

# 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*

## 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, and residual inhibition. Other methods involve measuring reactions to tinnitus. These tests measure how tinnitus affects one's life or function using questionnaires. Self-reporting questionnaires are useful assessment tools for clinical use, research, and treatment evaluation. Most of questionnaires

for tinnitus are available in English, and translated tinnitus questionnaires are used for non-English speaking cultures. Because translation from one language to another may cause changes in meaning, translated questionnaires should be validated and similarity to the original version should be confirmed. Many questionnaires have been created, but most are written in English, and due to cultural differences, simple translation is insufficient. Therefore, translated questionnaires should be validated. Tinnitus handicap questionnaire (THQ) is self-reporting tinnitus questionnaire which consists of 27 items. THQ has three subscales. Factor 1 addresses the individuals' physical health, emotional status, and the social consequences of tinnitus, Factor 2 addresses hearing difficulty and factor 3 addresses the patients' view on tinnitus [2]. THQ showed high reliability and validity [2], THQ was translated to several languages, and also showed high reliability and validity [3-5]. However, there is no equivalent for the THQ in Korean.

Hence, the aim of the present study was to evaluate the reliability and validity of the Korean version of the THQ (THQ-K). In addition, we aimed to determine the relationship between the questionnaire and psychoacoustic measurement of tinnitus.

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## 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

Table 1. Characteristics of participants

Characteristic	Mean $\pm$ SD (range)
Age (year)	53.2 $\pm$ 14.1 (15-76)
Sex (male:female)	25:35
Duration of tinnitus (month)	47.6 $\pm$ 71.9 (12-480)
Site of tinnitus	
Right ear	16
Left ear	19
Both ear	18
Head	5
Unknown	2
Pure tone audio test average (0.5, 1, 2, 3, 6, 8 kHz)	
Right	29.3 $\pm$ 19.0
Left	26.4 $\pm$ 19.8
Minimum masking level (dBSL)	14.4 $\pm$ 12.5
Loudness match (dBSL)	9.8 $\pm$ 8.8
Pitch match (kHz)	4.5 $\pm$ 3.0
Tinnitus quality	
Tonal	7
Multi-tonal	53
Visual analogue scale (0-10)	
Loudness	4.4 $\pm$ 2.7
Distress	4.2 $\pm$ 2.9
Mean value	
Tinnitus handicap questionnaire	35.5 $\pm$ 25.6
Tinnitus handicap inventory	41.0 $\pm$ 27.0
Beck's depression index	16.0 $\pm$ 1.0

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  $\pm$  14.1 years, and the mean duration of tinnitus was 47.6  $\pm$  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

Table 2. Item-total correlation in the tinnitus handicap questionnaire in Korean

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

THQ, tinnitus handicap questionnaire; THI, tinnitus handicap inventory; BDI, Beck's depression index; STAI, state-trait anxiety inventory; VAS, visual analogue scale.

\*P-value<0.001.

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 tin-

nitus 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>.

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Supplementary material. Korean version of the tinnitus handicap questionnaire (THQ-K)

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