

Adaptation of the dizziness handicap inventory for use in the Arab population

Abdulrahman A. Alsanosi, MBBS, AB.

ABSTRACT

الأهداف: إنشاء النسخة العربية من مقياس إعاقة الدوخة، وتقييم مدى أمان وموثوقية هذه النسخة من خلال تطبيقها على مجموعة واسعة من المرضى المصابين بالدوخة والاضطرابات الدهليزية والمرضى السليمين من أصول عربية.

الطريقة: أُجريت هذه الدراسة الاستفتائية في عيادة الأذن والأعصاب، مستشفى جامعة الملك عبدالعزيز، الرياض، المملكة العربية السعودية وذلك خلال الفترة من يناير 2009م إلى يناير 2011م. لقد تم تطوير النسخة العربية من مقياس إعاقة الدوخة باستخدام بروتوكول موحد لاختبار الترجمة، وعلى هذا تم اختبار النسخة المترجمة. شملت الدراسة 50 مريض مصاب بالاضطرابات الدهليزية، و50 من المشاركين الأصحاء الذين شملتهم مجموعة الشاهد. وتم تحليل الاستجابات إحصائياً لكل المشاركين في مجموعة الدراسة والشاهد وذلك اعتماداً على الاتساق الداخلي.

النتائج: أظهرت النسخة العربية ارتفاع كبير في الاتساق الداخلي وكذلك ارتفاع كبير في مدى أمان وموثوقية هذه النسخة. ولقد كانت نتائج معامل كرونباخ ألفا الفنية 0.87 (0.81-0.92)، والبدنية 0.81 (0.72-0.88)، والعاطفية 0.79 (0.69-0.87)، وكانت الدرجة الشاملة بين المرضى 0.92 (0.89-0.95). وقد تم العثور على اختلاف كبير في درجات المجال لمقياس الإعاقة بين مجموعة الدراسة ومجموعة الشاهد ($p=0.00$).

خاتمة: أظهرت نتائج هذه الدراسة تناسق داخلي قوي أثناء تطبيق مقياس النسخة العربية من مقياس إعاقة الدوخة، وبالتالي تعد النسخة العربية من هذا المقياس آمنة وموثوق بها للتقييم الذاتي لشدة الاضطرابات الدهليزية.

Objectives: To generate an Arabic version of the Dizziness Handicap Inventory (DHI), and to assess its reliability by applying it to a group of patients with vestibular disorders and control healthy subjects of Arabic origin.

Methods: The Arabic version of the DHI was developed using the standard protocol for test translation. This pilot study was carried out between January 2009 and January 2011 at the Otolaryngology/Neurotology Clinic at King Abdulaziz University Hospital, Riyadh, Kingdom of Saudi Arabia. The translated version was then tested using 50 patients with vestibular disorders, and 50 control subjects. Participants' responses were statistically analyzed for internal consistency within and between the patient and control groups.

Results: An Arabic DHI showed a significantly high internal consistency and reliability. Cronbach's alpha coefficient with 95% confidence interval for functional score among patients was 0.87 (0.81-0.92), 0.81 (0.72-0.88) for physical score, 0.79 (0.69-0.87) for emotional score, and 0.92 (0.89-0.95) for the overall DHI score. A significant difference was found in domain scores and total DHI score between the dizzy and control groups ($p=0.00$).

Conclusion: The Arabic version of the DHI is a valid and reliable self-assessment tool for the severity of vestibular disorders.

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From the Department of Otolaryngology & Head and Neck Surgery, King Saud University, Riyadh, Kingdom of Saudi Arabia.

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Address correspondence and reprint request to: Dr. Abdulrahman A. Alsanosi, Associate Professor, Department of Otolaryngology & Head and Neck Surgery, King Saud University, PO Box 245, Riyadh 11411, Kingdom of Saudi Arabia. Tel. +966 (1) 4786100. Fax. +966 (1) 4775748. E-mail: sanosi@hotmail.com

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Dizziness is a common health problem among adults, especially the elderly. Disorders of the vestibular system, besides generating physical and emotional problems, may worsen quality of life.¹ This condition creates a public health care problem as 80% of affected individuals require medical help, and there is an interruption of their work or daily activities as a result of the symptoms.² Clinical examination of a dizzy patient is not a suitable procedure to assess the psychological impact of dizziness, and this has prompted many investigators to develop questionnaires to evaluate the quality of life of a dizzy patient. In 1990, Jacobson and Newman³ designed and validated a specific questionnaire for dizziness, the Dizziness Handicap Inventory (DHI) aiming at evaluating the self-perception of the incapacitating effects provoked by dizziness. The original American version has been translated into several languages and cultures, such as Chinese, French, Brazilian, and Norwegian.⁴⁻⁷ On literature review, there is no questionnaire in the Arabic language to evaluate the self-perceived effects of dizziness. Therefore, the purpose of this study is to translate, validate, and culturally adapt the DHI for application in the Arabic-speaking population, and to describe the results of its application in patients with vestibular disorders.

Methods. Patient recruitment. Patients were recruited between January 2009 and January 2011 from the Otolaryngology/Neurotology Clinic at King Abdulaziz University Hospital, Riyadh, Kingdom of Saudi Arabia, a tertiary care hospital. Participants with dizziness due to vestibular disorders for more than 2 months, who were also native Arabic speakers, being able to speak and understand the common Arabic language, were included in this study. Patients with handicaps due to other causes were excluded from this study. All patients visiting our clinic complaining of dizziness were requested to participate in the study if they fulfilled the inclusion criteria. Healthy family members accompanying the patient were also requested to participate in the study as control subjects. In total, 50 patients with vestibular disorders, and 50 healthy subjects were enrolled in the study.

Ethical considerations. The study was approved by the Ethical Committee, College of Medicine, King Saud University, and was carried out according to the principles of the Helsinki declaration. Furthermore, written informed consent was obtained from all the participants of this study.

Development of the Arabic version of the Dizziness Handicap Inventory. The DHI consists of 25 items designed to assess the self-perceived level of handicap

due to dizziness. The items are grouped into emotional (9 items), functional (9 items), and physical (7 items) domains. Each item has 3 response options (yes, sometimes, and no), which were scored as 4, 2, and zero points.

The Arabic version of the DHI was developed as follows: 1. Permission to translate the English version of DHI into Arabic along with cross-cultural adaptation of the original DHI was obtained from the main authors of English version. 2. The English version (Appendix 1) was translated by 2 bilingual otolaryngologists into the common Arabic language. 3. The translated Arabic version was re-translated into an English version by 2 independent bilingual individuals who were unaware of the original version of the DHI. 4. All translations were reviewed by the committee of the 4 translators, and the pre-final Arabic version of dizziness handicap inventory (ADHI) was drafted. 5. The clarity and comprehensibility of each item in the ADHI were evaluated by patients who rated each item into one of the following 3 subcategories: very clear, clear to some extent, and not clear. 6. To assess the completeness of items, the final ADHI (Appendix 2) was tested on a separate group of 25 patients who fulfilled the eligibility criteria and represented a group of people with self-perceived dizziness handicap. 7. After reviewing the feedback of the tested group, we found that some items required amending because of cultural differences, for example, in item 6, cinema was replaced with wedding auditorium because of the absence of cinemas in Saudi Arabia. Next, item 15 was modified because alcohol is forbidden in Saudi Arabia, and so, the sentence was modified to a more culturally acceptable one, while retaining the same meaning as that of the original version. 8. The translated and culturally modified ADHI was finalized (Appendix 2) and administered to the group of patients with vestibular disorders and control subjects.

Statistical analysis. Using the Statistical Package for Social Sciences version 18 (SPSS Inc., Chicago, IL, USA), quantitative variables were presented as mean, standard deviation, median, Q1, Q3, minimum, maximum, and 95% confidence intervals (CI) for the mean. Kolmogorov test was used to test normality. Non-parametric variables were compared between the 2 groups using Mann-Whitney test. Correlation between non-parametric variables was carried out using the Spearman rank correlation coefficient. Cronbach's alpha was used to test reliability. A value greater than 0.8 was considered 'good', greater than 0.9 was considered 'excellent', and a value greater than 0.7 was considered 'satisfactory.'

Results. The participants of this study comprised 50 patients with dizziness (28 men and 22 women; mean age, 45 years) and 50 control subjects (26 men and 24 women; mean age, 35 years). The mean total ADHI score for the patients with vestibular disorders was 50.2 (SD = 23.9), ranging between 10 and 100 out of a maximum total score of 100. The mean scores for the 3 domains were functional 17.4, physical 11.5, and emotional 21.3. The score was higher for the emotional domain than for the physical and functional domains. The reliability of the ADHI was tested using Cronbach's alpha coefficient for each of the 3 separate domains and for the overall ADHI score among patients. It was found that all the domains and total ADHI scores were very reliable, and that the functional domain was the most reliable (Table 1). There was a positive correlation between the total ADHI score and each domain as well as between the domains (Table 2). Each domain and its individual items were found to be significant (Table 3). The individual domain scores, and the total ADHI score were found to be significantly higher in the patients group than in the control group ($p=0.000$; Table 4).

Discussion. We developed an Arabic language version of the DHI by translation from English and modification to meet cultural acceptability. The ADHI

Table 1 - Cronbach's alpha coefficient for each of the 3 separate domains, and for the overall Arabic dizziness handicap inventory (ADHI) score among patients.

Domain	Number of items	Cronbach's alpha coefficient for patients (n=50)	95% CI
Functional	9	0.87	0.81-0.92
Physical	7	0.81	0.72-0.88
Emotional	9	0.79	0.69-0.87
ADHI overall	25	0.92	0.89-0.95

Values more than 0.7 are considered reliable, CI - confidence interval

Table 2 - Spearman rank correlation coefficient between the score of each domain and total Arabic dizziness handicap inventory (ADHI) score.

Domain	Total	Functional	Physical
Total ADHI	—	—	—
Functional	0.930* $p=0.000$	—	—
Physical	0.857* $p=0.000$	0.788* $p=0.000$	—
Emotional	0.845* $p=0.000$	0.712* $p=0.000$	0.526* $p=0.000$

*Correlation is significant at the <0.0001 level (2-tailed)

Table 3 - Spearman rank correlation coefficient between the score of each domain and its individual items.

Functional items	r	Physical items	r	Emotional items	r
F1	0.634* $p=0.000$	P1	0.818* $p=0.000$	E1	0.426 $p=0.002$
F2	0.627* $p=0.000$	P2	0.756* $p=0.000$	E2	0.717* $p=0.000$
F3	0.756* $p=0.000$	P3	0.730* $p=0.000$	E3	0.608* $p=0.000$
F4	0.875* $p=0.000$	P4	0.500* $p=0.000$	E4	0.641* $p=0.000$
F5	0.671* $p=0.000$	P5	0.683* $p=0.000$	E5	0.584* $p=0.000$
F6	0.698* $p=0.000$	P6	0.659* $p=0.000$	E6	0.530* $p=0.000$
F7	0.693* $p=0.000$	P7	0.587* $p=0.000$	E7	0.681* $p=0.000$
F8	0.627* $p=0.000$			E8	0.586* $p=0.000$
F9	0.648* $p=0.000$			E9	0.689* $p=0.000$

*Correlation is significant at the <0.0001 level (2-tailed)

Table 4 - Comparison between patients and controls regarding domain scores and total ADHI score.

Domain	Group	No.	Mean	S.D.	P-value
Functional	Patients	50	17.40	10.61	0.000
	Controls	50	3.04	4.22	
Physical	Patients	50	11.52	7.37	0.000
	Controls	50	1.68	2.50	
Emotional	Patients	50	21.28	8.87	0.000
	Controls	50	1.92	3.02	
TOTAL DHI	Patients	50	50.20	23.91	0.000
	Controls	50	6.64	8.26	

The data is non-parametric. *Significant difference

All differences are significant at <0.0001

Monte Carlo sig. 2-tailed 95% confidence interval 0-0.03

was tested in patients with vestibular disorders and in healthy control subjects. The results of the present study indicate that the ADHI had strong reliability in the patients group.

Our findings are similar to those of the original study by Jacobson and Newman,³ and to those of the more recent studies of the Hebrew,⁸ and the Italian versions⁹ of the DHI. The Cronbach's alpha values obtained for the Hebrew and Italian versions of the DHI are similar to those obtained in this study. Possible explanations for this similarity are that the questions asked in the DHI lend themselves well to translation and cross-cultural adaptation; this was exemplified by a study that investigated the internal consistency of such a translated version using comparable study populations.¹⁰ The

advantages of the DHI are its simplicity and the relevance of the items to individuals with dizziness, and the fact that the questionnaire accounts for all health components as described by the WHO's International Classification of Functioning, Disability, and Health.¹¹

The DHI was first developed for use in the United States of America where the culture, environment, and social norms are quite different from those in the Arab world in general, and in particular, Saudi Arabia. The Arabic version of the DHI was developed to accommodate these cultural differences while maintaining the reliability and clinical utility of the original DHI. The study was performed in a group of patients where the majority were Saudi. We would suggest further testing in different parts of Arab world, where there are culture differences.

In conclusion, the study suggests that the Arabic DHI can be reliably applied to the Arabic-speaking population to estimate the degree of disability experienced by patients with dizziness. The Arabic version of the DHI appears to be a valid and reliable tool for assessment of patients' self-perception of the handicap and its effect on their quality of life. It might also prove to be helpful in assessing the response of Arabic-speaking patients to various methods of dizziness treatment, and to be useful tool in future related research.

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Appendix 1 - Dizziness Handicap Inventory from Jacobson and Newman (1990).³

Items	Yes	Sometimes	No
1. Does looking up increase your problem?			
2. Because of your problem, do you feel frustrated?			
3. Because of your problem, do you restrict your travel for business or recreation?			
4. Does walking down the aisle of a supermarket increase your problem?			
5. Because of your problem, do you have difficulty getting into or out of bed?			
6. Does your problem significantly restrict your participation in social activities such as going out to dinner, going to movies, dancing, or to parties?			
7. Because of your problem, do you have difficulty reading?			
8. Does performing more ambitious activities like sports, dancing, household chores such as sweeping or putting dishes away increase your problem?			
9. Because of your problem, are you afraid to leave your home without having someone accompany you?			
10. Because of your problem, have you been embarrassed in front of others?			
11. Do quick movements of your head increase your problem?			
12. Because of your problem, do you avoid heights?			
13. Does turning over in bed increase your problem?			
14. Because of your problem, is it difficult for you to do strenuous housework or yardwork?			
15. Because of your problem, are you afraid people may think you are intoxicated?			
16. Because of your problem, is it difficult for you to walk by yourself?			
17. Does walking down a sidewalk increase your problem?			
18. Because of your problem, is it difficult for you to concentrate?			
19. Because of your problem, is it difficult for you to walk around your house in the dark?			
20. Because of your problem, are you afraid to stay home alone?			
21. Because of your problem, do you feel handicapped?			
22. Has your problem placed stress on your relationships with members of your family or friends?			
23. Because of your problem, are you depressed?			
24. Does your problem interfere with your job or household responsibilities?			
25. Does bending over increase your problem?			

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مؤشر الإعاقة من الدوران - Appendix 2

لا	نعم بعض الاحيان	الاستفسارات
		١. هل النظر إلى أعلى يزيد من مشكلتك؟
		٢. هل تشعر بالاحباط بسبب مشكلتك؟
		٣. هل تحمّن سفرك للعمل والترفيه بسبب هذه المشكلة؟
		٤. هل المشي في ممرات الأسواق يزيد من مشكلتك؟
		٥. هل لديك صعوبة في الاستلقاء أو الاستيقاظ من على السرير بسبب مشكلتك؟
		٦. هل تحد هذه المشكلة من مشاركتك بشكل كبير في الأنشطة الاجتماعية مثل: الخروج لتناول العشاء، والذهاب إلى قصور الافراح أو إلى الحفلات؟
		٧. هل لديك صعوبة في القراءة بسبب هذه المشكلة؟
		٨. هل القيام بالأنشطة العضلية مثل الرياضة وأداء الأعمال المنزلية مثل الكنس وجلي الصحون يزيد من مشكلتك؟
		٩. هل تخاف من مغادرة المنزل دون وجود أحد يرافقك بسبب مشكلتك؟
		١٠. هل سبق أن أخرجت أمام الآخرين بسبب مشكلتك؟
		١١. هل تحريك رأسك بسرعة يزيد من مشكلتك؟
		١٢. هل تتجنب المرتفعات بسبب مشكلتك؟
		١٣. هل التقلب على السرير يزيد مشكلتك؟
		١٤. هل تواجه صعوبة في القيام بالأعمال الشاقة في المنزل أو الحديقة بسبب مشكلتك؟
		١٥. هل تخشى بسبب مشكلتك أن يظن الناس بأنك تبهو مثل السكران؟
		١٦. هل من الصعب المشي بمفردك بسبب مشكلتك؟
		١٧. هل السير على الرصيف يزيد مشكلتك؟
		١٨. هل من الصعب عليك أن تركز بسبب مشكلتك؟
		١٩. هل من الصعب عليك المشي حول المنزل في الظلام بسبب مشكلتك؟
		٢٠. هل تشعر بالخوف من البقاء في البيت وحيداً بسبب مشكلتك؟
		٢١. هل تشعر بأن مشكلتك تسبب لك نوع من الإعاقة؟
		٢٢. هل تسببت مشكلتك في توتر علاقاتك مع بقية أفراد عائلتك وأصدقائك؟
		٢٣. هل أنت مكتئب بسبب مشكلتك؟
		٢٤. هل تعارض مشكلتك مع عملك أو مسؤولياتك المنزلية؟
		٢٥. هل الركوع يزيد من مشكلتك؟