

Research

## Correlation between Tinnitus Handicap Inventory with Tinnitus Primary Function Questionnaire in Indonesian language

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### ABSTRACT

**Background:** Complaints of tinnitus sufferers are generally subjective, while there is no objective examination in establishing the diagnosis of tinnitus so far, so that a questionnaire is needed to help establish it. The limitations of objectively assessing tinnitus have led to self-report questionnaires as the best option for evaluating tinnitus symptoms and measuring the extent to which quality of life is negatively impacted. **Objective:** to compare the scores between the Indonesian Tinnitus Handicap Inventory (THI) and the Indonesian version of the 12-item Tinnitus Primary Function Questionnaire (TPFQ). **Method:** A descriptive analytic study with a cross sectional design, where both variables were observed at the same time. This research was conducted at the Neurotology Outpatient Unit (URJ) RSUD Dr. Soetomo Hospital, Surabaya from September 2019 to April 2020. **Result:** A total of 29 tinnitus patients who met the criteria were divided by age, gender, degree of hearing loss, THI score, THI severity, and TPFQ score. **Conclusion:** The results of the correlation test between the degree of hearing loss with THI-Indonesia and the degree of hearing loss with the Indonesian 12-item TPFQ showed no difference in the results, namely both were not correlated, so the Indonesian 12-items TPFQ was valid and reliable, and it could be used to shorten the assessment time of tinnitus sufferers in hectic outpatient clinics.

**Keywords:** tinnitus, tinnitus questionnaire, quality of life for tinnitus patients, THI, TPFQ

### ABSTRAK

**Latar belakang:** Keluhan penderita tinitus umumnya bersifat subyektif, sedangkan sampai saat ini belum ada sarana pemeriksaan obyektif dalam menegakkan diagnosis tinitus, maka diperlukan kuesioner untuk membantu. Keterbatasan menilai tinitus secara obyektif telah menjadikan kuesioner mandiri (self-report) sebagai pilihan terbaik untuk mengevaluasi gejala tinitus dan mengukur sejauh mana kualitas hidup terkena dampak negatif. Tujuan: membandingkan skor antara Tinnitus Handicap Inventory (THI) Indonesia dengan Tinnitus Primary Function Questionnaire (TPFQ) 12-item versi Indonesia. **Metode:** Penelitian ini bersifat deskriptif analitik dengan desain potong lintang, dimana kedua variabel diamati dalam waktu yang bersamaan. Penelitian ini dilakukan di Unit Rawat Jalan (URJ) Neurotologi RSUD Dr. Soetomo pada bulan September 2019 sampai dengan April 2020. **Hasil:** Sebanyak 29 pasien tinitus yang memenuhi kriteria dibagi berdasarkan kategori usia, jenis kelamin, derajat gangguan pendengaran, skor THI, derajat keparahan THI, dan skor TPFQ. **Kesimpulan:** Hasil uji korelasi antara derajat gangguan pendengaran dengan THI-Indonesia maupun derajat gangguan pendengaran dengan TPFQ 12-item Indonesia menunjukkan tidak ada perbedaan hasil, yaitu sama-sama tidak berkorelasi, sehingga TPFQ 12-item Indonesia adalah valid dan handal dapat digunakan untuk mempersingkat penilaian penderita tinitus di klinik rawat jalan yang sibuk

**Kata kunci:** tinitus, kuesioner tinitus, kualitas hidup pasien tinitus, THI, TPFQ

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## INTRODUCTION

Tinnitus is a disorder of auditory perception in the absence of physical sound stimuli. Individuals with tinnitus may describe auditory phantoms as ringing, buzzing, roaring, or other sounds in the ear or head that cannot be observed by an examiner. Many people with tinnitus could adapt well, but sufferers may find that auditory phantoms intrude on daily life activities, aggravate behavioral and emotional distress, impair mental concentration and disrupt sleep. As such, tinnitus is characterized not only by its perceptual features, (e.g. loudness, pitch, duration, and laterality) but also by the person's reactions and distress.<sup>1</sup>

The quality of life could decrease with increasing tinnitus complaints, and patients with severe tinnitus disturbance might experience severe limitations in their day-to-day-life.<sup>2</sup>

Over 70 million people in Europe suffer from some form of tinnitus, which can be chronic and disabling for the affected individuals.<sup>2</sup>

Tinnitus, often referred as "ringing in the ears" is a health condition that is estimated to affect 10% to 15% of adults worldwide. With an estimated prevalence of 10% to 15% in adult, tinnitus is thought to affect more than 50 million people in the United States. Approximately 25% of adults who experience tinnitus report that the condition interferes with daily activity and 1% to 3% individuals report that their quality of life is seriously affected.<sup>3-4</sup>

In relation to the prevalence of tinnitus, a cross sectional study with 1960 subjects found that 22% of the population in the city of Sao Paulo (Brazil), 26% female and 17% male, had experienced this symptom.<sup>5</sup> Within

a period from January 2016 to December 2018, there were 420 incidence of tinnitus at Dr. Soetomo General Hospital, Surabaya.<sup>6</sup>

For the past several decades, researchers have focused on the etiology and the treatment of tinnitus. The assessment of tinnitus upon the daily life of the sufferers plays a vital role in the diagnosis, treatment and monitoring besides anamnesis, physical examination, and audiometry. As the nature of tinnitus is mostly subjective, whereas objective measures have not been established up to date, so therefore questionnaires are needed to establish the diagnosis. To achieve a multi-domain approach, these measures employ more than one item for each domain to maintain high reliability and validity. To the knowledge of researchers, no less than 20 of self-rating questionnaires have been utilized in clinical practice globally, which include the Tinnitus Questionnaire (TQ), Tinnitus Handicap Inventory (THI), Tinnitus Reaction Questionnaire (TRQ) and Tinnitus Functional Index (TFI).<sup>7</sup>

The lack of an objective measure of tinnitus has led to self-report questionnaire as the best option to evaluate tinnitus symptom and quantify the degree to which quality of life is negatively impacted.<sup>8</sup>

These effects are not related to the physical characteristics of tinnitus such as perceived loudness; although its effect show high inter-subject variability. Hence some questionnaires have been developed to solve this issue.<sup>9</sup> Questionnaires can be used to assess patients' perception of tinnitus severity and its impacts on their life. Tinnitus Functional Index (TFI) and Tinnitus Handicap Inventory (THI) are the most widely used tinnitus questionnaires.

It is known that in many cases, tinnitus may accompany hearing loss, although the tinnitus without any apparent hearing loss in the conventional audiometry is also prevalent. Tinnitus Handicap Inventory (THI) was introduced and revised by Newman et al. This questionnaire includes 25 items and 3 functional subscales (items 1, 2, 4, 7, 9, 12–15, 18, 20, 24 related to functional aspects in the areas of mental, social/occupational, and physical function), emotional (items 3, 6, 10, 16, 17, 21, 22, 25 related to affective responses to tinnitus), and catastrophic (items 5, 8, 11, 19, 23 related to desperation, inability to escape from tinnitus, perception of having a terrible disease, lack of control, and inability to cope). THI is a valid tool for evaluating tinnitus and monitoring treatment effect.<sup>9</sup>

The adapted Indonesian version of THI instrument is valid and reliable according to transcultural validation principles by WHO as psychometric instrument on the quality of life in patients with tinnitus, therefore could be utilized as self-assessment of quality of life in patients with tinnitus.<sup>10</sup>

The shortcoming of THI is it could not distinguish between sleep disturbances, difficulty concentrating, decreased social enjoyment, and hearing loss. Besides, THI could not be used as a guideline in the treatment of tinnitus. Recent research has found that the latest questionnaire developed by Richard Tyler (2014) is valid, reliable and sensitive and can be used as a tool to measure the quality of life of tinnitus patients. The questionnaire consists of 20-item and 12-item questionnaire representing 4 independent domains, namely emotion, hearing, sleep, and concentration, known as the Tinnitus Primary Function Questionnaires (TPFQ). TPFQ-12 and TPFQ-20 questionnaires have been trans-adapted and validated in Indonesian language. The result showed there is no difference between TPFQ in question 12 and question 20. Question 12 is valid and reliable, can be used and represents question 20.<sup>11</sup>

The purpose of this research was to compare the score of THI Indonesian language with TPFQ-12 Indonesian version.

## METHOD

This was a descriptive analytic study using cross sectional design, where two variables were observed at the same time, conducted at the Neurotology Outpatient Unit of Dr. Soetomo General Hospital, Surabaya from September 2019 until April 2020. This research aimed at comparing THI Indonesian language score which was compliant with cultural trans-adaptation guideline, with TPFQ-12-item Indonesian version score, which was also already compliant with cultural trans-adaptation guideline, as a tool to measure the impact of tinnitus on the quality of life of the sufferers. This study had been approved by the Ethical Clearance Committee of Medical Research of Faculty of Medicine Universitas Airlangga and Dr. Soetomo General Hospital No.0918/LOE/301.4.2/V/2022.

All research samples received the same treatment: a comprehensive case history, providing information, writing informed consent to participate in the study, otoscopy examination, examination using pure tone audiometry, and filling questionnaire. Sampling technique was consecutive sampling with inclusion and exclusion criteria. The inclusion criteria were aged 18-above, suffering unilateral or bilateral tinnitus, minimally 1-month persistent tinnitus, no history of middle ear disease, not consuming psychological and neurological medication, normal otoscopic findings, and able to understand Indonesian language. The exclusion criteria were patients with temporo-mandibular joint disturbance and patients with severe mental illness.

Participants were expected to fulfill THI and TPFQ-12-item Indonesian version at the same time during the assessment. THI

questionnaires consist of 25 questions with three choices of “yes” (4 points), “sometimes” (2 points) and “no” (0 points). The higher the score, the worse quality of life would be.<sup>5</sup>

TPFQ 12-item questionnaire used respond of 5 point-scale, with total score from 0 to 100. The higher score represented the higher severity of patients’ quality of life.<sup>12</sup> Data processing and questionnaire result analysis for each factor validity and reliability was tested using Cronbach’s alpha ( $p < 0.5$ =reliable) with the help of software statistic package SPSS (Statistical Package for the Social Sciences) where data normality

was primarily tested. The validity test used Spearman correlation coefficient, and the descriptive and clinical demographic data were counted.

## RESULT

Recruited tinnitus patients fulfilling the inclusion criteria had mean age 43.48 years old (age range 18-77 years, standard deviation 16.64). Mean hearing threshold 50.11 dB (range 7.5-112.5 dB, standard deviation 27.18).

### Characterisistic based on gender, hearing loss degree

**Table 1. Gender distribution**

Gender	N	%
Female	17	58.6
Male	12	41.4
Total	29	100.0

**Table 2. Distribution of hearing loss degree**

Degree	N	%
Normal	6	20.6
Light	6	20.6
Moderate	5	17.3
Moderately-severe	5	17.3
Severe	5	17.3
Very severe	2	6.9
Total	29	100.0

**Table 3. THI descriptive analysis**

	Minimum score	Maximum score	Average	Standard deviation
Total THI	0	94	51.44	27.99
Functional scale	0	44	22.82	13.54
Emotional scale	0	32	16.68	9.38
Catastrophic scale	0	24	11.93	7.37

**Table 4. THI severity degree**

Degree	N	%
No handicap	5	17.24
Light handicap	4	13.80
Moderate handicap	5	17.24
Severe handicap	8	27.58
Catastrophic handicap	7	24.14
Total	29	100.0

**Table 5. TPFQ 12-item descriptive analysis**

	Minimum % score %	Maximum score %	Average %	Standard deviation
Total TPFQ 12-item	2.5	100	47.06	26.18
Concentration scale	0	100	49.19	32.47
Emotional scale	0	100	55.44	28.85
Hearing scale	0	100	48.83	34.06
Sleeping scale	0	100	34.88	29.75

**Table 6. THI and TPFQ 12-item correlation test with hearing loss degree**

Spearman test	p-value	
	THI	TPFQ 12-item
Hearing loss degree	0.316	0.131

## DISCUSSION

Tinnitus Handicap Inventory (THI) was developed in 1996 and up to date has been trans-adapted to various languages such as Italian, Portuguese, Chinese-Mandarin, Chinese-Canton, Persian, Dutch, and Korean with trustworthy validity and reliability.<sup>13,14</sup>

Tinnitus Primary Function Questionnaire (TPFQ) started to be developed since 2014 and up to date has been trans-adapted to various languages in the world such as Indian, Chinese, Korean and Arabic with trustworthy validity and reliability.<sup>7,12,13,15</sup>

Questionnaire with 12 items focusing on 4 main factors affected by tinnitus were concentration, thoughts and emotion, hearing, and sleep. When one or more of these primary functions are affected, tinnitus sufferers can experience difficulties in secondary functions including work, socialization, recreation, friendship and general quality of life.<sup>16</sup>

Tinnitus Primary Function Questionnaire (TPFQ) consists of 4 subscales namely: 1. concentration subscale (item 1,2 and 3), 2. emotion subscale (item 4,5 and 6), 3. hearing subscale (item 7,8 and 9), and 4. sleeping



subscale (item 10,11,12). Each subscale is totaled and divided by three, so that every subscale has its percentage. Total percentage is the amount of all subscales and divided by four. There are 4 benefits of TPFQ, firstly, this questionnaire is more sensitive to measure the changes in the main factors because it does not cover the secondary factors related to general quality of life. Secondly, the questionnaire is more efficient with only 12 items. Thirdly, it could measure the score of each subscale, and fourthly, it could detect the change of subscale score, before and after treatment.<sup>11</sup>

The study result showed the number of female sufferers was 17 (58.6%) compared to 12 male sufferers (41.4%). The mean age was 43-48 (age range 18-77years, standard deviation 16.64). The above result was different with other research showing that the number of male sufferers was higher than female, with 24 male and 16 female, equivalent to male prevalence of 60%.<sup>5</sup> Other research also showed that male sufferers was more than female, there were 70 male and 30 female. The age range of tinnitus sufferers were 18 to 70 years old.<sup>17</sup>

Both correlation tests between hearing loss degree and THI Indonesia, as well as hearing loss degree and TPFQ 12-item showed no difference, that both results were not correlated, thus TPFQ 12-item Indonesia was valid and reliable, could be used to shorten tinnitus assessment at the hectic Outpatient Clinic.

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