Research Article

Psychometric Properties of the Persian Version of the Dizziness Handicap Inventory for Patient Caregivers in Children

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Highlights

● The Persian version of the Vanderbilt pediatric DHI-PC is culturally adapted

● The DHI-PC-P is a valid and reliable tool to measure dizziness outcomes in pediatric

● The DHI-PC-P can be used clinically for vertigo evaluation at 5 to 12 years old

A B S T R A C T

Background and Aim: Questionnaires are useful tools for clinicians. This study aimed to translate the Dizziness Handicap Inventory for Patient Caregivers (DHI-PC) into Persian (DHI-PC-P) and assess its psychometric properties for children aged 5–12 years.

Methods: This is a descriptive-analytical psychometrics study. After obtaining permission from the developers of the DHI-PC, translation into Persian and cross-cultural adaptation were done according to the international guidelines for self-assessment tools recommended by the American Association of Orthopedic Surgeons. Participants were 21 parents (mean age: 38.05 years, SD=6.1 years, 18 female) and their children with dizziness (mean age 8.69 years, SD=2.41 years, 9 female) between the ages of 5–12 years old. Face validity, content validity, and test-retest reliability at an interval of 14–21 days were evaluated for the DHI-PC-P.

Results: The face validity was confirmed qualitatively by the experts' opinions and quantitatively by calculating the item impact score. Content validity was confirmed by calculating the content validity index and the content validity ratio (0.97 and 0.86, respectively). The internal consistency was good (Cronbach's alpha=0.90). For the test-retest reliability, the intraclass correlation coefficient was obtained 0.94, indicating an excellent reliability.

Conclusion: The DHI-PC-P can be used clinically as a valid and reliable tool for children with dizziness aged 5–12 years.

Keywords: Questionnaire; dizziness handicap inventory; validity; reliability; vertigo; children

Introduction

Dizziness is one of the most common complaints of people referred to neurology and otolaryngology departments [1]. The term dizziness refers to feelings off imbalance, spatial disorientation, or false sense of motion. Patients may describe symptoms with terms such as disequilibrium, sense of spinning, sense of floating, lightheadedness (presyncope), and even vertigo [2]. Balance disorders are more common in adults, but are not rare in childhood. According to the literature, the prevalence of dizziness among children ranges from 0.45% to 5.3%, and it is relatively more common in girls than in boys [3, 4]. Children diagnosed with balance disorders usually do not express the main complaint related to balance [5]. Migraine Vertigo (MV), Benign Paroxysmal Vertigo of Childhood (BPVC), otitis media, viral infection, and head trauma are the five main causes of dizziness in children, accounting for 70% of cases [6]. The most common cause of dizziness in the age group of 0–6 years is BPVC, while MV is more common in children aged 7–12 years [7]. Children may not be able to express their symptoms verbally to understand the effect of dizziness in their daily activities. In addition, children are often unaware of their dizziness or balance disorders. When the patient is a child, it is difficult to elicit symptoms from the patient; therefore, it is essential for clinicians to obtain information from the parents and caregivers. Parents who spend more time with their children are excellent sources of information for understanding their children's problems [8, 9].

Currently, there are few tools to assess dizziness in children, some of which are the Dizziness Handicap Inventory for Patient Caregivers (DHI-PC) which evaluates dizziness-related handicap in children [10], the Dizziness Handicap Inventory-Child/Adolescent (DHI-CA) which evaluates the impact of dizziness on the quality of life of children and adolescents [11], the Pediatric Vestibular Symptom Questionnaire (PVSQ) which evaluates the presence and severity of subjective vestibular symptoms in children with vestibular disorders [12] and the Pediatric Visually Induced Dizziness (PVID) questionnaire which evaluates the presence and severity of visually induced dizziness in children [13]. In 2015, McCaslin et al. [10] used the dizziness handicap inventory for adults and developed the DHI-PC to quantify the psychosocial impact of dizziness in children aged 5–12 years. This questionnaire has 21 multiple-choice questions without subscales that can be answered in a short time by the child's caregivers. So far, it has been translated into Japanese, Korean, French, and Portuguese languages [9, 14-16], but there is still no Persian version of this questionnaire; therefore, this study aimed to translate and assess the psychometric properties of the Persian version of the DHI-PC (DHI-PC-P).

Methods

Questionnaire

The DHI-PC is a tool with 21 questions that is completed by caregivers of children aged 5–12 years with dizziness. In this questionnaire, instead of the words "dizziness", "vertigo" and "unsteadiness", the term "problem" is used, which makes it possible to examine a wide range of dizziness disorders. The questions are answered by "Yes" (4 points), "Sometimes" (2 points), and "No" (0 points). The total score ranges from 0 to 84, where a higher score indicates greater disability. This questionnaire does not have subscales.

Translation

After obtaining consent from the developers of the original version of the DHI-PC via e-mail, it was translated to Persian according to the international guidelines for self- assessment tools recommended by the American Association of Orthopedic Surgeons (AAOS). The translation and cross-cultural adaptation were carried out in the following steps: Translation to Persian, comparison of the translations, back translation to English, review by a panel of experts, test of the initial draft and its submission to the developers of the original version for final approval [17].

Participants

The study population consists of the parents of children with dizziness referred to the neurology clinic of Mofid Children's Hospital affiliated to Shahid Beheshti University of Medical Sciences, Tehran, Iran, from August 2022 to March 2023. The age range

Table 1. Demographic characteristics of the participants

		Frequency	Percent
Gender of children	**Male**	12	57.14
	Female	9	42.86
Gender of caregivers	**Male**	3	14.29
	Female	18	85.71
Causes of dizziness in children	**Migraine vestibular**	18	85.7
	Otitis media	1	4.8
	Head trauma	2	9.5

of children was 5–12 years. The participants were 21 parents (mean age: 38.05±6.1 years, 18 female) of children with dizziness (mean age: 8.69±2.41 years, 9 females). An informed consent was obtained from the participants. MV was the most common cause of dizziness and vertigo in pediatric patients in the current study (Table 1).

Evaluation of psychometric properties

Validity

Quantitative and qualitative methods were used to evaluate the face validity of the DHI-PC-P. For the qualitative analysis of face validity, a panel of 9 experts in the field of balance and children were asked to give their opinion about the understandability of each item. The quantitative analysis of face validity was done by measuring the impact score of items. Five caregivers rated the importance of each item based on a five-point Likert scale from 1 (not important) to 5 (highly important). The impact score for each item was calculated using the formula, "item impact score=frequency(%)×importance". The frequency in the formula is the number of people who rated the item 4 or 5, while the importance is the mean item score. An impact score more than 1.5 indicates that the item is acceptable [18].

Evaluation of content validity was also performed by two qualitative and quantitative methods. In the qualitative method, a panel of experts in the field of balance and children were asked to provide their corrective opinions on the grammar, appropriateness of the words, the importance of items, and the proper place of items.

In quantitative method, the content validity was checked by using the Lawshe method, a panel of 9 experts evaluated the necessity of items based on a three-point Likert scale, "essential", "useful, but not essential" and "not necessary". Then, Content Validity Ratio (CVR) was calculated using the formula, "CVR=(Ne–(N/2))/(N/2)", where N is the total number of experts and Ne is the number of experts who chose the "essential" option. CVR≥0.78 indicates that the presence of the item is acceptable and is necessary [19]. For calculating the Content Validity Index (CVI), three criteria of simplicity, relevance, and clarity of each item were first evaluated separately using a four-point Likert scale by the same panel of experts. Then, the number of experts who rated 3 to 4 was divided by the total number of experts. According to this index, the items with CVI>0.79 are retained, while the items with a CVI of 0.7–0.79 are revised, and the items with a CVI<0.7 are discarded [20, 21].

Reliability

Cronbach's alpha was used to determine the internal consistency of the questionnaire, and the reliability was evaluated with the test-retest method [22, 23]. In the test-retest method, the total scores of 10 children from the two tests were evaluated at an interval of 14–21 days and the Intraclass Correlation Coefficient (ICC) was calculated.

Data analysis

The data were analyzed in SPSS v.17 (IBM SPSS, Chicago, IL). Shapiro-Wilk test was used to verify the normality of data distribution. The significant level was set at 0.05

Table 2. Statistical performance per question for the Persian version of dizziness handicap inventory for patient caregivers

Question	Mean	SD	CVI	CVR	Corrected item-total correlation	Cronbach's Alpha if item deleted
Q1	2.29	1.71	1.00	1.00	0.444	0.904
Q2	2.76	1.34	0.89	0.78	0.647	0.900
Q3	2.48	1.54	1.00	0.78	0.489	0.903
Q4	1.90	1.95	0.89	0.78	0.545	0.902
Q5	1.90	1.61	1.00	0.78	0.652	0.899
Q6	2.48	1.25	1.00	1.00	0.462	0.904
Q7	2.95	1.50	0.89	0.78	0.428	0.904
Q8	3.43	1.29	0.81	0.78	0.458	0.904
Q9	3.05	1.36	1.00	0.78	0.447	0.904
Q10	2.10	1.84	1.00	0.78	0.429	0.905
Q11	2.19	1.66	1.00	1.00	0.442	0.904
Q12	2.57	1.57	0.89	0.78	0.746	0.897
Q13	2.00	1.90	1.00	0.78	0.481	0.904
Q14	2.76	1.61	1.00	1.00	0.741	0.897
Q15	1.52	1.54	1.00	1.00	0.549	0.902
Q16	1.62	1.50	1.00	1.00	0.428	0.904
Q17	1.52	1.66	1.00	0.78	0.508	0.903
Q18	2.00	1.67	1.00	1.00	0.440	0.904
Q19	1.71	1.93	1.00	0.78	0.514	0.903
Q20	2.29	1.59	1.00	1.00	0.724	0.897
Q21	2.77	1.34	1.00	1.00	0.780	0.897
Total	48.29	19.81	-	-	-	-

CVI; content validity index, CVR; content validity ratio

Results

Translation

There was no serious problem in the translation stage. The items 2, 4, 7, 8, 11 and 17 were difficult for translation which were discussed by the panel of experts. The translation of the words "frustrated", "tense" and "down" in items 4, 7 and 11, respectively was discussed and finally the best words in Persian were used. In items 2 and 8, translation was performed according to the opinion of experts using the words close to the meaning of the original item. In items 17, the word "alleys" (*kucheha* in Persian) was used instead of the word "blocks", which has a clearer meaning for Persian-

speakers from a cultural point of view. The final format of the DHI-PC-P is presented in Appendix A.

Evaluation of psychometric properties

Validity

Mean scores of the DHP-PC-P was in the range of 8-76 (Mean=48.29±19.81). The highest score was for the item 8 and the lowest score was for the items 15 and 17 (Table 2).

The clarity and understandability of the items of the DHI-PC-P were confirmed by the experts. All items had an impact score more than 1.5, indicating the good face

validity. All items had CVR and CVI more than 0.78 and 0.79, respectively. The CVR and CVI of the whole scale were 0.86 and 0.97, respectively. The content validity of the DHI-PC-P was excellent.

Reliability

Cronbach's alpha was 0.90 with an item-total correlation of 0.44–0.78, indicating that the good internal consistency of the tool (Table 2). In assessing test-retest reliability, the ICC was obtained 0.94, indicating an excellent reliability. Paired t-test did not indicate any significant difference between the test and retest scores (p=0.8).

Discussion

The risk of dizziness or vertigo problems in children can be increased by factors such as MV, BPVC, infections, and trauma [6]. Also, currently, children are not routinely screened for vestibular or balance disorders in world. There is a higher incidence of vestibular disorders in children with hearing loss, including sensorineural hearing loss [24]. Children with dizziness may not be able to express their symptoms, which may delay the intervention for them. The use of questionnaires is very useful in adults with dizziness, because they can report their problems in detail; however, it is difficult for the clinician to determine the origin and severity of dizziness or vertigo in children. In this regard, the caregivers or parents of children can be useful sources for appropriate screening of these children. In this study, the DHI-PC was thus selected from among the limited questionnaires available in the field of dizziness assessment in children which can be completed in a short period of time. It is similar to the DHI that was developed in 1990 by Jacobson and Newman [25], which can quantify the psychosocial effects of dizziness in children.

In this study, the translation of the DHI-PC from English to Persian was performed and its validity and reliability were assessed. The items were semantically close to the items of the original version. The understandability of the DHI-PC-P was confirmed by experts and the participants. The mean total score of participants was 48.29±19.81 and the items 2, 7, 8, 9, 12, 14, and 21 had the highest scores (>2.5). For the French version of the DHI-PC [14], the mean total score was reported 41.6±19.3 points and the items 1, 3, 6 and 21 had the highest scores (>2.5), which shows that only the item 21 (related to difficulty concentrating at school) had a high score in both Persian and French versions. In accordance with the original version of the DHI-PC with a total score of 0–84, a score of 0–16 indicates no handicap or restriction in activity; a score of 16–26 indicates mild handicap or restriction; a score of 26–43 indicates as moderate handicap, and a score>43 indicates severe handicap or restriction in activity [10]. Based on this categorization, the mean total score of children in our study indicate a severe handicap.

For the DHI-PC-P, the Cronbach's alpha was 0.90, while for the original version, it was 0.93 [10]; for the Japanese version, 0.91 [9]; for the Korean version, 0.94 [16] and for the French version, >0.9 (on all items) [14]. Cronbach's alpha showed that the DHI-PC-P has high internal consistency, similar to the original and other mentioned versions. The ICC was 0.94 in our study, while it was 0.98 for the original version [10]. Therefore, the test-retest reliability of the DHI-PC-P is excellent, similar to the original version, indicating that this tool is reliable for the clinical use.

Since the prevalence of dizziness in children is lower than in adults, it is recommended to investigate the DHI-PC-P in a wider age range using a larger sample size of children in other studies.

Conclusion

The DHI-PC-P is a valid and reliable tool and can be used clinically for Persian-speaking children with dizziness aged 5–12 years.

Ethical Considerations

Compliance with ethical guidelines

This is a descriptive-analytical psychometrics study that was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences (Code: IR.SBMU.RETECH.REC.1401.151).

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Authors' contributions

Conflict of interest

The authors declared no conflict of interest.

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