



Validity of the Turkish Version of the Tinnitus Primary Function Questionnaire

Original Investigation

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Abstract

Objective: This study aimed to evaluate the reliability and validity of the Turkish version of the Tinnitus Primary Function Questionnaire (TPFQ-T).

Methods: The study was conducted with 103 patients who had been experiencing tinnitus for longer than three months. All participants completed the TPFQ-T, the Beck Anxiety Inventory, the Beck Depression Inventory, the Pittsburgh sleep quality index, the Tinnitus Handicap Inventory and the magnitude estimation.

Results: Cronbach's alpha was 0.88. Cronbach's alpha was also computed for every one of the four subscales: $\alpha=0.67$ for sleep, $\alpha=0.72$ for hearing, $\alpha=0.86$ for concentration, and $\alpha=0.75$ for emotion. There was a correlation between the overall score obtained from the TPFQ-T and its subcategories and other questionnaires measuring corresponding factors.

Conclusion: Overall, the findings of this investigation show that the TPFQ-T is both reliable and valid. As a result, the current translated version of the TPFQ-T is suitable for patients who speak Turkish as their first language and serves as an effective tinnitus questionnaire.

Keywords: Tinnitus, questionnaire, validity, quality of life

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Introduction

The sense of hearing a sound such as pure tone, noise, or hissing in the absence of an objective, physical source is known as tinnitus (1). Tinnitus is a prevalent clinical symptom with numerous intricate reasons. Given its subjective nature, self-reported questionnaires have become more common in recent decades for evaluating the condition. Tinnitus questionnaires are a popular tool for guiding treatment

and evaluating tinnitus research (2). The purpose of tinnitus questionnaires is to accurately identify and measure the patient's tinnitus-related problems. The study by Tyler and Baker (3) in 1983 is perhaps the first systematic investigation of tinnitus utilizing the self-report approach.

Worldwide, several questionnaires are in widespread use. Presently there are two scales that have been translated into



Turkish (4,5). The most used is the Tinnitus Handicap Inventory (THI), but this questionnaire cannot help to distinguish between different responses (4). Although it has been suggested that it is less sensitive to variations during therapy, it was created expressly to diagnose the severity of the condition. Moreover, the three-label category scale has no practical application in the management of tinnitus (2).

Tyler et al. (6) developed the Tinnitus Primary Function Questionnaire (TPFQ), which is being widely used internationally, for research and treatment purposes. Since each item is rated on an interval scale ranging from 0 to 100, it is more likely to identify small variations (2).

The TPFQ has been validated in multiple languages (2,6-10). Therefore, this study aimed to evaluate the validity and reliability of the TPFQ Turkish version (TPFQ-T).

Methods

A total of 103 participants, aged between 18 and 76 years (mean: 45.28±14.35 years), were included in the study. The sample size was determined based on recommendations in the literature, which suggest obtaining 5-10 times the number of scale items for cross-cultural adaptation studies (11). The study received ethical approval from the Health Sciences University Non-Interventional Research Ethics Committee (decision no: 19/222, dated: 28/05/2019), and permission was obtained from Dr. Tyler via email for the translation of the TPFQ.

All patients had subjective, persistent, spontaneous, unilateral or bilateral subjective idiopathic tinnitus, with or without hearing loss. A detailed physical examination and pure-tone audiometry were conducted in the Otorhinolaryngology and Audiology Departments. Patients were included in the study if they had a tinnitus history of at least three months, unilateral or bilateral tinnitus, with or without hearing loss, and were fluent in Turkish. Those with any history of otologic or neurotologic surgery, as well as those with a history of behavioral, psychiatric, or neurological disorders were excluded.

Participants were asked to freely fill out the TPFQ-T. Additionally, they filled out four validated Turkish versions of related questionnaires: the THI, the Beck Depression Inventory (BDI), the Beck Anxiety Inventory (BAI), the Pittsburgh sleep quality index (PSQI) and the magnitude estimation. All questionnaires were used to assess the reliability and construct validity of the TPFQ-T.

The study was built upon the following consecutive phases:

Step 1: Translation and trans-adaptation of the TPFQ into Turkish using the conventional translation back-translation procedure.

Step 2: Linguistic validation of the trans-adapted TPFQ-T's feedback rating.

Step 3: Testing of participants with tinnitus (including those with and without hearing loss) using the trans-adapted questionnaires (TPFQ-T & THI) and calculating test scores.

Step 4: Validation of the TPFQ-T.

Step 5: Evaluation of the validity of the 20-questions TPFQ-T.

TPFQ Turkish version: participants were asked to score each item on a scale of 0 to 100, where 100 is completely agree and 0 is completely disagree. The total score and mean score of each subscale were calculated. The defined subscales are: concentration (questions 3, 7, 11, 15 and 19), emotion (questions 1, 4, 8, 10 and 12), hearing (questions 2, 6, 9, 14 and 17) and sleep (questions 5, 13, 16, 18 and 20) (6).

Scoring and Statistical Analysis

- Each TPFQ-T item was rated on a 0-100 scale, where 0= completely disagree and 100= completely agree.
- The total and subscale scores (concentration, emotion, hearing, sleep) were computed.
- Internal consistency was assessed using Cronbach's alpha coefficient.
- Pearson's and Spearman's correlation coefficients were used to examine validity by comparing TPFQ-T with THI Turkish version (THI-T), BDI-Turkish version (BDI-T), BAI-Turkish version (BAI-T), and PSQI Turkish version (PSQI-T) scores.

Tinnitus Handicap Inventory-Turkish version: Three response alternatives (yes: 4 points; sometimes: 2 points; no: 0 points) on the functional, emotional, and catastrophic implications of tinnitus were given to the subjects in the 25-item THI-T. The total of the scores from the 25 items, which ranged from 0 to 100, was used to calculate the overall THI score (12).

Beck Anxiety Inventory-Turkish version: Anxiety was measured using the 21-item BAI-T, which focuses on somatic symptoms. The degree of botheration caused by each symptom throughout the previous week was indicated by the respondents. Ratings for responses varied from 0 (not at all) to 3 (severely) on a 4-point Likert scale (13).

Beck Depression Inventory Turkish Version: This 21-item multiple-choice questionnaire is commonly used to evaluate the degree of depression. Participants were asked to select the statement from a list of options that most accurately reflected how they felt. Every question on the survey received a score between 0 and 3. The overall score, which ranged from 0 to 63, was then calculated by adding the scores of each item. The reported level of depression increased with increasing scores on the questionnaire (14).

Pittsburgh Sleep Quality Index Turkish Version: PSQI aids in assessing a person’s sleep quality during the previous month. There are 24 questions in total. Nineteen of these are answered by the individual, and five are answered by their partner or spouse. Subjective sleep quality, sleep latency, length, habitual sleep efficiency, sleep disorders, use of sleep medicine, and daytime dysfunction are the seven subcomponents of sleep quality that are measured by the individual’s responses to the scale’s 19 items. The PSQI total score spans from 0 to 21 and is calculated by adding seven subscores. Poorer sleep quality is indicated by a higher overall score (15).

Magnitude Estimation: Participants were asked to rate the loudness of their tinnitus on a scale of 0 (very faint) to 10 (very loud).

Statistical Analysis

IBM’s SPSS version 22.0 was utilized for statistical analysis (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY, USA). Data were presented as mean (X), range, and standard deviation as numerical values or percentages.

The internal consistency of TPFQ-T in overall and of the subgroups were studied using Cronbach’s coefficient of alpha; and the associations between the TPFQ scores and other measurements were studied using Spearman’s and Pearson’s rank correlation coefficients.

Results

The demographic data for each of the 103 participants are given in Table 1. The age range of the participants was 18 to 76 years, with an average of 45.28 years. There were 28 female and 75 male participants. The mean duration of tinnitus was 38.54 months. Forty-one of the patients had left-sided tinnitus, 27 had right-sided tinnitus, and 35 had bilateral tinnitus. The mean loudness of tinnitus was 5.66 on a scale of 0 to 10.

Regarding validity-related surveys, the THI-T had a mean score of 49.37 (43.79-54.96), the PSQI-T had a mean score of 7.49 (6.69-8.29), the BDI-T had a mean score of 13.43 (11.32-15.54) and the BAI-T had a mean score of 14.09 (11.83-16.35). The mean score of TPFQ-T was 47.52 (42.36-52.68).

Patients’ hearing status was assessed using pure tone audiometry. The pure tone averages, which include the air conduction thresholds at 0.5 kHz, 1 kHz, 2 kHz, and 4 kHz, are given in Table 2.

Reliability

Cronbach’s alpha coefficient values higher than 0.67 are generally considered acceptable, while values above 0.80 indicate good reliability, as suggested by Paiva et al. (16) and Sasaki et al. (17). In our study, Cronbach’s alpha was 0.88.

Cronbach’s alpha was also calculated for each of the four subscales ($\alpha=0.86$ for concentration; $\alpha=0.75$ for emotion; $\alpha=0.72$ for hearing; and $\alpha=0.67$ for sleep). An item-total correlation greater than 0.50 is typically considered a sign of strong internal consistency (8).

High correlations were found between the total TPFQ-T score and the subscale scores. The strongest correlation was found with the Concentration subscale (0.869), followed by the emotion (0.756), hearing (0.723), and sleep (0.672) subscales. Additionally, inter-item correlations indicated that all subscales were significantly related to the total TPFQ-T score. Specifically, the correlations of concentration, emotion, hearing, and sleep with the total score were 0.930, 0.857, 0.849, and 0.828, respectively. These findings suggest that each subscale substantially contributes to the overall TPFQ-T structure. Table 3 shows the mean scores for the four subscales and the total score of the 20-item TPFQ-T.

Table 1. Characteristics of tinnitus patients (n=103)

Parameter	Values
Age, year	45.28±14.35
Male sex, n (%)	75 (72.8)
Female sex, n (%)	28 (27.2)
Tinnitus duration, months	38.54
Tinnitus side, n (%)	
Left	41 (39.8)
Right	27 (26.2)
Bilateral	35 (34)
Loudness of tinnitus, dB	5.66 (5.17-6.14)
TPFQ-T, mean (95% CI)	47.52 (42.36-52.68)
THI-T, mean (95% CI)	49.37 (43.79-54.96)
PSQI-T, mean (95% CI)	7.49 (6.69-8.29)
BDI-T, mean (95% CI)	13.43 (11.32-15.54)
BAI-T, mean (95% CI)	14.09 (11.83-16.35)

n: Total number of participants, CI: Confidence interval, dB: Decibel, TPFQ-T: Tinnitus Primary Function Questionnaire Turkish version, THI-T: Tinnitus Handicap Inventory Turkish version, PSQI-T: Pittsburgh Sleep Quality Index Turkish version, BDI-T: Beck Depression Inventory Turkish version, BAI-T: Beck Anxiety Inventory Turkish version

Table 2. Hearing status of tinnitus patients

Pure tone audiometry test	Right ear (n=103)	Left ear (n=103)
PTA (0.5, 1, 2, 4 kHz) dB	22.04±18.75	21.66±15.33
Stimulus Frequency		
0.5 kHz, dB	17.62±18.97	16.34±13.94
1 kHz, dB	17.56±18.86	15.24±14.11
2 kHz, dB	18.53±19.10	18.17±16.76
4 kHz, dB	34.45±27.39	36.89±24.64

n: Total number of participants, PTA: Pure tone average, kHz: Kilohertz, dB: Decibel

Construct Validity

The TPFQ-T's construct validity measures were determined by calculating the Pearson's correlation coefficient values between the test's total score and each of its four subcategory scores, as well as the scores obtained from the four validity test measures (THI-T, BDI-T, BAI-T, and PSQI-T) (Table 4).

The Turkish version of the questionnaire can be found in the Appendix (Appendix 1).

Discussion

Our study aimed to assess the validity and reliability of TPFQ-T. The internal consistency of TPFQ-T was high among the items. There was a correlation between the total items of the TPFQ-T and its subcategories and those of questionnaires measuring comparable parameters. Our findings showed TPFQ-T to be valid and reliable.

According to Tyler et al. (6), tinnitus affects a person's ability to concentrate, feel emotions, hear, and sleep, all of which are important in daily life, work, and social relations. The TPFQ-T yields data on the respective contributions of each subcategory (emotion, concentration, hearing, and sleep measures) to overall severity.

The results of the validation assessment of the TPFQ-T were found comparable to those of the original TPFQ (6). Cronbach's alpha rating for reliability was 0.88 for the Turkish version and 0.92 for the original TPFQ.

The overall score and the subcategory scores of the original TPFQ and K-TPFQ showed a strong correlation with the results obtained from surveys measuring comparable parameters in validity assessments (6,8). For the original TPFQ, the range of Spearman's correlation coefficient values was 0.52 to 0.77, while for TPFQ-T, it was 0.36 to 0.80. Overall, these findings show that TPFQ-T is just as valid and reliable as the original TPFQ.

Nevertheless, there are some limitations to our study, despite the demonstrated validity and reliability of the TPFQ-T. Firstly, TPFQ-T's test-retest reliability was not assessed. Test-retest assessment of the questionnaire measures would increase the reliability of the TPFQ-T by revealing the reliability of participants' responses. On the other hand, the fact that the TPFQ-T results showed a correlation with the results of similar questionnaires suggests that the individuals' answers were consistent.

In the initial TPFQ study, Tyler et al. (6) used the Tinnitus Handicap Questionnaire (THQ), whereas in our study we used THI-T which is widely used in Türkiye. The correlation

Table 3. Mean and standard deviation of total and subscales for TPFQ-T

Patients (n=103)		Value (mean±SD)
TPFQ-T	Total	47.52±26.39
	Concentration	44.25±29.65
	Emotion	59.71±27.46
	Hearing	41.52±31.28
	Sleep	44.61±33.68

n: Total number of participants, SD: Standard deviation, TPFQ-T: Tinnitus primary function questionnaire Turkish version

Table 4. Correlations between the four questionnaires and the TPFQ-T's total and subscale scores (n=103)

Variables	THI-T	BDI-T	BAI-T	PSQI-T
Total scores				
r	0.806*	0.427*	0.369*	0.595*
p	0.000**	0.000**	0.000**	0.000**
Concentration scores				
r	0.805*	0.391*	0.325*	0.525*
p	0.000**	0.000**	0.001**	0.000**
Emotion scores				
r	0.739*	0.390*	0.368*	0.515*
p	0.000**	0.000**	0.000**	0.000**
Hearing scores				
r	0.618*	0.294*	0.278*	0.448*
p	0.000**	0.003**	0.004**	0.000**
Sleep scores				
r	0.653*	0.416*	0.321*	0.606*
p	0.000**	0.000**	0.001**	0.000**

*r: correlation coefficient, **p<0.05, n: Total number of participants, THI-T: Tinnitus Handicap Inventory Turkish version, BDI-T: Beck Depression Inventory Turkish version, BAI-T: Beck Anxiety Inventory Turkish version, PSQI-T: Pittsburgh Sleep Quality Index Turkish version

between the TPFQ-T and THI-T was 0.80, i.e., similar to the corresponding figure of 0.77 between TPFQ and THQ reported in Tyler et al.'s (6) paper.

The tinnitus questionnaires (especially THQ) have also been used for decades to assess treatment-related changes in drugs, devices, cochlear implants, and vagal nerve stimulation (18-21). Therefore, the TPFQ, which is scored between 0 and 100, may also be suitable for use in this field, as it is more likely to detect minor variations.

Conclusion

Any tools or methods used to evaluate psychometric traits and tinnitus severity ought to maintain a high level of accuracy and reliability. A test's validity is determined by its reliability. When used with adult tinnitus sufferers, the TPFQ-T-a cross-cultural adaptation and Turkish translation of the TPFQ-is a viable and trustworthy tool.

We propose that this scale can be employed in Turkish tinnitus studies and clinical practice as a substitute for the current tinnitus scales. To validate the scale as an outcome measure, more research is required.

Ethics

Ethics Committee Approval: The study received ethical approval from the Health Sciences University Non-Interventional Research Ethics Committee (decision no: 19/222, dated: 28/05/2019).

Informed Consent: Written informed consent was taken from all the of the patients.

Footnotes

Authorship Contributions

Concept: F.C.A.Ö., R.T., B.S., Design: F.C.A.Ö., R.T., B.S., Data Collection and/or Processing: F.C.A.Ö., H.K.B., C.E.Ü., Analysis and/or Interpretation: F.C.A.Ö., H.K.B., C.E.Ü., Literature Search: F.C.A.Ö., H.K.B., C.E.Ü., B.S., Writing: F.C.A.Ö., H.K.B.

Conflict of Interest: The authors declare that they have no conflict of interest.

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Main Points

- Tinnitus is a common medical symptom that can be debilitating.
- Currently, there is no objective way to define the presence of tinnitus. Questionnaires are important because they are based on patient self-report.
- Satisfactory values were found for the internal consistency for the Tinnitus Primary Function Questionnaire-Turkish version (TPFQ-T) and the subscales.
- Construct validity was proven for the TPFQ-T and its subscales.

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Appendix 1. (Turkish Version of the Questionnaire)

Iowa Tinnitus (Kulak Çınlaması) Primer Fonksiyon Anketi (6)

İsim:

Tarih:

Lütfen her bir madde için 0'dan (hiç katılmıyorum) 100'e (tamamen katılıyorum) kadar olan ölçek üzerinden puanlama yapınız.

#	Açıklama	0-100
1	Kulak çınlaması yüzünden bazı önemli görevlerde dikkatimi toplamakta zorluk çekiyorum.	
2	Kulak çınlamam yüzünden geceleri uyanık şekilde uzanıyorum.	
3	Kulak çınlamamın gitmesini istiyorum. Çok sinir bozucu oluyor.	
4	Kulak çınlamam yüzünden geceleri uyumakta zorluk çekiyorum.	
5	Aynı anda bir sürü şey olurken, kulak çınlamam en önemli olanıyla ilgilenmeme engel oluyor.	
6	Kulak çınlamam bazı konuşma seslerini engelliyor.	
7	Bir şeyler hakkında rahat düşünemem kulak çınlamamın en kötü etkilerinden birisidir.	
8	Kulak çınlamam can sıkıcıdır.	
9	Kulak çınlamam hakkındaki en kötü şeylerden birisi konuşmayı anlamama olan etkisidir, işitme kaybımın herhangi bir etkisinden fazla ve ötesindedir.	
10	Kulak çınlamam işitme kaybımdan bağımsız olarak müzik ve şarkılardan zevk almama engel oluyor.	
11	Gün boyunca yorgun oluyorum çünkü kulak çınlamam uykumu bölüyor.	
12	İşitme kaybıma ek olarak, kulak çınlamam konuşmayı anlamama engel oluyor.	
13	Kulak çınlamam yüzünden bunalımdayım.	
14	Geceleri uyandığımda, kulak çınlamam tekrar uykuya dalmamı güçleştiriyor.	
15	İç huzurumun bozulması kulak çınlamamın en kötü etkilerinden birisidir.	
16	Sessiz bir odada okuma yaparken kulak çınlamam yüzünden dikkatimi toplamakta sorun yaşıyorum.	
17	Uyumamdaki güçlük kulak çınlamamın en kötü etkilerinden birisidir.	
18	Kulak çınlamam yüzünden endişeliyim.	
19	Kulak çınlamamın işitmemdeki etkisi işitme kaybımın etkisinden daha kötüdür.	
20	Kulak çınlamam bazı görevlerin üzerinde odaklanmamı zorlaştırıyormuş gibi hissediyorum.	