RESEARCH ARTICLE

Validity and reliability of the Persian version of the vestibular disorders activities of daily living scale

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Abstract

Background and Aim: The vestibular impairment causes a reduction in daily life functions. Since it is difficult to detect the inter relationship between impairment of vestibular system and its effect on the personal activities, an assessment tool is required to evaluate the effect of the vestibular impairment on the daily living tasks. Thus the aim of this study was to survey the validity and reliability of the Persian version of the vestibular disorders activities of daily living (VDAL) inventory and preliminary results of the pre and post treatment of patients with vestibulopathy.

Methods: The validity and reliability of Persian version of vestibular impairment questionnaire were assessed. The questionnaire was given to 34 patients with vestibular impairment aged between 40-70 years. The participants were in the two groups, rehabilitation and control groups. The rehabilitation group received appropriate programs but the control group did not receive any treatments. Data were collected again after 4-6 weeks. The results of two the groups were compared.

Results: The content validity index was calculated for the tools to 1. The internal consistency was excellent for total score (α=0.95). Test-retest reliability showed good results for global score (ICC=0.95). The results of the study showed that vestibular rehabilitation could improve the score of the Persian version of VADL questionnaire.

Conclusions: The results demonstrated that the Persian version of this questionnaire is a reliable and valid tool for assessing the patients with vestibular impairment and can be applied for the follow-up of the rehabilitation programs.

Keywords: Vertigo; balance questionnaire; rehabilitation; validity and reliability

Introduction

Vestibular disorders are usually associated with symptoms such as dizziness, vertigo and disequilibrium. The occurrence of these symptoms increases with age, which in turn reduces the ability of a person to function in daily life [1].

Today, the assessment of patients with vestibular disorders exceeds the measure of impairment (the results of balance tests) and includes the study of the impact of the impairments on psychosocial functions through the implementation of related questionnaires [2]. Since the diagnosis of the relation between the disorders to the vestibular system and its effects on the

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individual's life is complex and difficult [3], quantitative and qualitative studies are required to assess patients with vestibular disorders and consider the obtained results in planning rehabilitation procedure for each individual [2].

The most popular and commonly used questionnaires in this regard are the activities-specific balance confidence (ABC) scale, dizziness handicap inventory (DHI), and vestibular disorders activities of daily living (VADL) scale [1]. The VADL assesses the negative impact of vestibular disorders on individual's daily activities, which is advantageous over other tools [1]. Before developing the VADL, there were only two questionnaires; i.e. The University of California Los Angeles Dizziness Questionnaire (VCLA-DQ) and DHI for assessing the quality of life of people with vestibular disorders. The Persian version of the DHI has been prepared by Jafarzadeh et al. [4] and the Persian version of the ABC scale questionnaire has been prepared by Hassan et al. [5]. The VADL was first implemented by Cohen in 1992 to investigate the effects of vestibular rehabilitation techniques; however, according to the participants' points of view, it did not describe the details of their problems. Therefore, Cohen prepared the extended version of this scale in 2000 for patients that vestibular disorder eliminates some of their important daily activities [6].

Regarding the lack of tools in the Persian language to assess the effect of vestibular disorders on daily functions, the aim of this study was to prepare the Persian version of the VADL.

Methods

The present study had two parts; 1) translation and adaptation of the VADL and 2) administration of the Persian VADL to 34 patients with vestibular disorders. Vestibular rehabilitation was performed in 17 cases and it was not done on the other 17 cases.

Translation and adaptation

After acquiring permission from Helen Cohen, the original English author, the VADL was translated independently from English into Persian by two translators in accordance with the International Quality of Life Association (IQOLA) [7]. One of the translators was an audiologist and the other was a non-specialist translator in this field. The two translation was merged. In the next step, two independent translators who mastered both Persian and English languages were asked to translate the Persian version back to English. Again, the two back-translations were merged to produce pre-final version of the VADL. The pre-final version was submitted to the original author for content adaptation, and her confirmation was obtained. To evaluate the content validity, the Persian version was presented to six audiologists to express their views on the intelligibility and clarity of questions and the final Persian version of VADL (VADL-P) was produced.

Administration of VADL-P to patients with vestibular disorder

After applying the corrections to the VADL-P and obtaining written consent from the patients, the VADL-P was presented in the interview form. Participants of this study were selected among patients referring to the hearing and balance section of Amir Alam Hospital and Asma Rehabilitation Center. The participants were 34 patients (27 females and 7 males) with an age of 40-70 years, with an average age of 53.7 years. Inclusion criteria of the study included clinical diagnosis of balance disorder with vestibular origin according to the results of videonystagmography and electrocochleography tests, lack of non-vestibular balance disorder and motion, and skeletal and muscular disorders. The scale was performed as soon as the disorder was diagnosed before any rehabilitation. If individuals were reluctant to cooperate, they were excluded from the study. Of these patients, 20 had benign paroxysmal positional vertigo (BPPV), 13 unilateral vestibular disorder, and 1 had bilateral vestibular disorder. After completing the VADL-P in the first stage, patients were randomly divided into two groups of 17 people. Rehabilitation was performed in the first (rehabilitation) group. For patients with BPPV, Epley maneuver was performed at Amir Alam Hospital or Asma Rehabilitation Center,

and patients with unilateral and bilateral vestibular disorder were treated by Cooksey and Cawthorne rehabilitation program [8]. The latter patients were asked to practice three times a day, each session lasting 20 minutes for four weeks at home. The control group, on the other hand, did not receive any rehabilitation during this period, and rehabilitation was postponed to after the study. After 4-6 weeks, the VADL-P was completed again by patients in both groups, and the score of the two groups was compared. In order to score the scale, there are 10-point continuum for the degree of independent performance and 1 "unrelated" item (when one does not perform the activity or prefers not to answer) for each item. Then, the scale was repeated again in a two weeks interval on 16 people of the same individuals randomly.

The present intervention study was approved by the University of Social Welfare and Rehabilitation Sciences.

Statistical analysis was performed using SPSS 22.0. 1) Content validity ratio (CVR) index was used to evaluate the content validity using Lawshe method. 2) The intraclass correlation coefficient (ICC) index was used to investigate the test-retest reliability. 3) Cronbach's alpha was used to check internal consistency. 4) The Shapiro-Wilk statistic was used to test the normality of the distribution of all variables. 5) Paired t-test was used to compare the results before and after treatment in the rehabilitation group.

Results

Translation and content validity
In preparing VADL-P, the description of the scoring scale based on independent performance was transferred to the beginning of the scale according to the specialists' point of view. Since the term "internal ear problems" was not understood by some patients, it was replaced in the scale with balance and vertigo problems. There was the same problem for functional activity number 1 (sitting from the sleep state), which changed to the phrase "sitting down after sleep" (transferring from sleep state to sitting)

and was clear for all patients. In the Brazilian version, functional activity 13 (walking on a smooth surface) and beneficial activity 14 (walking on a rugged surface) were not intelligible to the patients and thus were replaced with phrases "walking on flat ground" and "walking on rough ground".

The CVR index obtained by referring to the Lawshe table was equal to 1, which was higher than the determined value (0.99) due to the number of specialists (6 persons), suggesting that all items had appropriate content validity. The test-retest reliability showed good results for global score. ICC value was 95% (p<0.001). The highest correlation coefficient was equal to 1 in beneficial activity number 27 (job activities such as occupation, childcare, building, students) and the lowest value of correlation coefficient was 0.42 in functional activity number 10 (reaching low places such as land or low shelf). According to the results, Cronbach's alpha coefficient was 95% for total score, implying that the VADL-P has a good internal consistency.

Administration VADL-P
The mean and standard deviation of scale items are presented separately in Table 1. Mean and standard deviation in the rehabilitation and control groups, before and after vestibular rehabilitation, are presented separately in Table 2. According to the obtained results, group (rehabilitation and control) interacts with pre-rehabilitation scores, (p<0.001). There was a significant difference between the scores before and after rehabilitation in the case group (p<0.001). However, in the control group, which did not receive any rehabilitation, there was no significant difference between the scores (p>0.05).

Discussion

Translation, validity, and reliability of the VADL-P
In this research, the translation and adaptation of the VADL-P were carried out in accordance with the principles, and the VADL-P was prepared by retaining the content. Different

Table 1. Statistical indices of the vestibular disorders activities of daily living questionnaire for each item in 34 patients with vestibular disorders

Item	Mean (SD)
F-1 Sitting up from lying down	3.82 (2.38)
F-2 Standing up from sitting on the bed or chair	3.91 (2.41)
F-3 Dressing the upper body (e.g. shirt, brassiere, undershirt)	2.70 (2.08)
F-4 Dressing the lower body (e.g. pants, skirt, underpants)	2.76 (2.01)
F-5 Putting on socks/stockings	2.91 (1.81)
F-6 Putting on shoes	3.32 (2.49)
F-7 Moving in/out of the bathtub or shower	3.61 (2.75)
F-8 Bathing yourself in the bathtub or shower	3.55 (2.86)
F-9 Reaching overhead (e.g. to a cupboard or shelf)	4.73 (3.35)
F-10 Reaching down (e.g. to the floor or a shelf)	4.14 (3.08)
F-11 Meal preparation	3.28 (2.90)
F-12 Intimate activity (e.g. foreplay, sexual activity)	3.08 (3.22)
A-13 Walking on level surfaces	2.76 (2.40)
A-14 Walking on uneven surfaces	3.90 (2.99)
A-15 Going up steps	4.08 (2.76)
A-16 Going down steps	4.26 (2.74)
A-17 Walking in narrow spaces (e.g. corridor, grocery store aisle)	3.46 (2.94)
A-18 Walking in open spaces	2.76 (2.38)
A-19 Walking in crowds	3.58 (3.11)
A-20 Using an elevator	3.58 (2.88)
A-21 Using an escalator	3.90 (2.70)
I-22 Driving a car	5 (4.26)
I-23 Carrying things while walking (e.g. package, garbage bag)	2.96 (3.15)
I-24 Light household chores (e.g. dusting, putting items away	3.87 (3.30)
I-25 Heavy household chores (e.g. vacuuming, moving furniture)	4.38 (3.54)
I-26 Active recreation (e.g. sports, gardening)	4.73 (3.74)
I-27 Occupational role (e.g. job, child care, homemaking, student)	3 (3.03)
I-28 Traveling around the community (e.g. car, bus)	3.15 (3.30)

studies have used various methods to translate and localize the questionnaire. In this study, like the Brazilian version (Portuguese), the translation was carried out according to IQOLA. In the VADL-P, the viewpoints of six specialists in the field of vestibular and balance assessments were taken into consideration, and finally, an acceptable and fluent translation was obtained.

The results showed that activity number 22 (driving) was not performed by 23 out of 34 participants in the study. This could be due to the higher number of middle-aged women participants in this study. However, because driving is a common and important activity among young women and men, it was kept in the Persian version of the questionnaire. The same problem was observed in the Brazilian version. Furthermore, most patients have selected the "unrelated" option for profitable activity number 28 (traveling throughout the community) in the original version by Cohen and Kimball [6], because the public transportation system has not been much used in that region. One good feature of the VADL-P is that patients can choose the "unrelated" option for an activity they never do, which has no effect on the total score.

The validity and reliability of VADL-P in patients with the peripheral vestibular disorder were investigated and confirmed. In this study, the scale was completed again by 16 participants after two weeks in order to verify the test-retest reliability. The ICC index for VADL-P was 0.95. In the present research, the obtained Cronbach's alpha coefficient to assess the internal reliability of the total score was 0.94, which is the upper limit. In the original version, Cohen and Kimball showed an internal correlation between the total score (α=0.97) while the Brazilian version showed a Cronbach's alpha coefficient of 0.92 for the total score.

The compatibility correlation coefficient (CCC) was used in the Brazilian version to investigate the test-retest capability. The questionnaire was completed by 40 patients within the one-week interval. The minimum CCC (0.75) was related to the functional subset while the maximum CCC (0.83) was related to the mobility subset. The VADL contemplates 28 activities divided

Table 2. Mean (standard deviation) scores of subscales of the Persian version of the vestibular disorders activities of daily living in both rehabilitation and control groups before and after intervention.

	Mean (SD) score before vestibular rehabilitation		Mean (SD) score after vestibular rehabilitation	
Subscales	Rehabilitation group	Control group	Rehabilitation group	Control group
Functional	3.97 (0.64)	2.98 (0.92)	1.33 (0.18)	3.01 (0.87)
Ambulation	4.20 (0.85)	2.97 (0.63)	1.68 (0.19)	3.64 (0.62)
Instrumental	4.81 (1.17)	2.91 (0.76)	1.59 (0.58)	4.20 (0.73)
Total score	4.26 (0.89)	2.96 (0.77)	1.51 (0.35)	3.51 (0.88)

into three sub-scales: functional, ambulation and instrumental. Each activity is assessed using a qualitative scale (0-10 points) based on the patients' self-perceived level of performance and independence while performing the activities today versus when they were free from vestibular disease the higher score in each subscale indicate higher level of dependence and disability.

The effect of rehabilitation in scores of patients with vestibular disorder on the VADL-P scores
The intervention affected the VADL score, meaning that vestibular rehabilitation had reduced the VADL-P score in the rehabilitation group. The mean total score of the VADL-P in the prerehabilitation stage was 4.24 in the rehabilitation group and 2.96 in the control group. After intervention, the total score in the rehabilitation group decreased to 1.51, but the total score increased in the control group to 3.51.

Conclusion
The Persian version of vestibular disorders daily activities questionnaire was prepared in accordance with IQOLA. Its validity and reliability were investigated and found that VADL-P is a reliable and valid tool for assessing patients with the peripheral vestibular disorder. The VADL-P psychometric properties are consistent with those of the original version. Furthermore, the comparison of the score of the two groups of rehabilitation and control showed that VADL-P

could be helpful in tracking the rehabilitation program.

Conflict of interest
The authors declare that they have no conflict of interest.

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