:328-334.
35. Herrera C, Tapia MC, Plaza G. Tinnitus and Ménière’s disease: characteristics and prognosis in a tinnitus clinic sample. Eur Arch Otorhinolaryngol 2006;263:504-509.
36. Crocetti A, Forti S, Ambrosi S, Bo LD. Questionnaires to evaluate anxiety and depressive levels in tinnitus patients. Otolaryngol Head Neck Surg 2009;140:403-405.
37. Herrera C, Hernandez FJ, Plaza G, de los Santos G. Long-term clinical trial of tinnitus retraining therapy. Otolaryngol Head Neck Surg 2005;133:774-779.
38. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry 1961;4:561-571.
39. Lee YH, Song JY. A study of the reliability and the validity of
the BDI, SDS, and MMPI-D scales. Korean J Clin Psychol 1991;10:98-113.

40. Frank SH, Zyzanski SJ. Stress in the clinical setting: the Brief Encounter Psychosocial Instrument. J Fam Pract 1988;26: 533-539.

41. Huh BY, Yim JH, Bae JM, Choi SS, Kim SW, Hwang HS. The validity of modified Korean-translated BEPSI (Brief Encounter Psychosocial Instrument) as instrument of stress measurement in outpatient clinic. J Korean Acad Fam Med 1996;17:42-53.

42. Langguth B, Goodey R, Azevedo A, Bjorne A, Cacace A, Crocetti A, et al. Consensus for tinnitus patient assessment and treatment outcome measurement: Tinnitus Research Initiative meeting, Regensburg, July 2006. Prog Brain Res 2007;166:525-536.

43. Robinson SK, McQuaid JR, Viirre ES, Betzig LL, Miller DL, Bailey KA, et al. Relationship of tinnitus questionnaires to depressive symptoms, quality of well-being, and internal focus. Int Tinnitus J 2003;9:97-103.

44. Zöger S, Svedlund J, Holgers KM. Relationship between tinnitus severity and psychiatric disorders. Psychosomatics 2006; 47:282-288.

45. Andersson G, Westin V. Understanding tinnitus distress: introducing the concepts of moderators and mediators. Int J Audiol 2008;47 Suppl 2:S106-S111.

46. Davis AC. Hearing disorders in the population: first phase findings of the MRC national study of hearing. In: Lutman ME, Haggard MP, editors. Hearing science and hearing disorders. London: Academic Press; 1983. p.35-60.

47. Matud MP. Gender differences in stress and coping styles. Personal Individ Differ 2004;37:1401-1415.

48. Addis ME, Mahalik JR. Men, masculinity, and the contexts of help seeking. Am Psychol 2003;58:5-14.

49. Brody LR. Gender and emotion: beyond stereotypes. J Soc Issues 1997;53:369-393.

50. Mazurek B, Szczepak AJ, Hebert S. Stress and tinnitus. HNO 2015;63:258-265.

51. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med 2001;16:606-613.

52. Jeon SW, Han C, Ko YH, Yoon SY, Pae CU, Choi J, et al. Measurement-based treatment of residual symptoms using Clinically Useful Depression Outcome Scale: Korean validation study. Clin Psychopharmacol Neurosci 2017;15:28-34.

53. Hald B, Anderson SD. Anxiety and depression in tinnitus sufferers. J Psychosom Res 1991;35:383-390.

54. Marciano E, Carrabba L, Giannini P, Sementina C, Verde P, Bruno C, et al. Psychiatric comorbidity in a population of outpatients affected by tinnitus. Int J Audiol 2003;42:4-9.