



Cross-cultural adaptation, reliability, and validity of the vestibular rehabilitation benefit questionnaire in the central Kurdish version

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Abstract

Background and objectives: The vestibular rehabilitation benefit questionnaire is a new patient-reported outcome measures with psychometric properties, to assess the efficacy of vestibular rehabilitation. The present study aims to cross-culturally adapt the questionnaire into the central Kurdish dialect and to examine its psychometric properties.

Methods: This is a cross-sectional study conducted in Sulaimani city- Kurdistan Region of Iraq from March to September 2022, on 127 patients diagnosed with vestibular disorders between 18 to 79 years old. The vestibular rehabilitation benefit questionnaire Kurdish version was created through a regulated process of cross-cultural adaptation. The Kurdish participants were responded to the questionnaire, vertigo symptom scale short form and dizziness handicap inventory to assess validity of the questionnaire. The reliability of the questionnaire was assessed by randomly selecting 40 participants to repeat the questionnaire responses over a 24-hour timeline.

Results: The results revealed that the α for subscales of dizziness, anxiety, motion-provoked dizziness, quality of life and the scale of vestibular rehabilitation benefit questionnaire -total were 0.81, 0.82, 0.78, 0.77, and 0.92, respectively. The intra-class correlation coefficient was 0.96 for the questionnaire total scale; 0.97 and 0.93 for symptoms and quality of life subscales, respectively. Spearman rho correlation coefficient revealed a powerfully positive relationship between total the questionnaire and dizziness handicap inventory, and a strong positive relationship between total questionnaire and vertigo symptom scale short form.

Conclusion: The vestibular rehabilitation benefit questionnaire Kurdish version is a reliable and validated patient-reported outcome measures that can be utilized for the Kurdish-speaking population.

Keywords: Central Kurdish dialect, Cross-cultural adaptation, Vestibular disorder, Vestibular rehabilitation benefit questionnaire.

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Introduction

Vestibular disorders (VD) disrupt the body's balance system, significantly impacting individuals' quality of life by limiting their everyday activities.^{1,2} The secondary problems due to VD include nausea and/or vomiting, reduced ability to focus or concentrate, and fatigue.³ The VD symptoms could be acute, episodic, or chronic. They may result from various differential diagnoses, including peripheral or central, unilateral or bilateral, and vestibular or non-vestibular origins.⁴ Vestibular rehabilitation (VR) is accepted as one of the most common therapies for different types of VD.^{2,4} It is a specialized form of therapy designed to alleviate primary and secondary symptoms of VD through the natural processes of the vestibular system, namely, adaptation, substitution, central programming, and recovering postural strategies.⁵ The efficacy of VR can be estimated using objective and subjective tools. Objective tools like posturography, rotational chair, video nystagmography (VNG), and video head impulse (vHIT) test are insufficient to evaluate the benefits of VR because they partially reflect rehabilitation effects. Self-reported assessments are helpful in identifying the impact of dizziness on daily living and the changes brought on by rehabilitation.⁶ Therefore, patient-reported outcome measures (PROMs) are accepted as a popular subjective tool.⁷ The Vestibular Rehabilitation Benefit Questionnaire (VRBQ) is one of the numerous PROMs available for VD.⁸ Zmnako translated two of these PROMs, the Vertigo Symptom Scale Short Form (VSS-SF) and Dizziness Handicap Inventory (DHI), into the central Kurdish dialect.^{7,9} The PROM questionnaires are a common technique for collecting health-related information in clinical studies because of their ease of use and simplicity. However, before application,

PROM must go through a cross-cultural adaptation process, which includes translation and cultural adaptation, to be used in a community with a language other than the source. Consistency and validity should also be confirmed and reported following international criteria for evaluating patient-reported health outcomes because the translation of any validated PROM can weaken its psychometric features.^{10,11} Stewart & Morris developed and validated the VRBQ with 36 items. The original version was revamped, where several redundant questions were omitted based on further research. The new version of VRBQ contains 22 questions.^{12,13} It scored an "excellent" rating on three Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) criteria and was perceived as the best measure to address treatment outcomes.¹⁴ This questionnaire was also translated into many languages, such as Turkish, Malay, Persian, and Chinese.^{2,5,6,15} This questionnaire aimed to assess dizziness, anxiety, motion-provoked dizziness, and improved patient quality of life (QoL) as a result of VR.¹³ The 22 questions are divided into two parts. Items 1 to 11 in Part A examine two dimensions of dizziness: the frequency of dizziness symptoms together with the severity of motion-induced and autonomic symptoms caused by dizziness. While Part B measures the changes in the patient's QoL before and after their VR.¹³ The study aimed to develop a reliable and valid Kurdish version of the international (VRBQ) measures to assess patients with VD.

Patients and methods

This is a cross-sectional study conducted in Sulaimani city- Kurdistan Region of Iraq from March to September 2022. The Kurdistan Higher Council of Medical Specialties Ethics Committee approved the study (No. 608 on 17th February 2022).



Afterwards, the VRBQ Kurdish version was translated from the original English version. The questionnaires were distributed to patients diagnosed with a vestibular illness and a control group. The surveys' reliability and validity were also tested. Upon data collection, appropriate statistical tests were selected to evaluate the respondents' responses via the statistical package for the social sciences (SPSS). The procedure of cross-cultural adaptation (CCA) of VRBQ was performed according to the guidelines proposed by Beaton et al. and Wild et al.^{16,17} According to the international regulation for qualified PROMs, a focus group was established consisting of six otolaryngologists fluent in the target language with a decade of experience in the field of VD.¹⁸ Two native speakers an otolaryngologist (T1) and an authorized native translator (T2) translated VRBQ from the original English language into Kurdish. Hence, two Kurdish VRBQ T1 and T2 were produced. The focus group merged the VRBQ T1 and T2 to create a unified VRBQ translation. Once merged, this unified translation was back-translated into English by a translator unaware of the original English version. The expressions that remained the same as the original version was retained. The confused expressions were cancelled and changed to the most clarified expressions to draft a preliminary VRBQ Kurdish version. Qualitative methods of pilot study and focus group (FG) were used to evaluate the content validity of the preliminary VRBQ Kurdish version based on Saw and Ng.¹⁸ Fifteen well-educated patients from the target population with linguistic skills were involved in the pilot study. The participants in the pilot study and FG members were requested to comment on each translated item in terms of clarity and understanding using a form created with ratings. The final version of the VRBQ-CK was approved after receiving an

excellent rating for all 22 items by FG and patients. The study was conducted using a cross-sectional survey. However, for the reliability subgroup, the survey was transformed into a short-term longitudinal study. A sample size of that of 4-5 times the number of variables was suggested for factor analysis.¹⁹ It implies that at least 88 (22 items x 4 = 88) participants are required for this VRBQ survey. The survey was conducted in two well-equipped audio-vestibular tertiary clinics in Iraq's Sulaymaniyah Province. The inclusion criteria of the study involved native Kurdish with adequate performance and communication skills with vestibular symptoms as their primary complaint and have been diagnosed with VD through history taking, bedside vestibular system assessment and objective tests such as videonystagmography (VNG), video head impulse test (vHIT), vestibular-evoked myogenic potentials (VEMP), dynamic posturography. The participants were 18 to 79 years old, with a wide range of educational backgrounds, from illiteracy to PhD degrees. On the other hand, the excluded criteria were patients using other Kurdish dialects, those aged below 18 and above 79 years old, and those with symptoms less than one day, together with patients with musculoskeletal diseases and symptoms due to other disorders (neurological, cardiopulmonary, and cognitive impairments). All participants responded to three central Kurdish version questionnaires (VRBQ, VSS-SF, and DHI). After obtaining their consent, the patients were required to fill out the questionnaires, except for illiterate patients, where the interviewer filled out the survey for them based on their responses. Additionally, 30 healthy respondents were also included in the study to determine the discriminating validity of the VRBQ, to proof the ability of the VRBQ to discriminate between patient and healthy



groups. To evaluate the validity of the VRBQ-CK in comparison to the validated VSS-SF-CK and DHI-CK VRBQ, VSS-SF, and DHI were employed in this study.^{8,10} Moreover, the reliability of the VRBQ was assessed by randomly selecting 40 participants to repeat the VRBQ responses over a 24-hour timeline. Due to the fluctuating nature of dizziness, a brief test-retest (over 24 hours) duration is preferred and the sequence of the VRBQ items was altered to prevent recall bias while responding.¹³ The VRBQ measures a participant's current state of symptoms, QoL, and a normal state for an individual. The 22 items divided into parts A and B address the significance of the dizziness characteristics and their effects. Part A consists of three symptom subscales: dizziness, anxiety, and motion-induced dizziness. Part B is a subscale for health-related QoL. Items in parts A and B employ a unique Likert scale. The score points range from 0 to 6. Several statistical tests were used to evaluate the validity and reliability of VRBQ-CK. The validity tests consist of convergent validity and discriminating validity. The Cronbach's Alpha test was employed to assess the internal consistency reliability, while the external reliability was performed using intra-class correlation.²⁰ The correlation between test and re-test respondents (n=40) was determined using the intra-class correlation coefficient (ICC). Poor reliability is indicated by a correlation coefficient below 0.5, moderate reliability between 0.75 and 0.9, while excellent validity is greater than 0.9.²¹ The total score of VRBQ-CK, VSS-SF-CK, and DHI-CK for all respondents (n=100) was correlated using the Spearman correlation test to determine the Convergent Validity. The Mann-Whitney U test determined the discriminative validity of the VRBQ Kurdish version between the patient and healthy group. Numerous statistical tests to

assess the validity and reliability of the VRBQ-CK were performed using SPSS.

Results

One hundred twenty-seven patients were included in this survey of Kaiser-Meyer-Olkin (KMO) and Bartlett's test results of 0.869 with a *p-value* approximating zero (less than 0.05). It means that that the sample size of this study is statistically suitable for analysis, because it was more than 0.8.²¹

The responses of the 127 respondents for the 22 items in the VRBQ-CK version scored an average missing value of 4.4%. There were 41 males (32%) and 86 females (68%) participants, with the minimum and maximum ages were 19 and 79 years, respectively. The mean age of the participants was 47.0; 28 (23%) of the participants were illiterate, 21 (17%) had primary education, 9 (7%) with secondary school education, 20 (16%) had a diploma, 28 (23%) had bachelor's degree, and 17 (14%) postgraduates. The time of symptoms ranged between one day to 7.5 years. Most participants (n = 53, 49%) suffered fewer than three months. Among the causes of VD, benign paroxysmal (the episodes of dizziness triggered by specific change in head position) positional vertigo (BPPV) was the most common (n = 51, 40%), followed by vestibular migraine (n = 39, 30%). The score of the dizziness, motion-provoked dizziness, anxiety, QoL, and total were converted to 100 for both 127 patients and 30 healthy respondents. For patient respondents, the minimum and maximum median scores in the Whisker plot box in Figure (1) were recorded by anxiety and dizziness (with one outlier) of 11 and 50 (out of 100), respectively. Moreover, the score of QoL, motion-provoked dizziness, and total had the same score of about 30 (out of 100). Based on the principal axis factoring extraction approach for non-parametric (non-normally distributed) data of the



VRBQ-CK, in which six iterations were performed for rotation of both Promax (Kappa=4) and varimax with Kaiser normalization.²² Consequently, four factors were extracted from the 22 items in the VRBQ Kurdish version, based on eigenvalues greater than 1 (respectively

8.15, 1.92, 1.68, and 1.16). Moreover, Cronbach's Alpha for the four factors was greater than 0.70 (0.71, 0.73, 0.86, and 0.91, respectively). Hence, the current structure of the four groups were maintained in VRBQ-CK.

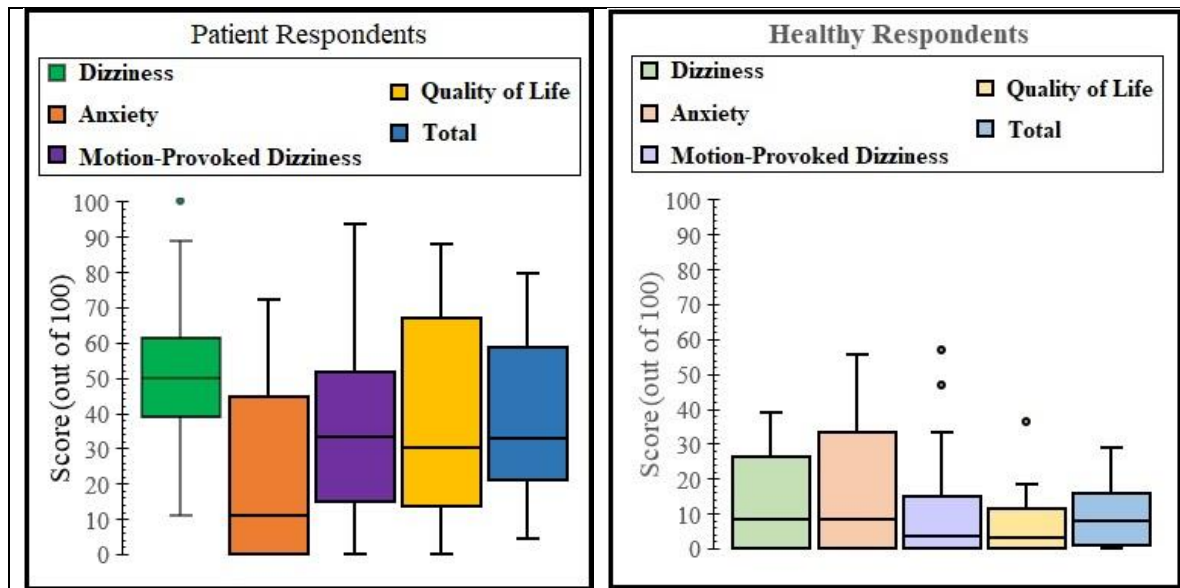


Figure (1): Patient (left) and Healthy (right) Respondents of the VRBQ

The internal consistency reliability test for the VRBQ-CK was performed using Cronbach's Alpha (α) for each subscale: dizziness $\alpha = 0.81$; anxiety $\alpha = 0.82$; motion provoked dizziness $\alpha = 0.78$; QoL $\alpha = 0.77$; and 22 items in VRBQ $\alpha = 0.92$. The test and re-testing 40 respondents were conducted over 24 hours. The results depicted an excellent relationship (greater than 0.8) between the first and second measurements at a confidence interval of 95%. At *p-values* less than 0.001, all correlations were significant for the total score and each subscale. The correlation between the VRBQ-CK and the comparators (DHI-CK

and VSS-SF-CK) was performed using the Spearman rho correlation coefficient. For the three questionnaires, correlations were calculated for total and subscale scores. A significant parallel correlation was observed between the three questionnaires. The dizziness subscale of the VRBQ was correlated with all other totals and subscales ($r: 0.44$ to 0.74), but the correlation between VRBQ-D and the total of the VSS-SF was robust ($r: 0.74$) Table (1). The Mann-Whitney U values of all subscales and total VRBQ were approximately zero (less than 0.05), except VRBQ_A at 0.096 (the bold value is greater than 0.05).

**Table (1):** Spearman Rho Correlation Coefficients of VRBQ

Items	VRBQ-D	VRBQ-A	VRBQ-M	VRBQ D+A+M	Health related quality of life	VRBQ Total
DHI-P	0.59	0.53	0.65	0.76	0.80	0.85
DHI-E	0.44	0.44	0.47	0.57	0.80	0.76
DHI-F	0.56	0.55	0.63	0.75	0.83	0.86
DHI Total	0.57	0.54	0.63	0.74	0.86	0.87
VSS-SF-V	0.72	0.44	0.47	0.66	0.63	0.69
VSS-SF-A	0.68	0.61	0.41	0.66	0.51	0.62
VSS-SF Total	0.74	0.57	0.47	0.71	0.60	0.69

The Spearman rho correlation coefficient values of *p-value* approximate to zero at the 0.01 level of significance.

VRBQ=vestibular rehabilitation benefit questionnaire, D=dizziness, A= anxiety, M=motion provoked dizziness, DHI=dizziness handicap inventory, P=physical, E=emotional, F=functional, VSS-SF= vertigo symptom scale short form, V=vertigo, A=autonomic/anxiety.

Discussion:

A global trend arises of using PROMs in medical specialties in different languages and dialect. There are now just two translated and validated questionnaires (DHI and VSS-SF) accessible in Kurdish central dialect in the vestibular field. In this study, the VRBQ (assess the effectiveness of vestibular rehabilitation in patient with vestibular disorders) translated into Central Kurdish Dialect. Then, both reliability and validity of VRBQ were tested statistically (as discussed in the methodology section). Kaiser-Meyer-Olkin (KMO) and Bartlett's test revealed that the sample size in this survey was meritorious and acceptable.²¹ Moreover, the results of Little's missing completely at random (MCAR) test demonstrated that the missing values were random.²³ The *p-value* for the MCAR test increased to 0.68 when the four variables (sex, age, education, and duration of symptoms) were included. The spike was due to the increased randomness of responses. Based on the values, the

statistical analysis can be performed as the lack of data will not impact data collection. As for the healthy respondents, all values in the Box-Whisker plot were lower than those of the patients of about 10 (out of 100). The median anxiety was almost the same for both groups because modern lifestyle can negatively affect the psychology of healthy respondents Figure (1). Kolmogorov-Smirnov and Shapiro-Wilk normality tests indicated that the responses for the 22 items of VRBQ-CK were not normally distributed because the *p-value* was approximately zero (less than 0.05).²⁴ The results of the internal consistency reliability were comparable to that of Morris et al.¹³ (original English version of VRBQ) and Neubert²⁵. Whereas, the result of test-retest depicted an excellent relationship between the first and second measurements at a confidence interval of 95%. At *p-values* less than 0.001, all correlations were significant for the total score and each subscale. This study's findings were approximately comparable to those of Gubduz et al.²The correlation



results indicated a solid positive relationship between total VRBQ and DHI, similar to that of Morris et al.¹³ and Moosavi et al.⁵ and a strong positive relationship for total VRBQ and VSS-SF. The correlation of the VRBQ-anxiety subscale was strong with the VSS-SF autonomic/anxiety subscale. The highest positive correlation of VRBQ-motion-provoked dizziness was with DHI-physical. Moreover, the health-related QoL subscale yielded a robust correlation with DHI-total with a *p-value* approximating zero at the significance level of 0.01. Besides that, the Discriminating validity of the VRBQ-CK can differentiate between normal and VD patients. However, the value of VRBQ_A greater than 0.05 indicated that anxiety is common in the population due to the modern lifestyle.

Conclusion:

Based on the data collected from 127 VD patients and their responses to the VRBQ-CK, VSS-SF, and DHI questionnaires, VRBQ-CK was accepted as a reliable and valid measurement tool. Hence, Kurdish researchers and medical professionals can use the VRBQ-CK to assess the QoL and the effectiveness of VR in individuals with VD.

Conflict of interest:

The authors of this article declared that there is no any commercial or declaration of interest concerning this submitted work.

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