

## Research Article



# The Translation and Psychometric Evaluation of the Persian Version of Iowa Tinnitus Primary Function Questionnaire

Hossein Namvar Arefi<sup>1</sup>, Majid Haddadi Aval<sup>2</sup>, Nastran Ranjbar<sup>3</sup>, Sadegh Jafarzadeh<sup>2,4\*</sup>

<sup>1</sup> Department of Audiology, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran

<sup>2</sup> Department of Audiology, School of Paramedical and Rehabilitation Sciences, Mashhad University of Medical Sciences, Mashhad, Iran

<sup>3</sup> Department of Neuroscience, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

<sup>4</sup> Sinus and Surgical Endoscopic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran



**Citation:** Namvar Arefi H, Haddadi Aval M, Ranjbar N, Jafarzadeh S. The Translation and Psychometric Evaluation of the Persian Version of Iowa Tinnitus Primary Function Questionnaire. *Aud Vestib Res.* 2023;32(3):213-7.

**doi:** <https://doi.org/10.18502/avr.v32i3.12937>

## Highlights

- The Persian version of the questionnaire showed high validity and reliability
- The questionnaire could be used in research and clinical settings
- No significant effect was observed for age or gender on the questionnaire

## Article info:

**Received:** 05 Jan 2023

**Revised:** 12 Mar 2023

**Accepted:** 12 Mar 2023

### \* Corresponding Author:

Department of Audiology, School of Paramedical and Rehabilitation Sciences, Mashhad University of Medical Sciences, Mashhad, Iran.  
[jafarzadehs@mums.ac.ir](mailto:jafarzadehs@mums.ac.ir)

## ABSTRACT

**Background and Aim:** Tinnitus is a common symptom and affects patients differently. The Iowa Tinnitus Primary Function (ITPF) questionnaire evaluates tinnitus in four areas: concentration, emotion, hearing, and sleep. This study aimed to translate and then assess the psychometrics of the ITPF questionnaire.

**Methods:** This is a cross-sectional and methodological (test construction) study. The questionnaire was translated by the Word Health Organization protocol. The validity and reliability of the questionnaire were assessed. The measured validities were the content, face, and discriminative. The reliability was estimated by internal consistency and test-retest stability. We also measured the effects of age and sex on the questionnaire's score.

**Results:** The questionnaire was translated based on the protocol. Each item of the questionnaire was understandable for patients and healthy participants. The face and content validities were confirmed by the patients and specialists, respectively. The score of 10.97 was determined as the cutoff point between patients and healthy participants, with a sensitivity of 86.70% and a specificity of 96.10%. The Cronbach  $\alpha$  was found to be 0.958, and the intraclass correlation coefficient was 0.975. No significant effect was observed for age ( $p=0.314$ ) and gender ( $p=0.866$ ).

**Conclusion:** The Persian version of the questionnaire showed high validity and reliability. It could be used in research and clinical settings.

**Keywords:** Tinnitus; tinnitus primary function questionnaire; reliability; validity



## Introduction

About 15% of the total population and 22% of over 50 years' people in the United States have tinnitus [1]. About 30%–40% of patients with hearing loss experience tinnitus, and 90% of patients with tinnitus have hearing loss [2]. Both tinnitus and hearing loss diminish the quality of life of patients with severe to profound tinnitus [3, 4]. Among patients with severe tinnitus, the prevalence of depression, anxiety, and even suicide is higher than in other patients [5]. Almost a quarter of patients with tinnitus look for different specialists to treat their sleep, concentration, and psychological disorders [6]. These different aspects of tinnitus raise the need for sensitive tools to evaluate tinnitus. Tinnitus questionnaires are useful tools for measuring the patient's condition. They are used for research and clinical purposes. They usually provide useful information about the severity of tinnitus that can be used in evaluating and monitoring patients' recovery. There are several questionnaires for the tinnitus evaluation; the Tinnitus Handicap Inventory (THI) [7] and Iowa Tinnitus Handicap Questionnaire [8] have been translated into the Persian language. Tinnitus affects different aspects of patients' lives: sleep, concentration, and social interaction. However, questionnaires such as THI cannot determine the effect of each factor separately, and the total score only indicates the overall impact of tinnitus on a person's life. Each aspect of the patient's life may be affected differently by tinnitus, or the patients may have specific needs that those questionnaires do not distinctly evaluate. The evaluation of a patient's particular needs could improve the success of treatment.

Tyler et al. created the Iowa Tinnitus Primary Function (ITPF) questionnaire in 2014 [9]. The questionnaire categorizes the patient's problems into 4 areas: concentration, emotion, hearing, and sleep. It can show the severity of the problem in each section separately. For this reason, this questionnaire can be very helpful in the clinical treatment of patients with tinnitus [9]. The advantage of the ITPF questionnaire over other questionnaires is the ability to separate and evaluate these aspects of tinnitus for therapeutic interventions. Each item of ITPF is scored from 0 (completely disagree) to 100 (completely agree). Scoring each item within this wide range allows us to detect small changes. According to Tyler, the questionnaire focuses on the main functions affected by tinnitus, so it is more sensitive and effective in treatment. Also, it has more sensitivity to measure changes in clinical work and can highlight areas likely to benefit from counseling and sound therapy [9]. This study aimed to translate and then evaluate the psychometrics of the ITPF questionnaire in Persian.

## Methods

The questionnaire was translated into Persian based on the World Health Organization protocol. First, the questionnaire was presented to two professional translators. Their mother tongue was Persian, and they also had good knowledge and experience in the English language. The questionnaire was translated into Persian. The translators also selected multiple alternative words for each word. Then, two translations were compared, and after reaching an agreement on the translated version, it was presented to two other translators for reverse translation. These translators had extensive knowledge and experience in the English language. They back-translated the Persian translation into the English language. Then, in a meeting with translators, researchers, and some clinicians involved in tinnitus evaluation and treatment, all versions of the questionnaire were examined, and the pre-final version of the Persian questionnaire was prepared. This version was presented to 10 patients to test if they understood the questionnaire's meaning correctly. Finally, a few unclear words were replaced with alternative words, and the Persian questionnaire's final version was created. The final Persian questionnaire was back-translated into the English language by a bilingual translator.

In the next step, different types of validity, including content, face, and discriminative validity, were evaluated. The questionnaire's original and Persian versions and back-translation were sent to seven experts for content validity. These experts had at least 5 years of experience assessing and treating patients with tinnitus. They were also familiar with different tinnitus questionnaires. These experts scored the quality and cultural compatibility of the translation from 0 to 100. For face validity, the Persian questionnaire was presented to 30 patients, and these patients scored the importance of each item. For discriminative validity, the results of 30 patients were compared with the results of 61 healthy participants.

Regarding reliability, two indicators of internal consistency and test-retest stability were used. For test-retest stability, the questionnaire was filled out by 30 patients in a 2-day interval, and the results were compared.

Finally, the frequency of responses to each item and the relationship between age and gender with the overall questionnaire scores were evaluated.

### Data analysis

The scores of patients and healthy participants were reported by mean and standard deviation. The normality of data was checked by the Kolmogorov-Smirnov test. For content validity, the average score of 95 for each item was used to approve each item. For face validity, the patients scored each item from 0 to 100; the average score of 95 was the criterion for confirming the item. The Receiver Operating Characteristics (ROC) curve, Cronbach  $\alpha$ , and the Intraclass Correlation Coefficient (ICC) were used to determine discriminative validity, internal consistency, and test-retest stability, respectively. Due to the non-normal distribution of age, The Spearman test was used to investigate the relationship between age and the overall scores of the questionnaire. The total score was compared between male and female patients by the Mann-Whitney test to evaluate the gender effect on the questionnaire. The p value of below 0.05 was considered significant.

### Results

The questionnaire was translated into Persian according to the standard protocol. The final translation was simple and fluent for the participants, and they could understand the meaning of each sentence. For content validity, the items that did not reach the average score of 95 were evaluated in a focus group of experts. Finally, the experts approved the translation quality and cultural compatibility for all items after necessary corrections, and all the questionnaire items reached the acceptable point for content validity. Also, the patients confirmed each item's understandability and face validity. In discriminative validity, a score of 10.97 was chosen as the cutoff point between the scores of patients and healthy participants. This cutoff point showed a sensitivity of 86.70% and a specificity of 96.10% for discrimination of patients and healthy participants. The final format of the questionnaire is presented in [Appendix 1](#).

The area under the curve was equal to 0.961. The Cronbach  $\alpha$  coefficient for internal consistency was 0.958, showing high consistency between items. The questionnaire also had high test-retest stability in patients, and a high ICC ( $r=0.975$ ) was obtained.

The patients showed the highest scores in emotional items of 10 and 6. While hearing items 15 and 13 showed the lowest score. The relationships of age and gender with the overall questionnaire scores were investigated, and no significant effect was observed for age ( $p=0.314$ ) or gender ( $p=0.866$ ). This shows the possibility of using

and comparing this questionnaire in different age populations among men and women.

### Discussion

This study was conducted to translate and evaluate the Persian version of the ITPF questionnaire. This ITPF has many applications in clinical work and the treatment of patients. In the Persian version, the face validity of the questionnaire was confirmed by patients. Tinnitus experts also confirmed the content validity, and finally, a simple and fluent translation was prepared so patients could properly understand each item of the questionnaire. The cutoff point of 10.97 represents the difference between patients and healthy participants. This cutoff point has high sensitivity and specificity. Other psychometric criteria of the questionnaire, such as internal consistency and test-retest stability, also showed good and high performance. The lack of a relationship between age and gender with the overall score of the questionnaire makes it possible to use and compare this questionnaire in different age groups among men and women. These results indicate the possibility of good clinical application of the ITPF questionnaire in Persian.

The current studies show the proper performance of the original and translated versions. Good validity and reliability were observed in the original English language questionnaire. Also, the factor analysis results showed that the selected questions successfully represented all four independent areas. Scores were correlated with loudness ( $r=0.40$ ,  $p<0.01$ ) and tinnitus handicap inventory ( $r=0.77$ ,  $p<0.01$ ). The sleep subscale was correlated with the Pittsburgh sleep index ( $r=0.68$ ,  $p<0.01$ ), and the emotion subscale with the trait anxiety questionnaire ( $r=0.67$ ,  $p<0.01$ ) and the Beck inventory ( $r=0.66$ ,  $p<0.01$ ). Based on these results, the ITPF questionnaire has good validity, reliability, and sensitivity and can be used to determine the effectiveness of clinical interventions [9, 10].

In a study by Talaat et al., the ITPF was translated and standardized into Arabic [11]. The Arabic version showed high internal consistency. The Cronbach alpha was 0.819 for the patients' group and 0.806 for the control group. The reliability of the Arabic ITPF questionnaire was also high, and there was a significant difference between the results of the patients and the control group [11].

Shin et al. investigated the reliability and validity of the Korean version of the questionnaire. A total of 79 participants completed the ITPF and the Korean version of the Pittsburgh Sleep Quality Index (PSQI), Beck Depression Inventory (BDI), and Tinnitus Handicap Questionnaire (THQ). The Korean version of the ITPF showed high internal consistency and reliability (Cronbach  $\alpha$  range 0.910–0.950). The total score obtained from ITPF items and its subscales had a moderate correlation with questionnaires that measure similar parameters (the Pearson correlation coefficient range 0.5–0.79). This study showed that the ITPF has good validity and reliability and can be used in patients suffering from tinnitus [12].

In another study, the Chinese version of the ITPF questionnaire and a 12-item version (selected from the original version) was evaluated among Chinese patients. In addition to ITPF, patients completed the THI, Beck Anxiety Inventory (BAI), BDI, and PSQI. Patients were also evaluated by pure tone audiometry and psychoacoustic tinnitus evaluations, including loudness matching. The Cronbach  $\alpha$  was used to assess the internal consistency and the Spearman rank correlation coefficient for the relationship between ITPF scores and other measurements. The Cronbach  $\alpha$  was 0.940 for the 20-item version and 0.920 for the 12-item version. Both versions significantly correlated with the estimated tinnitus loudness, THI, PSQI, BDI, and BAI. The researchers concluded that the 20- and 12-item versions of the Chinese ITPF are valid and reliable for tinnitus evaluation and can be used for the assessment and management of tinnitus in the Chinese population [13, 14].

Shaurya et al. tried to investigate the impact of tinnitus on the patients' quality of life with and without hearing loss using the Indian version of the ITPF questionnaire [15]. For this purpose, ITPF was translated and standardized in Hindi. Tinnitus patients with and without hearing loss completed the Indian versions of ITPF and THQ. The effects of tinnitus on their quality of life with these two questionnaires were compared. The ITPF scores had a positive correlation with the THQ. There was also a significant correlation between both questionnaires. The 12-item Indian ITPF questionnaire showed high internal consistency and test-retest reliability [15].

The limitation of this study is the lack of comparison between the results of ITPF and other questionnaires in patients with tinnitus. The simultaneous evaluation of ITPF and similar questionnaires can indicate the quality of the questionnaire. This issue is suggested for further studies.

## Conclusion

The psychometric evaluation of the Persian version of ITPF showed good validity and reliability. This questionnaire is suitable for use in clinical and research settings.

## Ethical Considerations

### Compliance with ethical guidelines

This was approved by the Ethics Committee of Mashhad University of Medical Sciences (IR.MUMS.REC.1396.262).

### Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

### Authors' contributions

HNA: Study design, acquisition of data, and drafting the manuscript; MHA: Acquisition of data and drafting the manuscript; NR: Interpretation of the results, statistical analysis; SJ: Study design, interpretation of the results, and drafting the manuscript.

### Conflict of interest

The authors have no conflict of interest.

### Acknowledgements

The study was supported by the Deputy of Research, Mashhad University of Medical Sciences (proposal code: 960464).

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