

ESTABLISHING RELIABILITY AND VALIDITY OF THE ARABIC VERSION OF THE HYPERACUSIS QUESTIONNAIRE

Contributions:

A Study design/planning
B Data collection/entry
C Data analysis/statistics
D Data interpretation
E Preparation of manuscript
F Literature analysis/search
G Funds collection

Ana'am Alkharabsheh^{A-F}, Wala Alaqrabawi^{B,E}

Hearing and Speech Sciences, University of Jordan, Jordan

Corresponding author: Ana'am Alkharabsheh; Hearing and Speech Sciences, University of Jordan, Queen Rania St, 11942, Amman, Jordan; email: anaamahm@buffalo.edu; Phone: +962-6-5355000 ext. 23274

Abstract

Background: To evaluate the extent of hyperacusis, different validated questionnaires have been published in English, such as the Hyperacusis Questionnaire (HQ) developed by Khalifa. However, there is currently no reliable and validated Arabic version of the HQ for use in clinical settings. This study aimed to translate the Khalifa modified HQ into Modern Standard Arabic (MSA) and to determine its validity and reliability in assessing the severity of hyperacusis in Arabic-speaking countries.

Material and methods: The original English version of the Khalifa modified HQ was translated into MSA. The translated version was applied to 142 patients who were divided into two groups: subjects aware of their hyperacusis and subjects not aware of their hyperacusis condition. Internal consistency reliability and Pearson correlation coefficient were calculated. Pairwise comparison of the total score and the score for each dimension was performed using unpaired t-tests. Validity assessment, consisting of Construct and Content validity, were also assessed.

Results: Results show high internal consistency and reliability coefficient. Results of correlation analysis suggest an overall strong and significant correlation between the average score of each item and the overall average score of all items in the questionnaire. The mean difference between the group reporting hyperacusis and the group reporting no hyperacusis was not statistically significant. Also, the gender effect was not statistically significant.

Conclusions: The Arabic version of the modified HQ shows high reliability and validity, suggesting it is a useful tool for the assessment of the severity of hyperacusis of Arabic-speaking patients with hyperacusis.

Key words: questionnaire • reliability • translation • Arabic language • hyperacusis • validity

OCENA RZETELNOŚCI I TRAFNOŚCI ARABSKIEJ WERSJI KWESTIONARIUSZA NADWRAŻLIWOŚCI SŁUCHOWEJ

Streszczenie

Wprowadzenie: W języku angielskim są publikowane rozmaite zwalidowane kwestionariusze do oceny stopnia nadwrażliwości słuchowej, jak na przykład Kwestionariusz Nadwrażliwości Słuchowej (HQ - Hyperacusis Questionnaire) opracowany przez Khalifa. Nie ma jednak obecnie żadnej rzetelnej i zwalidowanej arabskiej wersji HQ przeznaczonej do zastosowania w warunkach klinicznych. Niniejsze badanie miało na celu przetłumaczenie zmodyfikowanego kwestionariusza Khalifa na współczesny standardowy arabski (MSA) oraz ocena jego rzetelności i trafności pomiaru stopnia nadwrażliwości słuchowej w krajach arabskojęzycznych.

Materiał i metody: Oryginalna angielska wersja zmodyfikowanego kwestionariusza Khalifa została przetłumaczona na MSA. Przetłumaczoną wersję wypełniło 142 pacjentów podzielonych na dwie grupy: osoby wiedzące, że mają nadwrażliwość słuchową, i osoby nie zdające sobie sprawy, że mają to zaburzenie. Następnie obliczono wewnętrzną spójność testu i współczynnik korelacji Pearsona. Przeprowadzono porównanie parami wyniku całkowitego i wyniku dla każdego z wymiarów z zastosowaniem testu *t*-Studenta dla próbek niezależnych. Wykonano także ocenę trafności kwestionariusza obejmującą trafność teoretyczną i treściową.

Wyniki: Wyniki badania wskazują na wysoką wewnętrzną spójność i rzetelność kwestionariusza. Wyniki analizy korelacji wskazują ogólną silną i istotną korelację pomiędzy średnim wynikiem dla każdego pytania kwestionariusza i średnim ogólnym wynikiem dla wszystkich pytań. Różnica średnich pomiędzy grupą zgłaszającą nadwrażliwość słuchową i grupą nie zgłaszającą nadwrażliwości słuchowej nie była istotna statystycznie. Także efekt płci osób badanych nie był statystycznie istotny.

Wnioski: Arabska wersja zmodyfikowanego HQ odznacza się wysoką rzetelnością i trafnością, co czyni ją użytecznym narzędziem do oceny stopnia nadwrażliwości słuchowej u pacjentów posługujących się językiem arabskim.

Słowa kluczowe: kwestionariusz • rzetelność • tłumaczenie • język arabski • nadwrażliwość słuchowa • trafność

Introduction

Hyperacusis is defined as an increased sensitivity to normal environmental sounds [1–3]. Sounds that may cause discomfort vary in frequencies and intensities, they typically include vacuum cleaners, washing machines, traffic

noises, dog barks, tissues being taken out of a box, and newspaper being folded [4]. Prevalence of hyperacusis in adults is estimated to be 8 to 15% [5,6]. The severity of hyperacusis varies widely, and patients may require sick leave from work [7,8]. Currently there are no objective measurements for hyperacusis. Clinically, questionnaires

and the uncomfortable loudness level (ULL) test are used to evaluate hyperacusis. ULL has been used as an important measurement to quantify hyperacusis [9]. Patients who complain of reduced tolerance to environmental sounds typically showed reduced ULL below 90 dB HL. However, using ULL does not always correlate with the severity of hyperacusis [9]. Questionnaires are also available to evaluate hyperacusis: different validated questionnaires have been published in English, such as the Hyperacusis Questionnaire (HQ) developed by Khalifa [4], the Questionnaire on Hypersensitivity to Sound (GUF) [10], and the Multiple Activity Scale for Hyperacusis (MASH) [11]. Among all these questionnaires, the HQ by Khalifa is the most commonly used questionnaire to evaluate hyperacusis in the literature. It was developed and validated using a general French population who complained of sensitivity to sounds. The original HQ consisted of 14 questions/items divided into three subscales: attentional, social, and emotional. The answer to each question/item was given on a 4-point scale, ranging from “no” (scoring 0 points), “yes, a little” (scoring 1 point), “yes, quite a lot” (scoring 2 points), to “yes, a lot” (scoring 3 points). Recently, the HQ was modified by the original author. The number of questions in the modified version is 20, and the attentional aspect has been replaced with the functional aspect. Also, the scoring scale was reduced from a 4-point scale to a 3-point scale. The answer to each question/item ranges from “no” (scoring 0 points), “sometimes” (scoring 2 points), to “yes” (scoring 5 points).

To date, alternative versions of the HQ, such as in Dutch, Swedish, Turkish, Japanese, and Arabic [12–16] have been derived from the English version. This Arabic version has been translated by Shabana et al., and was then used on a sample of Egyptians with normal hearing complaining of hyperacusis [16]. They compared a group with hyperacusis (with or without tinnitus) with a control group of similar age and gender. They found that the hyperacusis patient's attention, social life, and emotions were affected by their condition. Their scores were higher on the HQ compared to the control group. However, the Arabic version of the HQ was not tested statistically [16].

Arabic is one of the six official languages of the United Nations, and is considered the native language of 22 UNESCO member states, according to a 2012 UNESCO report [17]. Arabic, according to the UNESCO report, is also the mother tongue of more than 422 million people in the Arab world and is used by more than 1.5 billion Muslims [17].

Given this large number of Arabic language speakers, a validated test is needed to assess the severity of hyperacusis in Arabic-speaking countries. In this study, we developed an Arabic version of the Khalifa modified HQ and determined its validity and reliability.

Materials and methods

Development of the Arabic version of the modified HQ

The questionnaire is divided into two parts. The first part includes three binary questions giving general information

on auditory disorders, noise exposure, tinnitus, and hyperacusis. The second part comprises 20 self-rating items that are scored on three dimensions: functional dimension (questions 1–7, total score 0–35), social dimension (questions 8–13, total score 0–30), and emotional dimension (questions 14–20, total score 0–35). The HQ is sensitive enough to identify subjects with hyperacusis in the general population. A mean score greater than 28 is indicative of hyperacusis. After obtaining permission from the author of the original English version of the Khalifa modified HQ (see Appendix), forward translation into Arabic was performed independently by three bilingual native Arabic-speaking individuals. A number of discrepancies were identified between the three translated versions. Therefore, the translators met and agreed on one Arabic version after the identification and modification of inappropriate expressions and questions. Then three independent bilingual native English-speaking individuals who had not previously read the English version of the Khalifa modified HQ back-translated the Arabic version into English. A meeting of all translators with the primary investigator was then held to agree on the final draft of the Arabic version of the modified HQ. Assessment of the clarity and adaptability of the translated version of the questionnaire was conducted by piloting the translated version on 16 subjects. The questionnaire was modified and finalized based on the subjects' feedback.

Patient Recruitment: Patients with complaints of hearing loss, tinnitus, or hyperacusis were approached through the clinic of Hearing and Speech at the Faculty of Rehabilitation Sciences, University of Jordan. Some of the subjects were unaware of their hyperacusis, and they were recruited based on the fact that they were at risk of developing hyperacusis and tinnitus, such as industrial workers in Jordan who are exposed to noise from their work environment. Inclusion criteria were based mainly on the subject's history and chief complaint of reduced tolerance to normal environmental sounds, and being at risk of developing tinnitus and hyperacusis. Subjects were required to be native Arabic speakers, able to read and write in Arabic, and aged 18 years or older. Written consent was obtained from all patients. The patients had the freedom to stop the questionnaire at any time. The study was approved by the University of Jordan Institutional Review Board. The final Arabic version of the HQ (see Appendix) was then administered to 142 subjects in total (102 males and 24 females) who met the eligibility criteria. Subjects were divided into two groups: those who were aware of their hyperacusis ($n = 37$, 26.1%) and those who were not ($n = 97$, 68.3%). Also, the subjects were grouped into subjects aware of their hearing loss ($n = 24$, 16.9%) and subjects not aware of their hearing loss ($n = 115$, 81%).

Statistical Analysis: Data were analyzed using the Statistical Package for Social Sciences (v 22; SPSS Inc, Chicago, IL). Quantitative variables were summarized by calculating means and standard deviations. Internal consistency for the total score and for each dimension was examined by estimating Cronbach's alpha coefficients [18], and by calculating the inter-total correlation to determine whether any item needed to be deleted, followed by Cronbach's alpha coefficient if an item was in fact deleted. Pearson correlation coefficient was calculated for the different subscales.

Table 1. Reliability analysis considering each item as deleted from the Hyperacusis Questionnaire

Item	Scale mean if item deleted	Scale variance if item deleted	Corrected item–total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
1	35.95	108.87	0.60	0.68	0.94
2	35.88	107.43	0.65	0.74	0.94
3	35.38	106.68	0.65	0.62	0.94
4	35.87	108.12	0.70	0.63	0.94
5	35.66	107.86	0.64	0.49	0.94
6	35.95	109.75	0.55	0.50	0.94
7	35.76	111.46	0.39	0.50	0.94
8	35.45	108.09	0.62	0.65	0.94
9	35.49	104.88	0.75	0.68	0.94
10	35.84	107.71	0.63	0.61	0.94
11	35.53	107.20	0.63	0.54	0.94
12	35.80	107.47	0.67	0.63	0.94
13	35.42	106.42	0.67	0.65	0.94
14	36.00	108.22	0.68	0.61	0.94
15	35.96	107.38	0.70	0.62	0.94
16	36.02	107.40	0.68	0.62	0.94
17	35.85	108.49	0.55	0.59	0.94
18	35.84	106.90	0.72	0.65	0.94
19	35.92	107.71	0.70	0.63	0.94
20	35.74	105.50	0.73	0.74	0.94

The correlation between the total hyperacusis score and different subscales was calculated. The correlation between hyperacusis score and having a hearing loss was calculated. Also, the correlation between reporting hyperacusis and reporting hearing loss was calculated.

Pairwise comparison of the total score and the score for each dimension was performed using an unpaired *t*-test. Also, pairwise comparison of the total score of the group who was aware they had hyperacusis and the total score for the group who was not aware of their hyperacusis was performed using unpaired *t*-tests. Gender effect on the total hyperacusis score was tested. All significance tests were 2-tailed and conducted at the 0.01 significance level.

Validity assessment consisted of Construct validity, which is “the extent to which a measure adequately assesses the construct it purports to assess” [19]. This was assessed through conducting a pilot study, pretesting 16 patients (college students and industrial workers) complaining of hyperacusis. Based on Khalfa (2002) [4], a score of ≥ 28 was used as the cutoff point to diagnose hyperacusis. A match between patients complaining of reduced tolerance to environmental sounds and a total score of ≥ 28 on the HQ was used as evidence that the translated version of HQ was a valid measure of hyperacusis. Content validity was also assessed, which refers to “the extent to which the measure adequately samples the content of the domain that constitutes the construct (e.g., different behavioral expressions of rumination that should

be included in a measure of rumination as a personality trait)” [19], by asking different audiologists to assess the questions under each subscale of the translated Arabic version of the HQ. Two professional translators were recruited as well to evaluate the translation process, in order to ensure that cultural adaptation was taken into consideration.

Results

Mean total score of all items in the Arabic version of the HQ (20 items) was 37.65 (SD, 10.91) out of a maximum score of 100. For the functional subscale, the mean hyperacusis score (7 items) was 13.13 (SD, 3.91) out of a maximum score of 35; for the social subscale (6 items), 12.43 (SD, 3.88) out of a maximum score of 30; and for the emotional subscale (7 items), 12.24 (SD, 4.18) out of a maximum score of 35.

Cronbach's alpha coefficient was calculated for the total items in the Arabic version of the HQ, and for the items in each of the 3 subscales. Cronbach's alpha coefficients for the total items of the Arabic version of the HQ and for the items in each of the functional, social, and emotional subscales were found to be 0.94, 0.84, 0.88, and 0.88, respectively.

Cronbach's alpha coefficient was calculated for the deleted items (Table 1). Cronbach's alpha remained the same for the total HQ and for the functional, social, and emotional subscales, while none of them was greater than the total scale alpha.

Table 2. Pearson correlation between the hyperacusis total score and each scale item

Item	Total score	
	<i>w</i>	<i>p</i>
1	0.62	<0.0005**
2	0.69	<0.0005**
3	0.69	<0.0005**
4	0.71	<0.0005**
5	0.67	<0.0005**
6	0.58	<0.0005**
7	0.44	<0.0005**
8	0.67	<0.0005**
9	0.80	<0.0005**
10	0.69	<0.0005**
11	0.68	<0.0005**
12	0.72	<0.0005**
13	0.71	<0.0005**
14	0.72	<0.0005**
15	0.72	<0.0005**
16	0.70	<0.0005**
17	0.60	<0.0005**
18	0.72	<0.0005**
19	0.71	<0.0005**
20	0.76	<0.0005**

***p*<0.01)**Table 3.** Paired samples *t*-tests between the hyperacusis total score and each dimension score

	Paired differences		<i>t</i>	df	Sig. (2-tailed)
	Mean	Std. deviation			
Hyperacusis total score and functional dimension score	38.65	30.92	14.57	135	0.005**
Hyperacusis total score and social dimension score	40.15	30.63	15.28	135	0.005**
Hyperacusis total score and emotional dimension score	39.99	31.41	14.85	135	0.005**

(***p*<0.01)

Results of correlation analysis suggest an overall strong and significant correlation between the average score of each item in the questionnaire and the overall average score of all items in the questionnaire (Pearson's correlation coefficient ranged from 0.44 to 0.76, *p*<0.01). Pearson's correlation coefficients between the items are presented in Table 2. The correlations between the total hyperacusis score and each subscale were significantly strong (0.88, 0.91, 0.92, *p*<0.01), for the functional, social, and emotional subscales, respectively.

Looking at the correlation of hearing loss and hyperacusis, out of 139 subjects who answered the question "Do you having hearing loss?", only 24 subjects (16.9%) answered "Yes" they had hearing loss, and 115 subjects (81%) answered "No". While for hyperacusis, out of 134 subjects 37 (26.1%) answered "Yes" they had hyperacusis, and 97 subjects (68.3%) answered "No". Out of 142 participants there were only 14 subjects who reported having hearing loss along with hyperacusis. Thus, we found that the correlation between the report of having hearing loss and the report of having hyperacusis was not statistically significant. However, the correlation between reporting hearing loss and the overall hyperacusis score was statistically significant (Pearson's correlation 0.3, *p*<0.01).

Pairwise comparison of the total score and the scores for each dimension showed that mean differences between total hyperacusis score and the functional, social, and emotional dimensions were 38.65 (SD, 30.90) (*t* = 14.57, *p*<0.01); 40.15 (SD, 30.63) (*t* = 15.28, *p*<0.01); and 39.99 (SD, 31.41) (*t* = 14.85, *p*<0.01), respectively (Table 3).

The results also showed that 97 (68%) of the subjects answered "no" to the binary question "Do you have hyperacusis?" in the first part of the questionnaire and 37 (26%) answered "yes" to the same question. Interestingly, out of the 97 subjects who said they did not have hyperacusis, 69 had a hyperacusis total score of ≥ 28 . On the other hand, 30 out of 37 subjects who reported experiencing hyperacusis had a hyperacusis score of ≥ 28 . The average hyperacusis score of the group that reported having hyperacusis was 58.61 (SD, 23.23), and of the group that reported having no hyperacusis was 50.07 (SD, 28.61). Using a *t*-test, the mean difference between the two groups was not statistically significant.

As for a gender effect, in our search for people at risk of developing hyperacusis, more male than female subjects were recruited. Overall, 102 males and 24 females participated in this study. The total hyperacusis score was 53.74 (SD, 29.04) for males and 49.75 (SD, 4.28) for females. Using a *t*-test, the mean difference between the male and female total hyperacusis scores was not statistically significant.

For validity analysis, the results of the pilot preliminary data collection study were collected from students at the Department of Hearing and Speech Sciences, University of Jordan, and industrial workers. These preliminary data, and reviews from other audiologists, suggested that the translated Arabic version of the modified HQ could be used as a valid tool to assess the effect of hyperacusis on patients whose native language is Arabic.

Discussion

In our study, we translated the modified HQ into Arabic according to the published guidelines [20], and we validated it to make it available for audiology clinical settings in Arabic-speaking countries.

Our results showed that the mean hyperacusis score was 37.65 (SD, 10.91) out of a maximum score of 100. This was an important outcome, since the criteria used to define hyperacusis, such as that of Khalifa (2002) [4] indicated that a score of 28 could be used as a cutoff point for the diagnosis of hyperacusis, while other studies [8,14,15] have suggested the use of a score of 16 as the cutoff point [15]. In our study, we used the cutoff score proposed by the original developer of the HQ. Thus, this variation in the score for diagnosing hyperacusis could vary based on the selected sample and the severity of the condition. In addition, our study is based on using the modified, rather than the original, version of the HQ. Therefore, the cutoff score for hyperacusis was different compared to other translated versions of the HQ.

Our results also showed that the Arabic version of the HQ had a high internal consistency, which is statistically acceptable [21]. Each subscale of the questionnaire had a Cronbach's alpha coefficient that was considered statistically acceptable. Based on the results of the correlation between the hyperacusis score of the group that reported having hyperacusis and the total hyperacusis score, the results indicate that if a person's total hyperacusis score is less than the cutoff point, such people might be diagnosed as having hyperacusis as they suffer from the effect of the problem on their life. Further, results of the correlation between hearing loss and total hyperacusis score, and, on the other hand, the correlation between reporting both hearing loss and hyperacusis, indicate that people who reported hyperacusis were aware of their hearing loss. However, those whose hyperacusis result was above the threshold and were unaware they had hyperacusis were also unaware of their hearing loss. The ambiguity inherent in hyperacusis makes it less recognizable by most people in Jordan. This could be due to the lack of knowledge about hyperacusis and the unavailability of a diagnostic tool to evaluate it. Industrial workers were recruited as well. Industry was targeted as it is established in the literature that noise exposure of workers in the industrial and ship-building sectors is considered a major risk factor for the development of tinnitus and hyperacusis [22]. Most industrial workers were neither aware of their hyperacusis nor their hearing loss. They reported experiencing some level of discomfort, but they were unable to say what it was. This again reflects the lack of knowledge and unavailability of diagnostic tools for tinnitus and hyperacusis in Arabic-speaking countries.

With respect to the effect of gender on the total HQ score, our data were different from the original report and of a Japanese study [8]. This difference in gender effect could be because sample selection may change the effect of gender on the total hyperacusis score. Our sample mostly included people who are at risk of developing hyperacusis, such as industrial workers, and most of them were males. Females were recruited from patients who presented to the Hearing and Speech Clinic at the University of Jordan and from

college students. Therefore, a future study using a more representative population is needed to understand the clinical characteristics of patients with hyperacusis in Jordan.

Until now, no other studies have examined the validity and reliability of the modified HQ. Thus, our study is the first to examine the validity and reliability of the Arabic version of the modified HQ. Our translated version of the Arabic HQ is consistent with the Arabic version of the Khalifa HQ translated by Shabana et al. (2011) [16], except that we evaluated reliability and validity statistically and we translated the modified version of the Khalifa HQ. Shabana et al. (2011) translated the Khalifa HQ into Arabic without evaluating its reliability and validity [16]. The Shabana study used the translated Arabic version of the HQ on a sample of Egyptians with normal hearing complaining of hyperacusis [15]. Their aim was to compare the audiological criteria of a group having hyperacusis (with or without tinnitus) against a control group of similar age and gender. However, that Arabic version was never validated [16]. Developing a reliable and valid Arabic version of the modified HQ is important to the audiologist in clinical settings to: 1) evaluate patients showing symptoms of hyperacusis, even those unaware of it; 2) address the emotional, social, functional, and psychological effects of hyperacusis on the patient's quality of life; 3) help the clinician to raise people's awareness about hyperacusis; 4) provide proper counselling and management for patients; and 5) monitor patient progress and evaluate the efficacy of management throughout therapy sessions.

There are several limitations of this study, including the complexity of translating between English and Arabic. In Arabic there are some words which have multiple English equivalents, and in future studies this ambiguity might require clarification by interviewing respondents instead of letting them fill out the questionnaire by themselves, ensuring that the responses were as accurate as possible. All previous studies have examined the reliability and validity of the translated versions of the original HQ, but our study is the first to examine the reliability and validity of the modified version of the Khalifa HQ. Thus, factor analysis is recommended to ensure that the additional questions in the modified version of HQ belong to the designed aspects. Also, future studies on the correlation between the type and the severity of hearing loss and hyperacusis are suggested.

Conclusion

Our Arabic version of the HQ is put forward as a valid, reliable, simple, easy to use, and inexpensive tool for the assessment of hyperacusis severity in Arabic-speaking patients who complain primarily of hypersensitivity to normal environmental sounds. Using HQ in clinical settings with patients showing symptoms of hyperacusis, even if they are not aware of it, can help the clinician raise people's awareness of hyperacusis, and help patients suffering from this unidentified problem.

Acknowledgements

We thank Dr Seigel, Research Associate Professor, State University of New York at Buffalo, and Dr Alhanbali, Assistant Professor, University of Jordan, for reviewing and proof-reading the article.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References

- Vernon JA. Pathophysiology of tinnitus: a special case – hyperacusis and a proposed treatment. *Am J Otol*, 1987; 8(3): 201–2.
- Katzenell U, Segal S. Hyperacusis: review and clinical guidelines. *Otol Neurotol*, 2001; 22(3): 321–7.
- Fackrell K, Fearnley C, Hoare DJ, Sereda M. Hyperacusis questionnaire as a tool for measuring hypersensitivity to sound in a tinnitus research population. *Biomed Res Int*, 2015; 2015: 290425.
- Khalifa S, Dubal S, Veillet E, Perez-Diaz F, Jouvent R, Collet L. Psychometric normalization of a hyperacusis questionnaire. *ORL*, 2002; 64(6): 436–42.
- Fabijanska A, Rogowski M, Bartnik G, Skarzynski H, editors. Epidemiology of tinnitus and hyperacusis in Poland. Proceedings of the Sixth International Tinnitus Seminar; 1999: Citeseer.
- Andersson G, Lindvall N, Hursti T, Carlbring P. Hypersensitivity to sound (hyperacusis): a prevalence study conducted via the internet and post. *Int J Audiol*, 2002; 41(8): 545–54.
- Juris L, Andersson G, Larsen HC, Ekselius L. Cognitive behaviour therapy for hyperacusis: a randomized controlled trial. *Behav Res Ther*, 2014; 54: 30–7.
- Oishi N, Yamada H, Kanzaki S, Kurita A, Takiguchi Y, Yuge I, et al. Assessment of hyperacusis with a newly produced Japanese version of the Khalifa hyperacusis questionnaire. *Acta Otolaryngol*, 2017; 137(9): 957–61.
- Anari M, Axelsson A, Eliasson A, Magnusson L. Hypersensitivity to sound: questionnaire data, audiometry and classification. *Scand Audiol*, 1999; 28(4): 219–30.
- Bläsing L, Goebel G, Flötzing U, Berthold A, Kröner-Herwig B. Hypersensitivity to sound in tinnitus patients: an analysis of a construct based on questionnaire and audiological data. *Int J Audiol*, 2010; 49(7): 518–26.
- Dauman R, Bouscau-Faure F. Assessment and amelioration of hyperacusis in tinnitus patients. *Acta Otolaryngol*, 2005; 125(5): 503–9.
- Blomberg S, Rosander M, Andersson G. Fears, hyperacusis and musicality in Williams syndrome. *Research in Developmental Disabilities*, 2006; 27(6): 668–80.

Funding

Deanship of Scientific Research, University of Jordan.

- Meeus OM, Spaepen M, Ridder DD, Heyning PH. Correlation between hyperacusis measurements in daily ENT practice. *Int J Audiol*, 2010; 49(1): 7–13.
- Fioretti A, Tortorella F, Masedu F, Valenti M, Fusetti M, Pavaci S. Validity of the Italian version of Khalifa's Questionnaire on hyperacusis. *Acta Otorhinolaryngologica Italica*, 2015; 35(2): 110.
- Yilmaz S, Taş M, Erdoğan Bulut EN. Assessment of reduced tolerance to sound (hyperacusis) in university students. *Noise Health*, 2017; 19(87): 73.
- Shabana MI, Selim MH, El Refaie A, El Dessouky TM, Soliman RY. Assessment of hyperacusis in Egyptian patients: evaluation of the Arabic version of the Khalifa questionnaire. *Audiological Medicine*, 2011; 9(4): 127–34.
- Message from Irina Bokova, Director-General of UNESCO, on the occasion of the first World Arabic Language Day 18 December 2012. UNESCO Digital library 2012 [4 Dec 2019]. Available from: <https://unesdoc.unesco.org>.
- Preves D, Sammeth C, Cutting M, Woodruff B. Experimental hearing device for hyperacusis. *Hearing Instruments*, 1995; 1: 37–40.
- Westen D, Rosenthal R. Quantifying construct validity: two simple measures. *Journal of Personality and Social Psychology*, 2003; 84(3): 608.
- Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *Journal of Clinical Epidemiology*, 1993; 46(12): 1417–32.
- Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrika*, 1951; 16(3): 297–334.
- Axelsson A, Anari M. Hyperacusis. Contributions to psychological acoustics. Results of the sixth Oldenburg symposium on psychological acoustics. Bibliotheks- und Informations system der Carl von Ossietzky University Oldenburg. 1993: 51–8.

Appendix

Arabic Hyperacusis Questionnaire

استبانة حول مشكلة الحساسية المفرطة للأصوات

استبانة رقم التاريخ

التأثير على الجانب الوظيفي			
كلا <input type="checkbox"/>	أحياناً <input type="checkbox"/>	نعم <input type="checkbox"/>	1. هل لديك مشكلة بالتركيز عند وجودك في بيئة صاخبة أو مزعجة؟
كلا <input type="checkbox"/>	أحياناً <input type="checkbox"/>	نعم <input type="checkbox"/>	2. هل لديك مشكلة بالقراءة عند وجودك في بيئة صاخبة أو مزعجة؟

3.	هل سبق لك استخدام سدادات الأذن أو أغطية الأذنين لتقليل إحساسك بالضجيج (لا تضع في الحسبان استخدام واقيات حماية الأذن المستخدمة بصورة عادية عند التعرض للمواقف ذات الصوت المرتفع)؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
4.	هل تجد صعوبة في تجاهل الأصوات المحيطة بك في مواقف الحياة اليومية؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
5.	هل تجد صعوبة في تحمل الاستماع للإعلانات (من خلال مكبرات الصوت) في المطارات، أو محطات القطارات، أو أثناء الطيران مثلاً؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
6.	هل يزعجك الضجيج في الشارع بشكل مبالغ فيه؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
7.	هل تقوم بتغطية أذنيك فور سماع الأصوات العالية؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
التأثير على الجانب الاجتماعي				
8.	حينما يقترح عليك شخص ما نشاطاً معيناً مثل الذهاب إلى السينما أو حضور حفل موسيقي، هل تقلق بشأن تعرضك للضجيج أثناء ذلك؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
9.	هل سبق أن رفضت دعوة أو رفضت الخروج فقط بسبب الضجيج الذي قد تتعرض له؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
01.	هل يزعجك الضجيج المرتبط ببعض المواقف (مثل الحفلات الموسيقية، أو حفلات الأعراس أو عروض الألعاب النارية، أو المهرجانات والاحتفالات العامة)؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
11.	هل لفت نظرك أحد معارفك إلى أنك لا تستطيع احتمال درجات معينة من الضجيج؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
21.	هل تزعجك بعض الأصوات التي لا تزعج غيرك في العادة؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
31.	هل تخيفك بعض الأصوات التي لا تخيف غيرك في العادة؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
التأثير على الجانب النفسي				
41.	هل يسبب لك الضجيج وبعض الأصوات التوتر أو الضيق والانعاج؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
51.	هل تقل قدرتك على التركيز مع وجود ضجيج في نهاية اليوم؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
61.	هل يؤثر الإجهاد والتعب في قدرتك على التركيز مع وجود ضجيج؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
71.	هل تجد أن أصواتاً معينة تضايقك أنت بالتحديد ولا تضايق غيرك؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
81.	هل يستنزف الاستماع اليومي إلى الكثير من الأصوات المزجة طاقتك؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
91.	هل تؤثر الأصوات اليومية على مزاجك العام؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا
02.	هل تضايقك أصوات لا تضايق الآخرين؟	<input type="checkbox"/> نعم	<input type="checkbox"/> أحياناً	<input type="checkbox"/> كلا

يمكن الهدف من هذه الاستبانة في تحديد المشاكل التي تنتسبب بها مشكلة الحساسية المفرطة للأصوات لديك (الأصوات قد يكون مصدرها العمل أو أي أصوات في البيت أو خارجه). اختر «نعم» أو «أحياناً» أو «كلا» لكل سؤال عبر وضع علامة × في المكان المناسب. نرجو منك ألا تتخطى أي سؤال.



Modified Khalfa Hyperacusis Questionnaire (Khalifa et al., 2002)

[Original English version of the modified HQ. Reproduced with permission of Karger Publishers]

Patient Name _____ Date _____

- | | | | |
|---|-----|-----------|----|
| 1. Do you have trouble concentrating in a noisy or loud environment? | Yes | Sometimes | No |
| 2. Do you have trouble reading in a noisy or loud environment? | Yes | Sometimes | No |
| 3. Do you ever use earplugs or earmuffs to reduce your noise perception?
(Do not consider the use of hearing protection during abnormally high exposure situations.) | Yes | Sometimes | No |
| 4. Do you find it harder to ignore sounds around you in everyday situations? | Yes | Sometimes | No |
| 5. Do you find it difficult to listen to speaker announcements (such as airport, airplanes, trains, etc.)? | Yes | Sometimes | No |
| 6. Are you particularly sensitive to or bothered by street noise? | Yes | Sometimes | No |
| 7. Do you “automatically” cover your ears in the presence of somewhat louder sounds? | Yes | Sometimes | No |

F Subscale Total _____

- | | | | |
|---|-----|-----------|----|
| 8. When someone suggests doing something (going out, to the cinema, to a concert, etc.), do you immediately think about the noise you are going to have to put up with? | Yes | Sometimes | No |
| 9. Do you ever turn down an invitation or not go out because of the noise you would have to face? | Yes | Sometimes | No |
| 10. Do you find the noise unpleasant in certain social situations (e.g., nightclubs, pubs or bars, concerts, firework displays, cocktail receptions)? | Yes | Sometimes | No |
| 11. Has anyone you know ever told you that you tolerate noise or certain kinds of sounds badly? | Yes | Sometimes | No |
| 12. Are you particularly bothered by sounds others are not? | Yes | Sometimes | No |
| 13. Are you afraid of sounds that others are not? | Yes | Sometimes | No |

S Subscale Total _____

- | | | | |
|--|-----|-----------|----|
| 14. Do noise and certain sounds cause you stress and irritation? | Yes | Sometimes | No |
| 15. Are you less able to concentrate in noise toward the end of the day? | Yes | Sometimes | No |
| 16. Do stress and tiredness reduce your ability to concentrate in noise? | Yes | Sometimes | No |
| 17. Do you find sounds annoy you and not others? | Yes | Sometimes | No |
| 18. Are you emotionally drained by having to put up with all daily sounds? | Yes | Sometimes | No |
| 19. Do you find daily sounds having an emotional impact on you? | Yes | Sometimes | No |
| 20. Are you irritated by sounds others are not? | Yes | Sometimes | No |

E Subscale Total _____

Subscale Total _____