INTRODUCTION

Tinnitus is defined as auditory perception in the absence of external sound [1]. The assessment of tinnitus is fundamental to tinnitus treatment and research. Tinnitus assessment can be divided into two categories. One category involves measuring tinnitus as a perceived sound, as tinnitus has qualities of sound such as loudness, pitch, and spectrum. Psychoacoustic tests include the tinnitus loudness match, tinnitus pitch match, minimum masking level (MML) test were performed.

Methods. A total of 60 patients were included in this study. Patients responded to the THQ-K, the tinnitus handicap inventory (THI), Beck’s depression index (BDI), and the visual analogue scale (VAS) for loudness and pitch, loudness match, and minimum masking level (MML) test were performed.

Results. Internal consistency of the THQ-K was examined using Cronbach coefficient alpha. Cronbach alpha was 0.96. The THQ-K showed a significant correlation with THI, BDI, VAS for distress, and VAS for loudness, but no significant correlation with psychoacoustic measurement of tinnitus, such as loudness match, pitch match, and MML.

Conclusion. The THQ-K is a reliable and valid test for evaluating the degree of handicap due to tinnitus for both research and clinical use.

Keywords. Tinnitus; Questionnaires; Validity and Reliability

Validation of a Korean Version of the Tinnitus Handicap Questionnaire

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Objectives. The goal of the present study was to evaluate the reliability and validity of the Korean version of the tinnitus handicap questionnaire (THQ-K).

Methods. A total of 60 patients were included in this study. Patients responded to the THQ-K, the tinnitus handicap inventory (THI), Beck’s depression index (BDI), and the visual analogue scale (VAS) for loudness and pitch, loudness match, and minimum masking level (MML) test were performed.

Results. Internal consistency of the THQ-K was examined using Cronbach coefficient alpha. Cronbach alpha was 0.96. The THQ-K showed a significant correlation with THI, BDI, VAS for distress, and VAS for loudness, but no significant correlation with psychoacoustic measurement of tinnitus, such as loudness match, pitch match, and MML.

Conclusion. The THQ-K is a reliable and valid test for evaluating the degree of handicap due to tinnitus for both research and clinical use.

Keywords. Tinnitus; Questionnaires; Validity and Reliability
MATERIALS AND METHODS

The present study is a retrospective medical chart review. From January 2013 to November 2013, 115 patients visited our Ear, Nose, and Throat clinic for tinnitus. We used the tinnitus handicap inventory (THI) and THQ-K for all tinnitus patients. Eighty-nine patients completed both the THQ-K and THI. We only included patients whose duration of tinnitus was longer than 12 months. Patients related with tinnitus compensation were excluded from this study. A total of 60 patients were included in this study. The THQ was independently translated into Korean by two bilingual otologists (Supplementary material), then back-translated to English to confirm equivalence. A third researcher confirmed the final THQ-K (Supplementary material). All patients had subjective chronic tinnitus for 12 months and all were native Korean speakers. The pure tone audiometry (PTA), pitch match, loudness match, and minimum masking level test were performed. The PTA was done over 0.25, 0.5, 1, 2, 3, 4, 6, and 8 kHz. Pitch match was performed with pure tone and loudness match using a 500-Hz pure tone to the ipsilateral ear. The otologic test to rule out middle ear infection was performed by a physician.

Patients responded to the THQ-K, the THI, Beck’s depression index (BDI), and the visual analogue scale (VAS) for loudness and distress [6-10]. Each participant completed the questionnaires at a clinic visit and pitch, loudness match, and minimum masking level test were performed at the same clinic visit. The present study was approved by the Institutional Review Board.

Internal consistency in subgroups of items and total items was measured by Cronbach alpha. We did Kolmogorov-Smirnov test to know whether the measurement of THQ-K was normally distributed or not. The measurement of THQ-K was not normally distributed. So, the relationships between the THQ-K and other measurements (THI, BDI, and the VAS for loudness and distress) were compared with Spearman rank correlation coefficient. We used IBM SPSS ver. 21.0 (IBM Co., Armonk, NY, USA) for the statistical analysis.

RESULTS

Data from sixty patients were analyzed. Of these sixty patients, 25 were men and 35 were women. The mean age of patients was 53.2 ± 14.1 years, and the mean duration of tinnitus was 47.6 ± 71.9 months. Other subject characteristics are presented in Table 1. Internal consistency of the THQ-K was examined using Cronbach coefficient alpha. Cronbach alpha was 0.96, similar to the English version of THQ (alpha = 0.94). The relationship between

| Item no. | Item-total correlation | Cronbach alpha coefficient without this item |
|----------|------------------------|---------------------------------------------|
| 1        | 0.643                  | 0.963                                       |
| 2        | 0.657                  | 0.963                                       |
| 3        | 0.556                  | 0.964                                       |
| 4        | 0.853                  | 0.962                                       |
| 5        | 0.644                  | 0.963                                       |
| 6        | 0.713                  | 0.963                                       |
| 7        | 0.864                  | 0.962                                       |
| 8        | 0.562                  | 0.964                                       |
| 9        | 0.744                  | 0.962                                       |
| 10       | 0.742                  | 0.962                                       |
| 11       | 0.817                  | 0.962                                       |
| 12       | 0.583                  | 0.964                                       |
| 13       | 0.705                  | 0.963                                       |
| 14       | 0.810                  | 0.962                                       |
| 15       | 0.762                  | 0.962                                       |
| 16       | 0.589                  | 0.964                                       |
| 17       | 0.845                  | 0.962                                       |
| 18       | 0.731                  | 0.962                                       |
| 19       | 0.749                  | 0.962                                       |
| 20       | 0.820                  | 0.962                                       |
| 21       | 0.779                  | 0.962                                       |
| 22       | 0.817                  | 0.962                                       |
| 23       | 0.736                  | 0.962                                       |
| 24       | 0.727                  | 0.962                                       |
| 25       | 0.113                  | 0.967                                       |
| 26       | 0.469                  | 0.964                                       |
| 27       | 0.828                  | 0.962                                       |
Table 3. Correlation between THQ and BDI, STAI, and VAS of loudness and distress

| Variable         | Spearman rank correlation coefficient |
|------------------|---------------------------------------|
| THI              | 0.843*                                |
| BDI              | 0.336*                                |
| VAS for loudness | 0.493*                                |
| VAS for distress | 0.753*                                |
| Pitch match      | 0.004                                 |
| Loudness match   | 0.156                                 |
| Minimum masking level | 0.037                       |

Each item and the total was measured (Table 2).

Correlations among THQ-K, THI, BDI, VAS for distress, and VAS for loudness were analyzed. The Spearman rank correlation coefficients with THI, BDI, and VAS for loudness, VAS for distress, pitch match, loudness match and MML were 0.843, 0.336, 0.493, 0.753, 0.004, 0.156, and 0.037 each. The THQ showed a significant correlation with THI, BDI, VAS for distress, and VAS for loudness, but no significant correlation with psychoacoustic measurement of tinnitus, such as loudness match, pitch match, and MML, was observed (Table 3).

DISCUSSION

The results of the present study showed that the THQ-K is reliable and valid, similar to the English version. The THQ has been translated into various languages. The internal consistency of other versions of the THQ has also been documented [3-5]. The Cronbach alpha values of the English, French, and Dutch versions were 0.94, 0.9, and 0.93 [2,4,5]. The THQ-K also showed internal consistency, similar to the English, French, and Dutch versions.

The THQ-K was well correlated with BDI which is measures of depression. This also supports the assertion that tinnitus affects patients’ quality of life. The THQ-K showed a low correlation with the psychoacoustic measure of tinnitus such as pitch and loudness match. This finding is similar to that of previous studies [2,11-13]. Psychoacoustic features of tinnitus might not be related with distress caused by tinnitus. However, THQ-K was well correlated with VAS for loudness. This finding is similar with Dutch version of THQ [5], we assumed two possibilities for this finding. One is VAS was not enough sensitive test, the other was patient could interpret “loudness” as a kind of distress or annoyance. Further research might be needed for this. Therefore, we suggest that the evaluation of tinnitus treatments should correspond with their treatment target. For treatments which reduce tinnitus, tinnitus itself should be measured. For treatments which reduce the distress of tinnitus, distress or handicap of tinnitus should be measured. In the present study, THQ-K was well correlated with the Korean translated THI (THI-K). Because the THI-K is the only validated tinnitus questionnaire in Korean [7], we used the THI-K for the comparison with the THQ. The THI is different from the THQ in some aspects. It was designed as a self-reporting questionnaire and measures reactions to tinnitus. The main difference between the THQ and THI is the scaling method for each statement. The THI offers closed set answers: patients answer either yes, sometimes, or no. In contrast, in the THQ, patients answer on a scale from 0 through 100. Zero indicates strong disagreement with the statement, and one hundred indicates strong agreement with the statement. In general, we can assume that a smaller number of response options might be less sensitive to change. In this sense, the THQ might be more sensitive in detecting changes in the reaction to tinnitus. Therefore, the THQ may be better for evaluating tinnitus treatments. However, there is currently no research on the optimum number of response options for detecting changes according to tinnitus treatment. As there is also currently no perfect questionnaire for tinnitus, multiple questionnaires are often needed for tinnitus evaluation. The validation of a translated questionnaire is an essential step. In summary, THQ-K showed good internal consistency and validity same as English version, THQ-K was well correlated with THI, BDI, and VAS for distress and VAS for loudness, but it was not well correlated with psychoacoustic test of tinnitus such as pitch match, loudness match and MML.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

SUPPLEMENTARY MATERIAL

Supplementary material can be found via http://www.e-ceo.org/src/sm/ceo-8-p. 198-s001.pdf.

REFERENCES

1. Moller AR. Tinnitus: presence and future. Prog Brain Res. 2007;166:3-16.
2. Kuk FK, Tyler RS, Russell D, Jordan H. The psychometric properties of a tinnitus handicap questionnaire. Ear Hear. 1990 Dec;11(6):434-45.
3. Arian Nahad H, Rouzbahani M, Jarollahi F, Jalaie S, Pourbakht A, Mokrian H, et al. Translation, validity, and reliability of a persian version of the iowa tinnitus handicap questionnaire. Iran J Otolaryngol. 2014 Apr;26(75):79-88.
4. Meric C, Pham E, Chery-Croze S. Translation and validation of the questionnaire “Tinnitus Handicap Questionnaire. 1990. J Otolaryngol. 1997 Jun;26(3):167-70.
5. Vanneste S, To WT, De Ridder D. Psychometric properties of the Tinnitus Handicap Questionnaire in a Dutch-speaking population. Clin Otolaryngol. 2011 Feb;36(1):9-16.
6. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961 Jun;4:561-71.
7. 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 Otolaryngol-Head Neck Surg. 2002 Apr;45(4):328-34.
8. 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(1):98-113.
9. Newman CW, Jacobson GP, Spitzer JB. Development of the tinnitus handicap inventory. Arch Otolaryngol Head Neck Surg. 1996 Feb;122(2):143-8.
10. Spielberger CD. State-trait anxiety inventory. In: Weiner IB, Craighead WE, editors. The Corsini encyclopedia of psychology. 4th ed. Hoboken (NJ): Wiley; 2010. p. 1698.
11. Hiller W, Goebel G, Rief W. Reliability of self-rated tinnitus distress and association with psychological symptom patterns. Br J Clin Psychol. 1994 May;33(Pt 2):231-9.
12. Monzani D, Genovese E, Marrara A, Gherpelli C, Pingani L, Forghieri M, et al. Validity of the Italian adaptation of the Tinnitus Handicap Inventory; focus on quality of life and psychological distress in tinnitus-sufferers. Acta Otorhinolaryngol Ital. 2008 Jun;28(3):126-34.
13. Newman CW, Wharton JA, Shivapuja BG, Jacobson GP. Relationships among psychoacoustic judgments, speech understanding ability and self-perceived handicap in tinnitus subjects. Audiology. 1994 Jan-Feb;33(1):47-60.
Supplementary material. Korean version of the tinnitus handicap questionnaire (THQ-K)

작성요령: 이 설문지는 총 27문항입니다. ‘전혀 그렇지 않다’는 0점으로, ‘매우 그렇다’는 100점으로, 그 중간은 0에서 100점 사이 점수로 표시해 주십시오. 모든 문항이 빠짐없이 답해 주십시오.

| 문항 | 내용 |
|------|------|
| 1. | 나는 이명 때문에 삶을 즐길 수 없다. |
| 2. | 나의 이명은 매년 나빠진다. |
| 3. | 이명 때문에 소리가 어디에서 나는지 분간하기 어렵다. |
| 4. | 이명 때문에 다른 사람들과의 대화를 따라 갈 수가 없다. |
| 5. | 이명 때문에 소음이 있는 곳을 피한다. |
| 6. | 이명 때문에 소음이 있는 곳에서 다른 사람들과 대화하기가 힘들다. |
| 7. | 이명 때문에 사회 활동이 어렵다. |
| 8. | 다른 사람들들은 이명이 얼마나 고통스러운지를 모른다. |
| 9. | 이명 때문에 집중할 수가 없다. |
| 10. | 이명 때문에 가족들과의 관계에 문제가 생긴다. |
| 11. | 나는 이명 때문에 기분이 우울해진다. |
| 12. | 나는 이명이 어떻게한지를 다른 사람들에게 설명하기 어렵다. |
| 13. | 이명은 나에게 스트레스를 준다. |
| 14. | 나는 이명 때문에 안정을 할 수 없다. |
| 15. | 나는 이명 때문에 불평이 많다. |
| 16. | 이명 때문에 밤에 잠들기가 어렵다. |
| 17. | 이명은 나를 지치게 한다. |
| 18. | 이명은 나를 불안하게 한다. |
| 19. | 나는 이명 때문에 내 전반적인 건강이 나쁘다고 생각한다. |
| 20. | 이명은 나의 대인관계에 영향을 미친다. |
| 21. | 나는 이명 때문에 말을 이해하는 능력이 떨어진다. |
| 22. | 나는 이명 때문에 짜증이 난다. |
| 23. | 나는 이명 때문에 텔레비전에서 나오는 말을 이해하기 어렵다. |
| 24. | 나는 이명 때문에 걱정이 많다. |
| 25. | 나는 이명 때문에 놀람적이고 답답한 생각을 가지고 있다고 생각한다. |
| 26. | 이명에 대해서 나는 친구들은 나를 돕는다. |
| 27. | 나는 이명 때문에 자주 좌절한다. |