Arabization and validation of the complete intelligibility spatiality quality questionnaire

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Objectives

To translate complete intelligibility spatiality quality (CISQ) questionnaire into Arabic language. **Background**

CISQ is a new questionnaire used to evaluate hearing aid benefit in patients with hearing loss. **Patients and method**

The original Italian version was converted into English version and then translated to Arabic. The finished translation of the Arabic CISQ process was applied to 170 patients (100 normal not complaining of hearing loss as control and 70 patients with history of hearing loss before using hearing aids and after 2–3 months of using hearing aids). The questionnaire's reliability and validity were assessed. Receiver operating characteristic curve and independent *t* test were also applied.

Results

The Arabic CISQ showed high internal consistency reliability coefficients with Cronbach's alpha. Test–retest correspondence was done following the first visit by 1 week for all items of the questionnaire for study and control groups. The questionnaire repeatability was high for Arabic CISQ using paired *t* test correlation for both groups correspondingly. The use of independent *t* test showed to a significant difference between both groups regarding the mean of each question and the total score of the Arabic CISQ, which was higher in cases with hearing aid than cases without hearing aid (*P* < 0.001).

Conclusion

The Arabic version of the CISQ questionnaire is a dependable convincing tool to estimate the benefit of hearing aid on the quality of life of people with hearing loss in Egyptian and Arab populations.

Keywords:

Arabic, evaluation, hearing aid, questionnaire, reliability, validity

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Introduction

Hearing is fundamental for human communication skills. Patients with hearing loss may bear severe loss in their psychological, social, and occupational lives; experience loneliness and depression; be afraid; and also have family stress because of the lack of care affecting patients with hearing impairment [1]. The prevalence of sensorineural hearing loss affects up to 40% of persons 65 years and older and increases with increase in age and may be as high as up to 85% in elderly homes [2]. The difficulties in understanding words and sentences, sound localization, and hearing speech in noise, which are related directly to auditory disorders, may affect the physical comfort of hearing-impaired individuals [3]. The problem can be reduced by using sound amplification device (e.g. hearing aid) which enable one to understand speech sounds besides environmental sounds to improve the communication skills [4]. Hearing aid verification techniques refer to outcome measures designed to assess efficacy of hearing aids [5]. Many questionnaires are obtainable to verify hearing aids. These include the Communication Profile

of Hearing Impairment [6], Hearing Performance Inventory [7], Hearing Handicap Inventory for the Elderly [8], Abbreviated Profile of Hearing Aid Benefit (APHAB) [9], Glasgow Hearing Aid Benefit Profile [10], Satisfaction with Amplification in Daily Life [11], and Client Oriented Scale of Improvement (COSI) [12,13].

The complete intelligibility spatiality quality (CISQ) questionnaire checks some aspects that are not commonly taken into consideration such as spatiality (localization of sound) and quality of sound. The questionnaire is composed of 30 questions divided in six subscales, five for each subscale. It is presented to the patients before using hearing aid and after 3 months of using it. The answers are demonstrated on a rating scale of 0–10 (0 never and 10 always) [14].

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Arabic language is ranked the fourth or fifth in terms of all spoken languages in the world and is spoken by more than 400 million citizens in the Arab region. It is considered the national language for 22 member states of UNESCO.

The aim of this study was to translate the CISQ into Arabic to find consolidate Arabic version that can be used by physicians in Arabic-speaking countries like Egypt to estimate the benefit of hearing aid on people with hearing loss. Then we determined the Arabic translation validity by trying it on some Egyptian with hearing loss and presenting its reliability thorough statistical analysis.

Patients and methods

Ethical approval for the current study was taken from the ethical committee in Menoufia University (421/4/12/2017) on the December 10, 2017.

Patients in our study were selected from audiology unit, ENT Department, Menoufia University Hospital; all patients were native Arabic speakers. The study was done between December 2017 and July 2018. Age ranged from 18 to 65 years. An approval was attained from all included patients. The final Arabic version of CISQ questionnaire was then administrated to 170 patients.

The subjected Egyptians were divided into two groups: the control group, which consisted of 100 Egyptian (60 male, 40 female) who were not complaining of hearing loss, and the study group, which consisted of 70 Egyptian patients (46 male and 24 female) with history of hearing loss. Egyptian patients were selected according to the inclusion criteria such as patients with hearing loss and no history of wearing hearing aids, and the same patients after using the hearing aids for 2–3 months. Participants should be Egyptians who spoke Arabic language. Meanwhile, patients with neurological, psychological, and behavioral issues were excluded from the present study.

Methods

Progress of the Arabic version of the CISQ: The translation and cross-cultural adaptation of CISQ were performed in six steps based on guidelines published by the American Association of Orthopedic Surgeons outcome committee. Step 1 of translation was done separately by two bilingual native Arabic-speaking individuals, including one physician (audio-vestibular physician), and the other was not. In

step 2, the principal investigator meets the translators to identify any contradiction between the two versions of translations, and then they submit an Arabic version. In step 3, backward translation was performed by two independent bilingual translators who were unfamiliar with the original CISQ. In step 4, all translations were reviewed by a committee of experts who consists of the four translators and the authors of the study. Step 5, the final Arabic CISQ was tested on a group of 10 patients who matched the eligibility criteria in this study, and they did not report any problems in understanding the translated version. In step 6, the proceeding steps were transcript-ed and the interviews of the patients were analyzed to write the final version of CISQ. The final version of CISQ was then applied to 100 normal individual and 70 patients with hearing loss who fulfilled the inclusion criteria after signing a written informed approval to be included in this study. All patients in our study were submitted to full history, general, neurologic, otological, and basic audiological examination using Madsen orbiter 922 pure tone audiometer, interacoustic AT235 tympanometer, and Arabic form of CISQ questionnaire that consists of 30 questions divided in six subscales. The scores were from 0 to 10. All patients were asked to give a score in a single number, where 0 means never and 10 meaning always.

Statistical analysis

Outcomes were obtained, tabularized, and analyzed statistically using an IBM personal computer with SPSS (version 22; SPSS Inc., Chicago, Illinois, USA), in which data were introduced as mean, SD, range, and in the form numbers and percentages. Internal consistency reliability was assessed by measuring Cronbach's alpha, and test-retest reliability were intended for reliability analysis. Paired t test and independent t test correlation coefficient were used for validity. Moreover, receiver operating characteristic curve was plotted. Sensitivity, specificity, positive, and negative predictive values were considered for possible cutoff points.

Power analysis

A statistical power analysis was performed after sample size estimation, based on data from the current study (N = 170), comparing patients (n = 70) with controls (n = 100). The effect size for this study was 0.49, which is considered to be large using Cohen's (1988) criteria, with an alpha = 0.05 and sample size = 170 participants, distributed as 70 patients and 100 controls. A post-hoc power analysis was conducted with this effect size (G Power 3.1)[15], and it is approximately ($1-\beta$) = 0.88. Thus, our power analysis for this sample size is adequate for the objectives of this study.

Results

When we compared the answers of each subscale between cases with hearing aid and those cases without hearing aid using paired t test, the results were statistically significant (P < 0.001) (Table 1).

Moreover, when we compared between cases with hearing aid and control group using independent Student t test, no significant difference was revealed (Table 2).

There is a positive correlation between items of the Arabic CISQ in the first and second visit among cases with hearing aid group using paired t test, indicating good repeatability (P < 0.001) (Table 3).

Cronbach's alpha coefficient was considered for each question and for the CISQ to assess the translated CISQ reliability. All items shared quite enough in the internal consistency of Arabic form of CISQ questionnaire with good reliability translated in Cronbach's alpha, except question 16, which showed the same results of overall Cronbach's alpha of 0.992. So, if an item should be deleted from this module, it would be question 16 (Table 4). CISQ questionnaire has sensitivity of 82% and specificity of 53% in diagnosis patients with hearing loss. The most sensitive cutoff point is 209 (Table 5).

Discussion

CISQ questionnaire is a new questionnaire that was designed specifically to assess the primary effects of hearing loss and effect of hearing aid application on person's life. It focuses on the six subscales.

So CISQ questionnaire in this study was converted into Arabic to improve the effort of hearing loss evaluation in Arabic countries like Egypt.

The mean age of cases was 37.90 ± 10.76 , with age range of 18–65 years, but in the study by Pamela G, the mean age was 69.8 years, and the age range was 25–86 years [14]. On the correlation between the age of patients and the Arabic CISQ scores, no significant statistical correlation was found.

The Arabic CISQ reliability was examined by internal consistency and test-retest reliability. All

Table 1 Comparison between patients bef	ore hearing aid and those	patients after hearing aid
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Variables	Patients (Mean±SD)					
	Patients before hearing aid (n=70)	Patients after hearing aid (n=70)	t test			
Quality	4.65±1.87	8.78±0.83	16.86			
Reverberate	4.43±1.84	8.45±0.79	15.31			
Noise intelligence	4.17±1.86	8.40±0.81	15.08			
Averseness	6.79±1.26	1.65±0.54	-31.34			
Silence	4.76±1.95	8.95±0.85	14.65			
Spatiality	4.31±1.93	8.39±0.86	13.84			

**Highly significant.

Table 2 Comparison between patients with hearing aid and control group

Variables	Mean±SD	Mean±SD					
	Patients with hearing aid (n=70)	Control group (n=100)	t test				
Quality	8.65±0.84	8.71±0.92	-0.42	0.325			
Reverberate	8.50±0.78	8.67±1.09	-0.56	0.315			
Noise intelligence	8.30±1.04	8.59±0.99	-0.09	0.089			
Averseness	1.36±0.63	1.67±0.62	-4.09	<0.001**			
Silence	8.96±0.93	9.10±1.07	-0.81	0.063			
Spatiality	8.24±0.84	8.49±0.93	-0.76	0.071			

**Highly significant.

Table 3 Test-retest reliability and repeatability measures of Arabic version of complete intelligibility spatiality quality questionnaire in the first and second visit among patients with hearing aid group

Variables	Patients with hea	ring aid (Mean±SD)	Paired t test	Р
	First visit	Second visit		
Quality	8.76±0.80	8.68±0.72	0.49	0.4
Reverberate	8.59±0.62	8.51±0.67	0.29	0.349
Noise intelligence	8.45±0.62	8.70±0.69	-0.71	0.107
Averseness	1.56±0.51	1.44±0.52	0.82	0.09
Silence	9.05±0.81	8.86±0.64	0.76	0.081
Spatiality	8.29±1.09	8.41±0.98	-0.67	0.113

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Table 4	Interitem	correlation	and	reliability	testing	for	averseness	questions

Variables		Inte	ritem correlat	ions	Reliability testing		
	q4	q10	q16	q21	q29	Cronbach's alpha	Cronbach's alpha if item deleted
q4	-	0.975	0.957	0.974	0.974		0.989
q10	0.975	-	0.952	0.961	0.972		0.990
q16	0.957	0.952	-	0.942	0.946	0.992	0.992
q21	0.974	0.961	0.942	-	0.971		0.990
q29	0.974	0.972	0.946	0.971	-		0.990

Table 5 Receiver operating characteristic curve for the total score of the questionnaire among cases group between patients before hearing aid and those patients after hearing aid

Area under	Р	Cut of	Sensitivity (%)	Specificity (%)	Asymptotic 95% c	onfidence interval
the curve		level			Lower bound	Upper bound
0.693	<0.001**	209	82	53	0.626	0.760

Area under the curve: the probability that a classifier will rank a randomly chosen positive instance higher than a randomly chosen negative one (assuming 'positive' ranks higher than 'negative'). **Highly significant.

items shared quite enough in the internal consistency of Arabic form of CISQ questionnaire tested by Cronbach's alpha, except q16 (Table 4). The test-retest correlation was applied to 100 control group and 70 study group after 1 week of the first administration and they were requested to answer the questionnaire once more. The questionnaire repeatability was high for each question's scores of Arabic CISQ. So the results indicate that the Arabic CISQ had acceptable stability over time and good reliability (P < 0.001). The validity of Arabic CISQ was examined by content and construct validity. Content validity is the ability of the instrument to covers the range of meanings included within a concept that is being measured. In the Arabic CISQ, it was measured by asking the participants to rate the questionnaire and detect any difficulties in understanding words or items and then to rephrase each item to detect any confusing or misleading words. Construct validity is a measure of how meaningful the questionnaire is when it is in practical use. Construct validity has two components: convergent and discriminant validity. In our study, we measured the discriminant validity. The Arabic CISQ discriminative ability was excellent to discriminate between patients before and after using hearing aids by using the receiver operating characteristic curve.

Conclusion

The results suggest that the Arabic form of the CISQ is a valid reliable tool for evaluating the effect of hearing aid on the quality of life of Arab patients with hearing loss. Future studies are recommended that further studies on using the Arabic version of CISQ regarding different types of hearing loss.

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Conflicts of interest

There are no conflicts of interest.

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