DEVELOPMENT AND STANDARDIZATION OF TINNITUS SEVERITY

INDEX QUESTIONNAIRE (TSIQ) IN BANGLA

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ABSTRACT

Psychometric validation is the study of determining internal consistency reliability and validity. Self-rating questionnaires are often used to assess severity of tinnitus. These questionnaires should be administered in the respondent's native language to obtain accurate responses. There is no self rating questionnaire in Bangla language to assess severity of tinnitus. The Tinnitus Severity Index Questionnaire (TSIQ) is one of the most used questionnaires. The aim of this study is to develop and standardize the TSIQ in Bangla, to investigate the complex interface of tinnitus with quality of life and psychological distress of the patients with tinnitus. A total of 30 native Bangla speaking adults (equally fluent in Bangla and English) with and without hearing loss, in the age range of 20 to 60 years and with a complaint of tinnitus for a minimum of 6 months participated in the study. Validity was tested by administering TSIQ-English and TSIQ-Bangla to the participants. Correlation coefficient =0.882, shows good correlation between the two different versions of the same questionnaires. Test-Retest reliability was 0.934. Correlation between THI-Bangla version and TSIQ-Bangla was significant (correlation coefficient=0.743). Thus TSIQ-Bangla is a valid and reliable tool.

Key words-Tinnitus Self Rating Questionnaire, Internal Consistency, Severity, Reliability.

Introduction

Tinnitus is the perception of sound for which there is no acoustic external source to the head (Henry, Dennis & Schechter, 2005).Global epidemiologic studies estimate the prevalence of tinnitus to be between 10%-15% (Mitchell, Newall, Golding & Rubin, 2003). Approximately 40 million people in the United States experience chronic tinnitus out of which almost 10 million people consider their tinnitus to be a significant problem.Hazell(1985)reported that 17% of the population in the United Kingdom has chronic tinnitus, but only 14% of them said that it bothers them a greatly. Innumerable treatments for this condition have been utilized with varying degrees of success. The goal of effective tinnitus management is not necessarily to mask or remove the patient's physical perception of tinnitus sounds. In many cases this is not even possible. According to Duckro et al. (1984) the treatment of chronic tinnitus is more accurately described in terms of management rather than cure. Several studies have demonstrated that the matched loudness of tinnitus is not correlated with its severity.

Tinnitus severity can be defined and quantified in several ways like, how much or how often a patient is bothered by tinnitus; how much or how often tinnitus distracts patient from enjoyment of life; or by how disabling patients perceive their tinnitus. Various instruments have been developed to assess tinnitus severity. These include the Tinnitus Handicap Questionnaire, the Tinnitus Severity Index, and the Tinnitus Handicap Inventory. Regardless of which assessment instrument is used, the goal of tinnitus management programs should be to reduce the severity of each patient's tinnitus. That is, clinicians should help patients to learn how to pay less attention to their tinnitus so that it bothers them less of the time. A realistic goal of an effective tinnitus management program is to help patients understand and gain control over their tinnitus, rather than tinnitus controlling them. Ultimately clinicians should strive to help patients progress to the point where tinnitus is no longer a negative factor in their lives.

Many studies have been undertaken to assess the effectiveness of tinnitus management programs or methods. Some of these studies assess tinnitus severity before treatment was initiated and assess it again immediately after the treatment program.

Few studies of the efficacy of tinnitus treatments have assessed their long-term effects on tinnitus severity. This is an important point to consider because patients' perception about their tinnitus often changes with time.

The relatively common occurrence of tinnitus may be attributed to its multiple etiologies, such as ear wax, middle ear infection, otosclerosis or even cochlear hair cell damage. Tinnitus can also be idiopathic (Crummer& Hassan, 2004). Further a strong association between occupational noise exposures and tinnitus is well documented (Hoffmann & Reed, 2004).Most individuals with tinnitus have associated hearing loss, however, a study by Silverstein,Arruda, and Rosenberg (1999),suggests that 20% to 30% of patients have tinnitus with normal hearing sensitivity. Irrespective of hearing status, tinnitus affects individual's lives to varying degrees. Tinnitus may be associated with disorders of sleep, lack of concentration, anxiety, depression that sometimes lead to suicidal tendencies. The most frequently reported problems among individuals suffering from tinnitus are: Trouble to sleep, persistence of tinnitus, difficulty understanding speech, depression, annoyance, confusion and dependence on drugs (Tyler & Baker, 1983). Disturbances due to tinnitus are intensified as subjects concentrates more on the sound, and hence, are constantly aware of it (Stouffer & Tyler, 1990). Tinnitus affects cognition to the extent that it reduces the cognitive capacity needed to perform tasks that require voluntary, conscious, effortful, or strategic control (Rossiter, Stevens & Walker, 2006).

Information on the nature of an individual's tinnitus may be obtained using case history (e.g. continuous or intermittent noise, type of tinnitus such as buzzing, ringing, roaring or hissing). Psychoacoustic characteristics of tinnitus such as loudness, pitch, and masking ability are obtained using intensity matching, frequency matching, minimum masking level and residual inhibition. Although these measures are useful in describing tinnitus, psychoacoustic characteristics have low correlation with the extent of adverse impact in an individual's life due to tinnitus (Newman & Sandridge, 2004).

Self rating questionnaires often are used to study the impact of tinnitus. Questionnaires aid in planning treatment and in addressing specific concerns during the counseling process. Self rating questionnaires are particularly useful in evaluating treatment outcome. In order to capture the nature of symptoms and tinnitus-related history, such as questionnaires allow the individual to describe the subjective impact of tinnitus.

The tinnitus severity index is a 12-item questionnaire that measures the effect of tinnitus on work and social activities and overall quality of life. The results of the 12 items of the TSI are then added for a single severity index (Meikles & Folmer, 2001). This is one of the shorter tinnitus questionnaire that has been published. There are two version of the TSI, the original uses 3 and 4 point scales (Meikles & Stewart, 1998) and a modified version using primarily a 5 point scales, with two 4 point questions and one 1 point question (Folmer & Carroll, 2006). The TSI has limited use outside USA, but the original version has been normed in New Zealand as well. The TSI has good internal consistency in both USA and NZ (chronbach'salfa >0.87) populations. The TSI has been found to correlate to the subjective rating of tinnitus loudness but not hearing loss. The TSI scores has been shown to be improved after a comprehensive audiology based tinnitus management programs.

A self assessment questionnaire provides greater and more detailed insight into areas that cannot be assessed by psychoacoustic evaluation procedures. They also explore the problems face by an individual and serve as a baseline for assessing treatment outcomes.

Responses to self assessment questionnaires are most accurate when administered in the native language of the individual. In Indiancontext, however, there is no self-rating questionnaire in Bangla to measure severity of tinnitus. Bangla is not only the official language of the state of West Bengal but is also a widely spoken language.So there is an immense need to develop TSIQ in Bangla for the Bengali population.

The aim of the study is to develop and standardize the Tinnitus Severity Index Questionnaire (TSIQ) in Bangla, to investigate the complex interface of tinnitus with psychological distress and quality of life in a population of adult tinnitus patients with and without hearing impairment for the native speakers of Bangla and to measure emotional, catastrophic and functional dimensions of these patients, that is brief, easy to administer and interpret, broad in scope, and psychometrically robust.

The objectives of the study were:
1. To standardize Bangla version of TSIQ to be used in clinical practice and research.
2. To measure validity, internal consistency and reliability of newly developed tool.
3. To validate this questionnaire in the tinnitus suffers with and without hearing impairment.

Method
Tools/Instrumentation:
1. Tinnitus Handicap Inventory (THI) developed by Newman, Jacobson and Spitzer (1996).
2. Bangla version of Tinnitus Handicap Inventory (THI)
3. Tinnitus Severity Index Questionnaire (Meikle, Griest, Stewart & Press, 1995)
4. Transadapted Bangla version of TSIQ International Test Commission Guideline for Test Translation and Adaptation (2001).
5. 5. Calibrated Diagnostic audiometer (MAICO MA53) with TDH 39 earphones (according to manufacturer's standards) serial no: 1016090.
6. Immittance audiometer (GSI-39 AUTO TYMP) serial no: 113405800.
7. Oto-acousticemission (OAEs) (MAICO ERO SCAN) serial no: 801127.
8. Auditory brainstem response (ABR) (RMS Medulla AD) serial no: 16101191.

Procedure:

Stage 1: Development of test material by linguistic validation.

The Tinnitus Severity Index Questionnaires(TSIQ) consists of total 12 questions among which the first 9 questions has 5 points rating scale, the next 3 questions has 4 points rating scale and at last there is a 8 point rating scale where the subject has to rate perceptually about his or her loudness of tinnitus.

The linguistic validation of the modified version of the Tinnitus Severity Index Questionnaire (TSIQ) into the Bangla version of Tinnitus Severity Index Questionnaire (TSIQ-Bangla) and its psychometric specification is done in the following steps:

a) Translation:In the first step TSIQ English questionnaire was translated by ten native speakers of Bangla, who hadhigh level of proficiency in English and Bangla. The ten native speakers translated the original instrument into Bangla language separately.

b) Back Translation:At the second step reverse-translation was done to check intactness of meaning by another 10 native Bangla speaker who had high level of proficiency in Bangla and English language. Back translation of the pooled Bangla version to English was done to measure the homogeneity of the original version of TSIQ.

Stage 2: Participant selection:Inclusion criteria:A total of 30 native Bangla speaking tinnitus subjects who has subjective, permanent and spontaneous (not occurring only during exposure to noise or immediately after noise), unilateral or bilateral subjective idiopathic tinnitus lasting at least for six months with hearing loss (mild to moderately severe degree of sensorineural hearing loss) or without hearing loss was taken for the study for measuring the concomitant validity. The age range of all the subjects studied was between 20 to 60 years (Mean Age=41.93). This study group was efficient to speak and read both Bangla and English.

The inclusion criterion was made to exclude any middle ear pathology by using Tympanometry & auditory neuropathy by using Oto-acoustic emission (OAE) & Auditory Brainstem Response (ABR).None of the subjects observed had any psychological or neurological disturbances.

The participants were selected from the audiological department of AYJNIHH, ERC, Kolkata. Participants fulfilling the inclusion criteria for the study were selected randomly.

Stage 3: Administering the developed test on participants with tinnitus and obtaining the test score:

The participants were informed that the questionnaires were being administered for the purpose of research, and written consent was obtained. They were briefed about the questionnaires and the response options. Validated TSIQ- Bangla material was given to the participants those who were selected for the study and the participants were asked to read the questionnaires and circle the appropriate rating. Any clarification requested for by the participants was provided.

Stage 4: Checking the reliability of the test:

To check its test-retest reliability the patients who were studied who had filled the TSIQ-Bangla questionnaire were called upon after one week and was asked to fill the same TSIQ-Bangla questionnairesagain. The retest was done without informing the patients the score of the previous test. There were no intervening treatment between test and retest conditions, e.g., fitting of hearing aid or noise generator devices, drug trials or any psychological management.

Internal consistency was checked by Psychometric Validation study which was used to determine internal consistency, reliability and validity of the Tinnitus Severity Index Questionnaire (TSIQ) Bangla Version.

Statistical Analysis:

In order to investigate the objectives of the study, the obtained data was statistically analyzed using the Software Statistical Package for the Social Sciences (SPSS-16 version). Kendall's tau-b was used for statistical analysis. Internal consistency was measuredbased on the correlations between different questions on the same questionnaire of TSIQ with Cronbach's alpha (α).

Results and Discussion

It is accepted that a careful translation of a questionnaire is not enough to standardize an assessment tool. Some statistical methods should be used to standardize and develop a questionnaire. In this study cross-cultural trans-adaptation procedure was used to standardize and validate the Tinnitus Severity Index Questionnaires in Bangla (TSIQ- Bangla). Validity was checked by judges' review (Brains, Willnat, Manheim & Rich, 2011). The construct validity was checked by correlating the total score of TSIQ-Bangla with the matched loudness and pitch of the participants.

Table 1: Averaged pure tone air conduction thresholds (dB HL) of 30 patients& average scores of THI – Bangla, TSIQ – English& TSIQ – Bangla of 30 patients.

Subject's Age/Sex	PureTone Average(dBHL) Rt. Lt.		THI–Bangla Score	TSIQ-English Score	TSIQ-Bangla Score
42yrs/M	36.6	30.5	62	42	44
24yrs/M	28.3	30.0	60	41	42
56yrs/M	23.3	38.5	58	45	46
35yrs/F	43.3	25.0	54	42	40
37yrs/M	50.0	51.6	70	55	54
44yrs/F	53.0	56.6	72	55	55
21yrs/M	48.3	43.3	72	59	57
39yrs/M	15.0	23.0	66	44	42
36yrs/M	18.3	18.3	56	42	39
38yrs/F	35.6	32.5	58	37	37
28yrs/F	25.0	28.0	58	42	43
23yrs/M	45.5	40.0	60	43	43
23yrs/M	22.6	25.0	60	46	45
35yrs/F	31.6	33.0	70	57	56
31yrs/M	40.5	45.6	72	56	55
57yrs/M	18.5	20.0	52	35	35
47yrs/M	32.6	38.3	42	37	36
30yrs/F	56.2	50.0	40	34	34
58yrs/F	65.8	65.0	42	33	32
46yrs/M	41.5	40.0	40	38	39
32yrs/F	56.2	51.5	42	33	32
28yrs/M	45.5	38.3	24	22	20
55yrs/M	55.0	41.6	26	23	23
45yrs/M	65.5	58.3	30	26	27
44yrs/F	30.5	35.8	56	42	41
50yrs/F	25.0	28.3	60	47	44
33yrs/M	18.5	15.8	58	45	47
57yrs/M	52.6	40.3	62	44	45
41yrs/M	15.3	20.0	64	44	41
32yrs/M	34.0	41.6	58	42	40

Correlations of TSIQ-Bangla& TSIQ-English

			VAR00002	VAR00003
Kendall's tau_b	VAR00002	Correlation Coefficient	1.000	0.882[**]
		Sig. (2-tailed)		0.000
		N	30	30
	VAR00003	Correlation Coefficient	0.882[**]	1.000
		Sig. (2-tailed)	0.000	
		N	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

Results of correlation between TSIQ-English& TSIQ- Bangla were obtained using Kendall's tau-b test of correlation and the correlation was found to be good. The correlation coefficient is 0.882

Correlations of THI- Bangla& TSIQ-Bangla

			VAR00002	VAR00003
Kendall's tau-b	VAR00002	Correlation Coefficient	1.000	0.743[**]
		Sig. (2-tailed)		0.000
		N	30	30
	VAR00003	Correlation Coefficient	0.743[**]	1.000
		Sig. (2-tailed)	0.000	
		N	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

Results of correlation between THI BANGLA & TSIQ BANGLA were obtained using Kendall's tau-b test of correlation & the correlation was found to be significant. The correlation coefficient is 0.743.

Self-rated loudness of tinnitus:

Table 3:Mean responses to questionnaires by 30 patients

	Initial scoring	Scoring after 15 days
Self rated loudness of tinnitus	7.06 ± 1.76	6.47 ± 1.93
Does your tinnitus		
1. Make you feel irritable or nervous	3.37 ± 1.02	2.98 ± 1.01
2. Make you feel tired or stressed	3.39 ± 1.10	3.03 ± 0.99
3. Make it difficult for you to relax	3.42 ± 1.04	3.05 ± 0.99
4. Make it uncomfortable to be in a quiet room	3.40 ± 1.20	3.49 ± 1.04
5. Make it difficult to concentrate	3.46 ± 0.99	3.06 ± 0.99
6. Make it harder to interact pleasantly with others	3.15 ± 1.10	2.77 ± 1.11
7. Interfere with your required activities (work, home, care, or other responsibilities)	2.95 ± 1.15	2.49 ± 1.13
8. Interfere with your social activities or other things you do in your leisure time	3.17 ± 1.13	2.74 ± 1.15
9. Interfere with your overall enjoyment of life	3.32 ± 1.06	2.79 ± 1.14
10. How much of an effort is it for you to ignore tinnitus when it is present?	2.11 ± 0.72	1.94 ± 0.74
11. How much discomfort do you usually experience when your tinnitus is present?	2.86 ± .87	2.43 ± 0.93
12. Does your tinnitus interfere with sleep?	2.98 ± 1.03	2.52 ± 0.94
Total tinnitus severity index score	37.58 ± 9.00	33.29 ± 9.60

Test –Retest reliability

			VAR00002	VAR00003
Kendall's tau_b	VAR00002	Correlation Coefficient	1.000	0.934[**]
		Sig. (2-tailed)		0.000
		N	14	14
	VAR00003	Correlation Coefficient	0.934[**]	1.000
		Sig. (2-tailed)	0.000	
		N	14	14

**Correlation is significant at the 0.01 level (2-tailed).

Test–Retest reliability was checked using Kendall's tau-b, which reveals correlation coefficient=0.934

Discussion:

Kendall's tau-b was used to find correlation between TSIQ-Bangla and TSIQ-English. Result revealed correlation coefficient = 0.882, which mean good correlation between the two different versions of the same questionnaire's. Test–Retest reliability was checked using Kendall's tau-b, which revealed correlation coefficient=0.934. Correlation was also checked between THI (Tinnitus Handicap Inventory)–Bangla version and TSIQ-Bangla version using Kendall's tau-b. Result revealed acceptable correlation value between the two questionnaires (correlation coefficient=0.743).

Summary and Conclusion

The present study had been aimed to develop a test for measuring tinnitus severity among native Bangla speakers. The test is named as "Tinnitus Severity Index Questionnaires–Bangla (TSIQ- Bangla)".

This study was needed for the Bangla speaking population because; most of the instruments that evaluate the "Quality of Life"are developed in English and intended to be used in English speaking countries. When such questionnaire are used with the native speakers of Bangla neither they are able to yield exact results nor able to give an exact estimation of tinnitus severity. There is yet no known self-rating questionnaire in Bangla language available to assess the impact of tinnitus. Therefore, a new instrument needs to bedeveloped or an existing one needs to be translated into another language (Guillemin, Bombardier & Beaton, 1993), by which, tinnitus severity of an individual speaking Bangla be measured properly.

To standardize the Tinnitus Severity Index Questionnaires (TSIQ) in Bangla, internal consistency reliability and test-retest reliability of the Bangla version of the Tinnitus Severity Index Questionnaires (TSIQ-Bangla) was done by using statistical methods (Cronbach's alpha, Kendall's tau-b correlation).

Future directions:

1. This tool can be further used to detect the outcome of tinnitus management.
2. This tool can be further translated into other Indian languages in terms of standardization.

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Appendix

Bangla TSIQ Questionnaires:

নীচের প্রশ্নগুলি মন দিয়া পড়ুন। প্রতিটি প্রশ্নের সাথে আপনার ক্ষেত্রে সম্ভাব্য উত্তরগুলির সংখ্যাচিহ্নিত করা আছে। যে উত্তরটি আপনার ক্ষেত্রে ঠিক সেটিতে গোলচিহ্নিত করুন।

কখনও না – ১

কখনও কখনও – ২

মাঝে মধ্যে – ৩

প্রায়ই – ৪

সবসময় – ৫

১. আপনার কানের আওয়াজ (Tinnitus) কি আপনাকে বিরক্ত করে ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

২. ক্লান্তি বা মানসিকচাপ অনুভব করেন ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

৩. বিস্রাম নিতে বা ধার কারন হয়ে দারায় ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

৪. কোলাহলহীন বা নিঃস্তব্ধ পরিবেশ থাকতে ও কি অস্বস্তিবোধ করেন ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

৫. মনসংযোগে বাধা ঘটায় ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

৬. অন্যের সাথে সহজ ভাবে কথোপকথনএ বাধা দেয় ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

৭. গুরুত্ব পূর্ন কাজ করতে বাধার সৃষ্টি করে ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

৮. অবসর সময় সামাজিক ও অন্যান্য কাজ করতে বাধা দেয় ?

☐ ☐ ☐ ২☐ ☐ ৪ ৫

৯. আপনার সার্বিক জীবন যাপনের আনন্দ অনুভবেবাধা দান করে ?

☐　　☐　　☐　২☐　　☐　　　৪　　　　৫

৮৫

১০. কানের আওয়াজকে আপনি সাফল্যের সাথে অবহেলা করতে পারেন ?

　　১. সহজেই

　　২. সামান্য চেষ্টায়

　　৩. মোটামুটি চেষ্টায়

　　৪. কখনওই পারেন না

১১. আপনার কি কষ্ট দায় কমনে হয় ?

　　১. দেয়না

　　২. সামান্য

　　৩. মাঝামাঝি

　　৪. খুববেশী

১২. আপনার ঘুম নষ্ট করে ?

　　১. না

　　২. মাঝেমাঝে

　　৩. প্রেয়েই

　　৪. সবসময়

আপনার কানের আওয়াজের প্রাবল্য (Loudness) যে সংখ্যা দ্বারা ব্যক্ত করবেন তা হল –

১　　　　২　　　　৩　　　　৪　　　　৫　　　　৬　　　　৭
৮

সামান্ন　　　　　　　　মাঝামাঝি
খুবতীব্