

Validity of the Thai Version of the Tinnitus Handicap Inventory: Correlation with SF-36

Pornthep Kasemsiri MD¹, Kwanchanok Yimtae MD¹
Attawit Somsap MD¹, Somchai Srirompotong MD¹, Suwanna Arunpongpaissal MD²

¹ Department of Otolaryngorhinology, Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

² Department of Psychiatry, Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

Objective: To study the validity of Thai-Tinnitus Handicap Inventory [THI], and correlation with SF-36 (Thai version).

Materials and Methods: A descriptive prospective study was conducted from March 8th, 2010, to November 19th, 2012, in Neuro-Otology clinic, Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, Thailand. THI was translated to Thai language. Furthermore, the correlation between Thai-THI and Thai SF-36 was assessed.

Results: 297 patients with tinnitus were interviewed despite the fact that the Thai-THI questionnaire was completed by 295 patients. Only, 289 patients completed both the Thai-THI and Thai SF-36 questionnaires. The Thai-THI allowed good internal consistency, with Cronbach's alpha coefficients of 0.94, 0.87, 0.89, and 0.67 for the overall scale, functional, emotional, and catastrophic domains, respectively. Patients in the severe and catastrophic groups of Thai-THI had significantly poorer Thai SF-36 scores than other groups in all the domains ($p < 0.001$); whereas patients in the moderate group of Thai-THI had poor Thai SF-36 scores in the domains of general health, vitality, social functioning, role-emotion, and mental health ($p < 0.001$).

Conclusion: The Thai-THI maintained its validity of the original version in all the domains. Most patients with tinnitus fell in the moderate to catastrophic groups that showed the poorest quality of life; thus, psychological effects of tinnitus should be considered in the management of symptoms.

Keywords: Tinnitus, SF-36, Tinnitus Handicap Inventory, Questionnaire

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Tinnitus is a common symptom which is generally associated with the pathology of the ear or surrounding organs. The mechanism of tinnitus is not clearly understood. Usually, the ringing in the ear is a subjective symptom that is heard only by the patients, making it difficult to measure the severity. Another problem is that there is no promising effective treatment yet, and hence, many patients continue to battle tinnitus-related effects such as stress, depression, and insomnia⁽¹⁻⁵⁾. Prolonged sleep deprivation affects ability to work, emotion, and quality of life [QoL]^(6,7).

Correspondence to:

Yimtae K, Department of Otorhinolaryngology, Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

Phone: +66-43-368396, Fax: +66-43-202490

E-mail: kwayim@kku.ac.th

Many tools have been developed to assess disease-specific and health-related quality of life [HR-QoL] in patients with tinnitus. These tools include the Tinnitus Questionnaire [TQ]⁽⁸⁾, Tinnitus Handicap Questionnaire [THQ]⁽⁹⁾, Tinnitus Reaction Questionnaire [TRQ]⁽¹⁰⁾, Tinnitus Severity Questionnaire [TSQ]⁽¹¹⁾, Tinnitus Severity Index [TSI]⁽¹²⁾, and Tinnitus Handicap Inventory [THI]⁽¹³⁾.

Among these tools, the TQ, THQ, TRQ, and THI are more reliable than TSI and TSQ, as the psychometric properties of at least three of their domains have been evaluated. Furthermore, the advantages of the TQ and THI include higher validity and test-retest reliability than other questionnaires. However, the TQ is more difficult to apply than THI, as it contains 52 items while THI contains only 25. Additionally, these 25 items have been analyzed using

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the responses to individual items according to severity of impediment⁽¹⁴⁾; therefore, we used the THI to evaluate the disease-specific, health-related quality of life in patients. Regarding HR-QoL, the Short-Form 36 [SF-36]⁽¹⁵⁾ is a widely-accepted questionnaire to evaluate general quality of life with non-specific disease. The Thai version of the questionnaire^(16,17) has validity similar to the original version; therefore, we used the SF-36 to compare the quality of life of patients with the responses to the Thai-THI. Although, previous study⁽¹⁸⁾ reported high validity of Thai-THI but they did not mention the correlation between QoL and severity of tinnitus. This impact of tinnitus on daily life could provide the useful information for clinical practice.

Materials and Methods

This prospective, descriptive study was conducted at the Neuro-otology Clinic, Srinagarind Hospital, Khon Kaen University, Thailand, from March 8th, 2010, to November 19th, 2012. A sample size of 297 subjects was deemed appropriate considering 95% confidence intervals, 2.5% error, and a prevalence rate of 5%. Inclusion criteria were as follows: subjective tinnitus symptoms persistent for more than 3 months, ability to read and communicate in Thai, and signed informed consent before participation. Patients with dumbness or deafness were excluded. The study was reviewed and approved by the Khon Kaen University Ethics Committee for Human Research (HE521343).

The THI was translated into the Thai language, back translated, reviewed, and pre-tested (cognitive interviewing) according to the guidelines provided by Guillemin et al⁽¹⁹⁾. A group of 10 patients with tinnitus were invited to participate as the pilot group to validate the Thai-version of the THI. The pilot group was excluded from the final analysis. The Thai-THI comprised 25 items and 3 responses (score 0, 2, or 4) for each item. The total score was then categorized into 5 levels of severity. A score of 0 to 16 indicates no impediment; 18 to 36, mild impediment; 38 to 56, moderate impediment; 58 to 76, severe impediment, and 78 to 100,

catastrophic impediment. The score was also analyzed in the three domains, namely, functional, emotional, and catastrophic. Furthermore, the internal validity of the Thai-THI was assessed using Cronbach's alpha.

Interviews on demographic data, the THI, and the SF-36 were conducted on the same day. Data on symptoms were obtained from the participants' medical records. To test validity, Pearson's correlations were calculated between the eight subscales of the Thai-SF-36 and the Thai-THI.

Results

Of the 297 patients with tinnitus, 133 were male (44.8%) and 164 were female (55.2%). Sample mean age was 53.8 years. Almost all the patients were Buddhist (99.3%) and included 84 government officers, 89 from business or private sectors, 70 from agriculture, 50 elderly adults, 5 students, and 3 from the police or soldiers. Further, 50.2% had completed only primary school, 15.5% had completed high school, and 34.3% had a bachelor's degree or above. Of the patients, 67.5% had tinnitus symptoms for more than 6 months. The symptom affected the right ear, left ear, and both ears for 32.9%, 31.2%, and 35.7% of the participants, respectively. Pure tone average threshold on the affected side was 47 dB (SD 24.6). The associated symptoms included hearing loss (65.2%), vertigo (48%), and aural fullness (11.4%) while 13.1% patients had no associated symptoms. A total of 295 patients completed the Thai-THI. The mean and standard deviation of Thai-THI scores for males and females were 57.23 (SD 24.13) and 56.21 (SD 25.16), respectively. Patients with tinnitus were classified into 5 groups based on the scores of Thai-THI (Table 1).

Thai-THI scores were analyzed in terms of 3 subscales, namely, functional, emotional, and catastrophic (Figure 1).

Cronbach's alpha coefficients were as follows: 0.94 for the full scale, 0.87 for the functional domain, 0.89 for the emotional domain, and 0.67 for the catastrophic domain. The Thai-SF-36 was completed

Table 1. Classification of severity of tinnitus according to THI score

Thai-THI score	Male (%)	Female (%)	Total (%)
No impediment (0 to 16)	1.69 (95% CI: 0.73 to 3.91)	4.41 (95% CI: 2.59 to 7.39)	6.10 (95% CI: 3.89 to 9.44)
Mild (18 to 36)	7.46 (95% CI: 4.98 to 11.03)	6.78 (95% CI: 4.43 to 10.24)	14.24 (95% CI: 10.71 to 18.69)
Moderate (28 to 56)	13.22 (95% CI: 9.82 to 17.56)	16.61 (95% CI: 12.80 to 21.28)	29.83 (95% CI: 24.90 to 35.28)
Severe (58 to 76)	13.22 (95% CI: 9.82 to 17.56)	13.90 (95% CI: 10.41 to 18.31)	27.12 (95% CI: 22.36 to 32.46)
Catastrophic (78 to 100)	9.49 (95% CI: 6.65 to 13.38)	13.22 (95% CI: 9.82 to 17.56)	22.71 (95% CI: 18.30 to 27.71)

by 289 patients. The mean and standard deviation of Thai-SF-36 scores were analyzed in each severity group. Pearson's correlation between the eight subscales of the Thai-SF-36 and the Thai-THI are shown in (Table 2).

Discussion

The Thai-THI has shown good validity and reliability, with a Cronbach's alpha of 0.902 in a previous study⁽¹⁸⁾. However, this value was lower than that of the original version and other languages versions because of the small sample size of 66 participants; therefore, we reevaluated the validity of Thai-THI. Regarding the impact of tinnitus on daily life, the previous study⁽¹⁹⁾ did not mention the correlation between QoL and severity of tinnitus; thus, we attempted to determine the correlation between SF-36 and Thai-THI scores, and thereby contribute valuable knowledge about the impact of tinnitus on daily life. Our study demonstrated that Thai-THI scores were strongly correlated with the severity of symptoms. The subscale scores increased with the intensity of severity. The Thai-THI has good internal consistency, with Cronbach's alpha coefficients of 0.94, 0.87, 0.89, and 0.67 for the overall scale, functional, emotional, and catastrophic domains respectively. These figures are very close to those of the original version (overall: 0.93, functional: 0.86, emotional: 0.87, and catastrophic: 0.67)⁽¹³⁾. Additionally, other-language versions of THI⁽²⁰⁻²²⁾ have similar internal consistency coefficients, ranging from 0.91 to 0.93; therefore, the internal consistency of the questionnaire has been maintained across diverse languages.

Almost 80% of the patients with tinnitus in

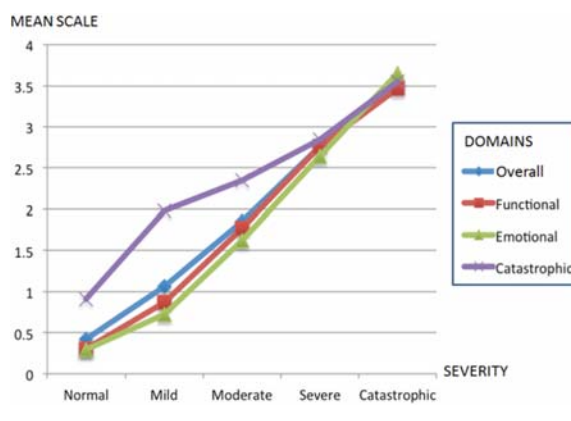


Figure 1. The mean scale overall and of the three domains of Thai-THI in each group.

Table 2. Mean of Thai-SF-36 scores in each severity group and correlations with total Thai-THI score

Thai-SF-36	Control	Severity				Correlation on Total Thai-THI
		No impediment	Mild	Moderate	Severe	
Physical functioning	77.27±17.78	83.24±17.04	72.86±20.31	71.74±19.78	56.01±22.14*	-0.4403**
Role-physical	93.18±16.17*	76.47±40.96	58.54±40.93	59.88±40.99	30.70±38.18*	-0.3931**
Bodily pain	81.36±17.29	78.91±17.82	73.27±21.51	73.40±24.63	57.34±19.49*	-0.3644**
General health	74.09±16.09*	65.31±22.25	56.28±21.73	53.61±19.93*	41.51±18.94*	-0.3917**
Vitality	71.82±11.89	77.35±16.21	65.37±14.81	62.38±15.47*	55.51±15.12*	-0.4911**
Social functioning	86.36±17.19	91.41±11.83	87.18±17.08	76.81±20.30*	60.20±19.87*	-0.5643**
Role-emotion	93.93±20.10*	80.39±33.46	71.55±39.13	56.98±42.43	32.07±39.02*	-0.4860**
Mental health	81.45±13.06	82.50±16.90	77.05±12.57	69.49±16.92*	61.79±16.09*	-0.5463**

* Significant difference $p < 0.01$; ** Significant correlation $p < 0.01$

the present study had Thai-THI scores in the moderate to catastrophic groups. All the groups except catastrophic had the poorest scores in the catastrophic domain of THI. The catastrophic group scored the poorest in the emotional domain of THI, and this was consistent with its SF-36 scores in the emotional domain.

The Thai-THI and the SF-36 were strongly correlated ($p<0.01$). The 4 groups of patients with mild to moderate severity had a significant lower quality of life [QoL] than control participants without tinnitus and the group with no impediment, especially in the domains of role-physical, bodily pain, general health, and role-emotion. Furthermore, the subgroup analysis of the domains of SF-36 showed significantly poor scores of severe and catastrophic groups ($p<0.01$) in the role-physical and bodily domains while the moderate to catastrophic groups showed significantly poor scores ($p<0.01$) in the general health, vitality, social functioning, role-emotion, and mental health domains. Overall, the QoL of patients with tinnitus decreased with increase in severity of impediment. Thus, the Thai-THI is an appropriate tool for assessing the psychological effects of tinnitus.

Conclusion

The internal consistency of the Thai-THI is similar to the original version in all domains and this measure has a strong correlation with the Thai SF-36. Thus, this valid and reliable measure can be used in the evaluation of the psychological effects of tinnitus. An important finding of the current study is that half of the patients had moderate to catastrophic severity and showed significantly poorer quality of life than other groups. Thus, neuro-otologic clinics should offer a complete mental health examination and psychiatry counseling as needed, for a holistic approach to tinnitus management.

What is already known on this topic?

Tinnitus is a common symptom that is generally associated with the pathology of the ear or surrounding organs. It produces the problems including stress, depression, and insomnia. These problems affect ability to work, emotion, and livelihood; therefore, QoL should be assessed. THI is one of questionnaire for assessing QoL in tinnitus patients. It is a higher validity and test-retest reliability than other questionnaires. Although, Thai-THI was developed but it did not mention about QoL and severity of tinnitus. Therefore, we conducted new Thai-THI version with

assessing correlation between QoL and severity of tinnitus.

What this study adds?

The internal consistency of the Thai-THI (overall: 0.94, functional: 0.87, emotional: 0.89, and catastrophic: 0.67) is similar to the original version in all domains (overall: 0.93, functional: 0.86, emotional: 0.87, and catastrophic: 0.67) and this measure has a strong correlation with the Thai SF-36 ($p<0.01$). An important finding of the current study is that half of the patients had moderate to catastrophic severity and showed significantly poorer quality of life than other groups. Thus, neuro-otologic clinics should offer a complete mental health examination and psychiatry counseling as needed, for a holistic approach to tinnitus management.

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Potential conflicts of interest

The authors declare no conflicts of interest.

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