RESEARCH ARTICLE

Development and assessment of validity and reliability of the Persian version of vestibular rehabilitation benefit questionnaire

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Abstract

Background and Aim: Assessment of vestibular rehabilitation outcomes is a necessary step in this process. Assessment by clinical devices can reveal and measure some aspects of intervention but cannot show its effects on the patient quality of life. Vestibular rehabilitation benefit questionnaire is a scale for evaluating the effects of vestibular deficits on the quality of life and psychological aspects more efficiently than similar questionnaires. This research studied preparation and assessment of validity and reliability of Persian version of this questionnaire.

Methods: The translation process was based on International Quality Of Life Assessment protocol with considering cultural adaptation. Face validity and content validity, including content validity ratio and content validity index (CVI) were evaluated and test-retest reliability and Cronbach alpha was measured for reliability assessment of 108 vestibular deficit patients who received vestibular rehabilitation interventions. Furthermore, dizziness handicap inventory was used to evaluate correlation between vestibular rehabilitation benefit questionnaire and dizziness handicap inventory results.

Results: Questions with imperfections were modified. CVI in Lawshe method was equal to 1 indicating the necessity of inserting some questions in the questionnaire. Intraclass correlation was 0.94 for the test-retest reliability and the Cronbach alpha was 0.68, i.e. Persian vestibular rehabilitation benefit questionnaire has good reliability. In addition, the Spearman correlation coefficient was 0.74, indicating a good correlation between two questionnaire scores.

Conclusion: Persian version of vestibular rehabilitation benefit questionnaire is as reliable and valid as its original version and can be used for patients with vestibular deficits under vestibular rehabilitation treatment.

Keywords: Vestibular rehabilitation; validity; reliability; vertigo; dizziness

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Introduction

Today with health perception enhancement, increased lifespan, and interest in active living, a higher prevalence of vestibular disorders is reported. One extensive epidemiologic study in the USA showed that 35% of above 40 years old Americans (about 69 million people) experience some kind of vestibular disorder [1]. To

overcome functional disabilities secondary to vestibular disorders, several treatments based on individual characteristics and needs are practiced. One of the most important treatments is vestibular rehabilitation. Vestibular rehabilitation consists of movements and exercises aiming for reducing vestibular symptoms and their consequences on patient's quality of life [2,3]. Vestibular rehabilitation is a set of exercises including adaptation, substitution, and habituation. Because of the high prevalence of vestibular disorders and dizziness and their adverse effects on the quality of life, the effects of rehabilitation and treatment options should be thoroughly determined [2]. To show the efficacy of rehabilitation, both objective and subjective tools might be used. For objective evaluations, functional assessments such as posturography, rotational chair, videonystagmography (VNG) and video head impulse (vHIT) test are useful. As health-related quality of life questionnaires can only assess general wellbeing [3,4], more specific questionnaires with more accurate scales have been developed to evaluate imbalance and its improvements after therapy [2].

For evaluating vestibular rehabilitation benefits, functional evaluations are not sufficient as they partially reflect rehabilitation effects and it seems that self-reported tools are more valuable for determining the effects of dizziness on personal life and rehabilitation-induced changes [4,5]. Questionnaires are simple, suitable and available tools that can be found easily by a simple search on the net. However, they must be valid and reliable. In other words, they must have content validity and can be used for monitoring rehabilitation outcomes [6]. Previous studies conducted by self-reported tools showed that vestibular rehabilitation can improve functional balance and dizziness and are good predictors of future referrals [7].

There are many dizziness questionnaires in English language such as Dizziness Handicap Inventory (DHI), Vestibular Disorders Activities of Daily Living (VADL), and UCLA-Dizziness Questionnaire (UCLA-DQ) [5,6,8]. Apparently, these questionnaires have some defects in psychological measures that may lead to some problems in outcome measures [2]. As a result, Vestibular Rehabilitation Benefit Questionnaire (VRBQ) was developed to compensate for those defects. This questionnaire is used for comparing patients' conditions before vestibular involvement and after rehabilitation. It has five subsets for vestibular symptoms, their effects on the quality of life as well as their psychological aspects [2]. VRBQ was invented and validated by Morris et al. The first version had 36 items but the developers omitted some redundant questions based on their further research. The new version of VRBQ has 22 questions. Five subsets of the VRBQ are symptoms, quality of life, dizziness, motion provoked dizziness, and anxiety that can evaluate every symptom with a potential effect on life [2]. The final version of VRBQ has good general consistency and excellent internal consistency for all subsets, therefore VRBQ is a multivariate scale for evaluating dizziness and its related disabilities and handicaps [9]. This questionnaire was selected for translation and then evaluating its reliability and validity.

Methods

The present study deals with preparation and then evaluation of reliability and validity of the Persian version of VRBQ. At first, the English version of VRBQ [10] was translated to Persian based on international quality of life assessment (IQOLA) following authors' permission. Translators were an audiologist and a professional translator. In translation some original phrases were adapted for Persian language. Then the first version of Persian VRBQ was back translated into English by two professional translators with great proficiency in both Persian and English languages. The aim was checking if the content of the questions remained unchanged with respect to the original version. The resulting translation was distributed among nine audiologists who were experts in vertigo and dizziness field of study. Based on Lawshe method for evaluating content validity index (CVI), audiology experts checked and scored relevance, simplicity, and clarity of each question based on a 4-point scale. In addition to

evaluating content validity ratio (CVR), audiologists scored necessity of the each item based on a 3-point scale.

According to the experts' comments and scores, CVI and CVR were calculated for each question. Acceptable CVI and CVR for each question were 0.79 and 0.78, respectively. For studying face validity, VRBQ was handed to nine experts and 15 subjects suffering from the vestibular disorder and their comments were applied.

After modifications, the final version (Appendix 1) was utilized for evaluating 108 subjects (87 women and 21 men) with vestibular problems. The age range of participants was from 27 to 70 years (mean age of 47.5 years old). Inclusion criteria were as follows: volunteer participation, balance difficulty with vestibular origin based on the test results and specialist's diagnosis, no neurologic disorder such as seizure, Parkinson, head trauma, metabolic diseases like diabetes, or high blood pressure. Before the main study, for evaluating test-retest reliability, the questionnaire was administered twice with one-week interval on 30 random patients out of 108 subjects with a vestibular disorder and intra-class correlation coefficient (ICC) was calculated. After four weeks of vestibular rehabilitation, VRBQ was administered on 108 patients and the internal consistency was evaluated by Cronbach alpha. For evaluating convergent validity, the total score of VRBQ Persian version in 20 subjects was compared with the result of Persian DHI that has high confirmed reliability and validity [11].

Results
Content validity index and ratio
Nine experts studied the questionnaire and all approved that every question in the Persian VRBQ was necessary for evaluating vestibular rehabilitation outcomes and based on CVR table, their content validity was acceptable. CVI for each individual question was calculated based on clarity, relevance to balance rehabilitation, and simplicity. Except for three items (question 6, 12, 15), all remaining items had an acceptable score above 0.79 (from 0.88 to 1).

Those three items had a score less than 0.77 which were reviewed and modified.

Results of face validity evaluation
Nine audiologists and 15 patients participated in this study. Their general perception about most questions was good although some patients considered some questions difficult to understand. Items that were modified based on patients' comments were as follows: "Compared to before the dizziness, I feel comfortable travelling" changed to "Compared to the time before dizziness, I feel comfortable in a moving car", "Compared to before the dizziness, I can concentrate and/or remember things" changed to "How is the quality of your concentration and remembering, compared to the time before dizziness?"

Reliability evaluation
Two evaluations had a significant correlation with ICC of 0.94. As it is shown in Table 1, the minimum and maximum ICC values were for dizziness subset (0.57) and symptom subset (0.99), respectively. Therefore the Persian version of VRBQ was a reliable questionnaire. Regarding the internal consistency, the Cronbach alpha was used for 108 patients and the total score was 0.68. All the findings and subset scores are summarized in Table 1. As it can be seen, the lowest and highest Cronbach alpha coefficient values were obtained for total score (0.68) and the quality of life subset (0.92), respectively.

Correlation between VRBQ and DHI
The Spearman correlation coefficient between DHI and VRBQ was 0.74. Therefore there was a significant correlation (r=0.74) between DHI and VRBQ after rehabilitation (p<0.001).

Discussion
VRBQ is a new questionnaire developed to be a comprehensive and valid self-reported tool compared to previous questionnaires. In the present study, VRBQ was translated into Persian and then its reliability and validity was tested and used for evaluation of vestibular

Table 1. Intraclass correlation coefficient and Cronbach's alpha for vestibular rehabilitation benefit questionnaire total score and subscales

Subscales and total	Cronbach's alpha	ICC
Symptoms subscale	0.81	0.99
Quality of life subscale	0.92	0.80
Dizziness subscale	0.89	0.57
Motion provoked dizziness subscale	0.86	0.98
Anxiety subscale	0.79	0.98
Total	0.68	0.94

ICC; intraclass correlation coefficient

rehabilitation efficacy. DHI was the first self-reported questionnaire that has been used extensively in patients with the vestibular disorder [5]. DHI is available in Persian [11]. The vestibular disorders activities of daily living (VADL) is used for evaluating disability secondary to vestibular disorder and its effects on individual independence in everyday living situations [6]. VADL is available in Persian, too [12]. In addition, UCLA-Dizziness Questionnaire (UCLA-DQ) was developed for evaluating type and severity of the effects of vestibular defects on the quality of life and anxiety [8].

The authors of VRBQ used DHI, Vertigo Symptom Scale-short form (VSS), and short form of health survey (SF-36). DHI and VSS are valid questionnaires used widely in studies and clinical settings. These two questionnaires can assess many aspects of dizziness and its effects such as anxiety and daily activity limitations and emotions. Therefore they were selected for this study [2,9]. However, these questionnaires cannot determine the degree of defect and its resulting limitations with high sensitivity. VRBQ has rectified those defects and has higher sensitivity to rehabilitation-induced changes compared to VADL and DHI. Its questions were analyzed qualitatively by interview with the subjects under rehabilitation. Then their symptoms and their effects on subjects were evaluated.

The time of the present study, there was not any other translation of VRBQ in other languages so we used the original findings of the English version for comparisons. Most parts of the Persian version of VRBQ were approved by audiologists indicating the good quality of the translation and questions were adapted appropriately based on patients' comments. Finally, subsets of VRBQ have good face validity, however, for improving the face validity, some phrases were modified slightly. Intraclass consistency (ICC) for Persian version of VRBQ was 0.94. Therefore it has a good consistency. Morris et al. showed that ICC of the original questionnaire was 0.99 [9]. The internal consistency was 0.68 based on the Cronbach alpha and the maximum and the minimum values were obtained for the quality of life and total score, respectively. This measure indicates a high correlation between VRBQ items. In the study of Morris et al., the Cronbach alpha was 0.73 for the total score, 0.92 for the quality of life, 0.89 for dizziness, 0.74 for anxiety and 0.91 for motion-provoked dizziness. Therefore the internal consistency was good. In the original study, the minimum value of the Cronbach alpha was for a total score which shows multi-dimensional characteristics of VRBQ [9].

Convergent validity showed good correlation between VRBQ and DHI. The Spearman correlation coefficient between VRBQ and DHI was

0.74. Morris et al. reported a moderate to strong correlation between VRBQ and DHI [9]. As VRBQ has more items than DHI, it is more sensitive to rehabilitation effects. Deveze et al. concluded that VRBQ alongside with posturegraphy and dynamic visual acuity (DVA) test is a strong tool with good validity for monitoring vestibular rehabilitation outcomes [13].

Conclusion

This study showed that Persian version of VRBQ has acceptable reliability and validity for evaluating vestibular rehabilitation outcomes in adults with vestibular disorders. Appendix 1 shows the final Persian version of VRBQ.

Conflict of interest

The authors declare that they have no conflict of interest.

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Appendix 1
Persian version of the Vestibular Rehabilitation Benefit Questionnaire (VRBQ)

به نام خدا

سن: **پرسشنامه سودمندی توانبخشی دهلیزی**

جنسیت: این پرسشنامه راجع به احساس **گیجی** شما در یک روز عادی طی هفته گذشته است.

اگر احساس می‌کنید مشکلاتی مربوط به سایر اختلالات دارید، آن‌ها را در پاسخ ذکر **ننمایید.**

لطفاً برای پاسخ به سؤالات، دور گزینه موردنظر خط بکشید.

بخش اول: علائم شما

این بخش راجع به‌دفعات روبرو شدن شما با تغییر حال است.

						۱. هرچند وقت احساس گیجی دارید؟
هیچگاه	به‌ندرت	نه‌چندان زیاد	گهگاهی	بسیاری از مواقع	خیلی از اوقات	همیشه
						هرچند وقت احساس خارش، تیر کشیدن یا بی‌حسی در بدن دارید؟
هیچگاه	به‌ندرت	نه چندان زیاد	گهگاهی	بسیاری از مواقع	خیلی از اوقات	همیشه
						۲. هرچند وقت احساس چرخش یا حرکت اشیا به دور خودتان دارید؟
هیچگاه	به‌ندرت	نه چندان زیاد	گهگاهی	بسیاری از مواقع	خیلی از اوقات	همیشه
						۳. هرچند وقت دچار احساس تپش و یا لرزش قلب می‌شوید؟
هیچگاه	به‌ندرت	نه چندان زیاد	گهگاهی	بسیاری از مواقع	خیلی از اوقات	همیشه
						۴. هرچند وقت احساس بی‌ثباتی به‌گونه‌ای دارید که ممکن است تعادل خود را از دست بدهید؟
هیچگاه	به‌ندرت	نه چندان زیاد	گهگاهی	بسیاری از مواقع	خیلی از اوقات	همیشه
						۵. هرچند وقت احساس اشکال در نفس کشیدن یا کم‌آوردن نفس دارید؟
هیچگاه	به‌ندرت	نه چندان زیاد	گهگاهی	بسیاری از مواقع	خیلی از اوقات	همیشه

این بخش راجع به پرسش جهت چگونگی وضعیت گیجی شما حین حرکت کردن است.

اگر از انجام حرکتی خودداری می‌نمایید لطفاً گزینه: باعث «احساس گیجی نمی‌شود» یا «هیچگاه گیجی ندارم» را انتخاب نکنید.

پیش از پاسخگویی به پرسش، حرکت موردنظر را انجام دهید یا با درمانگر تعادل خود مشورت نمایید.

								۶. خم شدن باعث:
احساس گیجی بسیار شدید می‌شود	احساس گیجی شدید می‌شود	احساس گیجی تقریباً کامل می‌شود	احساس گیجی قابل‌توجه (متوسط) می‌شود	احساس گیجی بسیار ملایم می‌شود	احساس گیجی ملایم می‌شود	احساس گیجی بسیار خفیف می‌شود	احساس گیجی نمی‌شود
								۷. دراز کشیدن و یا غلت زدن در رختخواب باعث:
احساس گیجی بسیار شدید می‌شود	احساس گیجی شدید می‌شود	احساس گیجی تقریباً کامل می‌شود	احساس گیجی قابل‌توجه (متوسط) می‌شود	احساس گیجی بسیار ملایم می‌شود	احساس گیجی ملایم می‌شود	احساس گیجی بسیار خفیف می‌شود	احساس گیجی نمی‌شود
								۸. در نگاه کردن به آسمان:
دچار گیجی بسیار شدید می‌شوم	دچار گیجی شدید می‌شوم	منگ کاملاً می‌شوم	دچار گیجی قابل‌توجه (متوسط) می‌شوم	دچار گیجی ملایم می‌شوم	دچار گیجی بسیار خفیف می‌شوم	گیجی هیچگاه ندارم
								۹. با حرکت آهسته سر به طرفین:
دچار گیجی بسیار شدید می‌شوم	دچار گیجی شدید می‌شوم	منگ کاملاً می‌شوم	دچار گیجی قابل‌توجه (متوسط) می‌شوم	دچار گیجی ملایم می‌شوم	دچار گیجی بسیار خفیف می‌شوم	گیجی هیچگاه ندارم
								۱۰. یا حرکت سریع سر به طرفین:
دچار گیجی بسیار شدید می‌شوم	دچار گیجی شدید می‌شوم	منگ کاملاً می‌شوم	دچار گیجی قابل‌توجه (متوسط) می‌شوم	دچار گیجی ملایم می‌شوم	دچار گیجی بسیار خفیف می‌شوم	گیجی هیچگاه ندارم

بخش دوم: تأثیر گیجی بر حالات شما

لطفاً هر سؤال را به‌دقت بخوانید – برخی عبارات برای نشان دادن مشکل شما است (مثلاً: «هنگام خیره نگاه کردن مشکل پیدا می‌کنم») و برخی برای این‌که نشان دهند شما مشکلی ندارید (مثلاً: احساس راحتی هنگام حرکت ماشین)

اگر سؤالی شامل حال شما نمی‌شود به‌جای آنکه آن را بدون پاسخ رها نمایید، لطفاً گزینه **«همانند قبل»** را انتخاب نمایید.

۱۱. احساس راحتی هنگام حرکت ماشین در مقایسه با قبل از دچار شدن به گیجی:

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۲. اعتمادبه‌نفس شما در مقایسه با قبل از گیجی چه تغییری کرده است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۳. در مقایسه با قبل از گیجی در مراقبت از خود (مثلاً: شستن موها، تمیز نمودن دندان‌ها، لباس پوشیدن و ...)، چه مقدار **مشکل‌دارید؟**

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۴. در مقایسه با قبل از گیجی، احساس آرامش شما در زمان تنها بیرون رفتن از منزل چه مقدار است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۵. در مقایسه با قبل از گیجی، کیفیت تمرکز و یا به خاطر آوردن شما چگونه است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۶. در مقایسه با قبل از گیجی، برای حمایت خود چه مقدار نیاز به تکیه‌دارید؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۷. کیفیت زندگی نسبت به قبل از گیجی چه مقدار بهبودیافته است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۸. در مقایسه با قبل از گیجی اجتناب شما از برخی فعالیت‌ها، وضعیت‌ها یا شرایط چه تغییری کرده است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۱۹. در مقایسه با قبل از گیجی، میزان رضایت شما از استقلال فردی خودتان چه تغییری کرده است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۲۰. در مقایسه با قبل از گیجی، احساس ثبات در تاریکی یا با چشمان بسته چه تغییری کرده است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم

۲۱. در مقایسه با قبل از گیجی، میزان شرکت شما در فعالیت‌های اجتماعی چه تغییری کرده است؟

خیلی راحت‌تر هستم   راحت‌تر هستم   کمی راحت‌تر هستم   **همانند قبل**   کمتر راحتم   دچار مشکل می‌شوم   بسیار کمتر راحتم