

Development of the Arabic version of the Vertigo Symptom Scale-Short Form: Validity and reliability

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Objectives

To translate the vertigo Symptom Scale-Short Form (VSS-SF) into Arabic and cross-cultural adaptation along with examining its validity and reliability.

Background

The VSS-SF is a common self-assessment dizziness questionnaire that assesses aspects of vertigo and vertigo-related anxiety which has two subscales: vestibular/balance subscale and autonomic/anxiety subscale. The VSS-SF can differentiate between a pure vestibular disorder and vertigo associated with anxiety.

Patients and methods

The VSS-SF was translated into Arabic and then cross-cultural adaptation was carried out. The questionnaire was completed by: study group ($n = 60$) patients diagnosed with vestibular disorders and healthy participants with no history of vertigo ($n = 120$). Internal consistency and test–retest reliability of the scale were examined by Cronbach's α and Spearman's correlation coefficients subsequently. Discriminant validity of the scale was examined by the Mann–Whitney U test and the receiver-operating characteristic curve.

Results

The Arabic VSS-SF showed good reliability for the total scale and its subscales with Cronbach's α coefficients (range, 0.716–0.880). Test–retest correlation showed high repeatability of the Arabic VSS-SF total score and its subscales such as Spearman's coefficient (range, 0.985–0.988). The Arabic VSS-SF discriminative ability was excellent to discriminate between the study group and healthy individuals using the Mann–Whitney test ($P < 0.001$).

Conclusion

The Arabic version of VSS-SF is a valid and reliable tool that is able to differentiate between dizzy patients and healthy people and patients with pure vestibular symptoms and patients with comorbid anxiety, in the Arabic populations.

Keywords:

anxiety, Arabic, Vertigo Symptom Scale-Short Form, vertigo

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Introduction

Dizziness and vertigo are common problems in medicine that are challenging to diagnose and treat. Vertigo is one of the subclassifications of dizziness, which is the subjective experience of hallucination of movement [1].

The incidence of dizziness (including vertigo) is about 15% to more than 20% of adults per year [2]. Patients with vestibular-balance disorders such as dizziness and vertigo have high prevalence of associated primary or secondary psychological disorders like anxiety; these usually increase the subjective impairment and affect the quality of life [3]. So clinical diagnosis and objective tests of balance disorder alone are not enough for assessing the severity and impact of dizziness, vertigo, and associated anxiety. Symptom-specific subjective measurements such as questionnaires are very important to identify the symptoms and status of patients accurately and evaluate the effectiveness of treatment [4].

The Vertigo Symptom Scale (VSS) is one of the most common subjective measures assessing vertigo and dizziness-related symptoms; it has the highest comprehensive validity among scales assessing dizziness-related symptoms [5]. It was developed by Yardley *et al.* [6] to measure the frequency of dizziness-related symptoms over the past 12 months; it consists of 34-items that were developed based on patient interviews. It has two subscales: vertigo subscale and autonomic/anxiety subscale. The scale differentiated between healthy people and patients, and the two subscales differentiated between pure vestibular symptoms and autonomic and anxiety symptoms in patients with dizziness [7]. It showed

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acceptable validity [7,8] and test-retest reliability with a mild correlation between two subscales [6]. The VSS-Short Form (SF) is a brief version derived from the VSS [9], which was developed for use in clinical practice as a measure of the frequency of dizziness, vertigo, and associated anxiety symptoms over the past month [10] with the central aim of monitoring the therapeutic effect [11]. VSS-SF internal consistency was satisfactory and test-retest reliability was moderate [12].

The VSS and the VSS-SF have been translated into many languages: German, Spanish, Turkish, Japanese, Norwegian, and all showed acceptable psychometric properties [13–16]. As Arabic language is one of the official languages in the United Nation, the main aim of this study was to translate the VSS-SF, cross-culturally adapt it into Arabic, and to investigate its validity and reliability, to be used in Egypt and among the Arabic population.

Patients and methods

The participants were divided into two groups: control group (healthy individuals) and study group (patient with vertigo), age range 18–45 years. All were native Arabic speakers. Written informed consent was obtained from all the participants. Ethical approval for this study was taken from the ethics committee in Menoufia University.

The controls were 120 healthy adults not complaining of dizziness. They were patient's relatives, friends, and family members of the authors. The study group was 60 adults suffering from vertigo and were previously diagnosed according to proper history and clinical diagnosis with peripheral or central vestibular disorders for at least 1 month. All patients were recruited from the Audiovestibular Unit, Menoufia University, Egypt between November 2017 and November 2018. The exclusion criteria consisted of patients with dizziness due to neurologic disorders, or cardiopulmonary disorders, patients with dizziness due to musculoskeletal disorders, or blind patients and patients diagnosed with psychiatric disorders.

All participants were asked to complete the scale again, 24–48 h after the first administration to examine test-retest reliability of the scale. The 24–48 h duration considered an appropriate interval as the dizziness and vertigo can change significantly across several days, and it has been used in previous similar studies [15,16].

First of all, permission was obtained from Professor Lucy Yardley, the main author of the original

VSS-SF [6,10] to translate it into Arabic. The VSS-SF was translated and cross-culturally adapted into Arabic based on the international guidelines for self-reported measures and according to Wild *et al.* [17,18].

Second step: two native Arabic-speaking translators with excellent English language developed two independent translations, one translator was familiar with the measured concept of VSS-SF (audiovestibular physician), and the other was not. Third step: backward translation was performed by two independent bilingual translators who were unfamiliar with the original VSS-SF. Fourth step: all translations were reviewed by a committee of experts consisting of the four translators and the authors of the study. Based on their feedback, slight modifications were made in response categories and scoring system like the Japanese version of VSS-SF by adding specific numeric values for the scale point, obtained from Professor Yardley, the author of the original English VSS [15], score ranges from 0 to 4 (0 = none, 1 = a few times 'about 1–3 times', 2 = several times 'about 4–6 times', 3 = quite often 'approximately more than seven times in less than 14 days', and 4 = very often 'during a period of ~15 days'). Further modulations were made by removing 'feeling sick' from question 3, and the word 'swimmy' from questions 6 and 15, to produce the final version of the Arabic VSS-SF.

Fifth step: the final Arabic VSS-SF was tested on a group of 10 patients who matched the eligibility criteria in this study. They did not report any problems in understanding the translated version, and therefore no additional changes were performed. Sixth step: the adapted Arabic VSS-SF was administered to the participants in our study.

All the participants completed the Arabic VSS-SF which is formed of 15 items. The scale range for each item is from 0 to 4 points. The total scale score range 0–60. The scale contains two subscales: vertigo subscale (VSS-V) consists of eight items (score range, 0–32) and autonomic-anxiety subscale (VSS-A) which consists of seven items (score range, 0–28) [10]. The patients were asked to choose the most appropriate answer matching their symptoms and the total score was achieved by summing the item scores; severe problems were indicated by higher scores (0 = no symptoms and 60 = severe vertigo).

The statistical analysis was done by SPSS Inc. (Chicago, Illinois, USA) statistical package, version 20. Parametric variables were expressed as mean and SD and were compared using Student's *t* test; Mann-Whitney test was used to compare between nonparametric variables. Significant difference was set at a *P* value of less than 0.05. Cronbach's α coefficient was used to

examine internal consistency of the Arabic VSS-SF, VSS-V, and VSS-A subscales; Values more than 0.70 was considered satisfactory, also was examined when each item was deleted, the lower recommended value is 0.2 [19]. Discriminate validity was measured by Mann–Whitney test, and receiver-operating characteristic (ROC) curves. For obtaining the greatest discriminative ability of the Arabic VSS-SF, cutoff points were examined. Test–retest reliability of the Arabic VSS-SF was reported by Spearman's correlation coefficient; reliability coefficients values more than 0.70 were considered satisfactory [20].

Results

The study group consists of 60 patients with vertigo which were previously diagnosed with peripheral and central vestibular disorders according to proper history and vestibular assessment (Table 1); their

Table 1 Diagnosis of the study group

Diagnosis	Number of patients [n (%)]
Vestibular migraine	18 (30)
BPPV	13 (21.6)
Cervical vertigo	7 (11.6)
Meniere's disease	6 (10)
Undiagnosed	5 (8.3)
Vestibular neuritis	4 (6.6)
Vertebrobasilar insufficiency	4 (6.6)
Labyrinthitis	2 (3.3)
Vestibular schwannoma	1 (1.6)
Total	60

age range 18–45 years was with a mean age of 35.33 ± 7.45 years. They included 26 men and 34 women. The control group comprised 120 adults; their age range 18–45 years was with a mean age of 33.45 ± 6.78 years, 68 men and 52 women; there was no significant difference between the groups regarding their age $P = 0.093$ or sex $P = 0.091$ using t test and χ^2 , respectively.

The study group consisted of 60 patients (26 men and 34 women) with peripheral or central vertigo according to history and vestibular assessment; the causes of vertigo are demonstrated in Table 1; their mean age was 35.33 ± 7.45 years and the control group consisted of 120 patients (68 men and 52 women); their mean age was 33.45 ± 6.78 years.

The Arabic VSS-SF had good reliability as the Cronbach's α coefficient value was more than or equal to 0.70 for the total scale in the control and study groups (Table 2) and for the two subscales also. The corrected item–total correlation showed only one value under 0.2 in item 13 ($r = 0.197$) in the study group but, this item was not removed from the scale as the calculated α if item deleted was 0.814 which decreases the overall Cronbach's α coefficient.

Test–retest reliability of the Arabic VSS-SF measured by Spearman's correlation coefficient was excellent for the total scale and both subscales (range, 0.985–0.988) (Table 3).

Table 2 Internal consistency of the adapted Arabic Vertigo Symptom Scale-Short Form among patients and controls

VSS-SF	Internal consistency of VSS-SF			
	Patients		Controls	
	Corrected item-total correlation	Cronbach's α if item deleted	Corrected item-total correlation	Cronbach's α if item deleted
Q1	0.512	0.792	0.300	0.759
Q2	0.559	0.790	0.544	0.734
Q3	0.510	0.792	0.295	0.759
Q4	0.264	0.809	0.343	0.757
Q5	0.433	0.799	0.428	0.748
Q6	0.329	0.807	0.427	0.751
Q7	0.348	0.804	0.315	0.763
Q8	0.444	0.798	0.382	0.753
Q9	0.444	0.798	0.436	0.747
Q10	0.448	0.798	0.382	0.753
Q11	0.542	0.792	0.406	0.750
Q12	0.527	0.791	0.365	0.754
Q13	0.197	0.814	0.413	0.753
Q14	0.439	0.798	0.320	0.758
Q15	0.341	0.806	0.319	0.758
Cronbach's α	0.810		0.766	
Total score (mean \pm SD)	23.30 \pm 8.70		8.09 \pm 4.80	
Mann-Whitney test=10.27				
$P<0.001$				

Q, question; VSS-SF, Vertigo Symptom Scale-Short Form.

The mean values for the total score were 8.09 ± 4.80 and 23.30 ± 8.70 in the control and study groups, respectively. The mean values for VSS-V were 14.36 ± 5.92 , 2.38 ± 2.37 in the control and study groups, respectively. The mean values for VSS-A were 11.03 ± 5.69 , 5.70 ± 3.48 in the control and study groups, respectively. Significant statistical difference was noted between the two groups regarding the total score of the scale and its subscales (Table 2).

The ROC curves are demonstrated in Fig. 1; the cutoff points that showed the highest sensitivity and specificity are demonstrated in Table 4.

Discussion

The VSS-SF is one of the most commonly used questionnaires and was translated into different languages [15,16]. Arabic language is one of the most widespread languages in the world, so the authors aimed to develop and cross-culturally adapt Arabic VSS-SF version to be used among the Arabic people. The translation has been done smoothly; based on the expert committee reviews, slight modifications were made in question 3 by removing 'feeling sick' as it is confusing for patients in the Arabic language and it is easy to understand the word 'nausea' alone and no further need for its clarification, and in questions

Table 3 Test-retest reliability of the Arabic Vertigo Symptom Scale-Short Form among patients and controls and its subscales among patients and controls

Scale (scale range)	Test (mean \pm SD)		Retest (mean \pm SD)		Spearman correlation (<i>r</i>)		95% CI	
	Patients	Controls	Patients	Controls	Patients	Controls	Patients	Controls
VSS-SF (0-60)	24.30 \pm 8.70	8.09 \pm 4.80	24.55 \pm 8.34	7.95 \pm 4.70	0.966*	0.993*	0.917-0.993	0.986-0.998
VSS-V (0-32)	14.36 \pm 5.92	2.38 \pm 2.37	14.01 \pm 5.65	2.31 \pm 2.33	0.988*	0.985*	0.973-0.994	0.970-0.995
VSS-A (0-28)	11.03 \pm 5.69	5.70 \pm 3.48	10.55 \pm 6.41	5.55 \pm 4.70	0.943*	0.996*	0.867-0.997	0.991-0.999

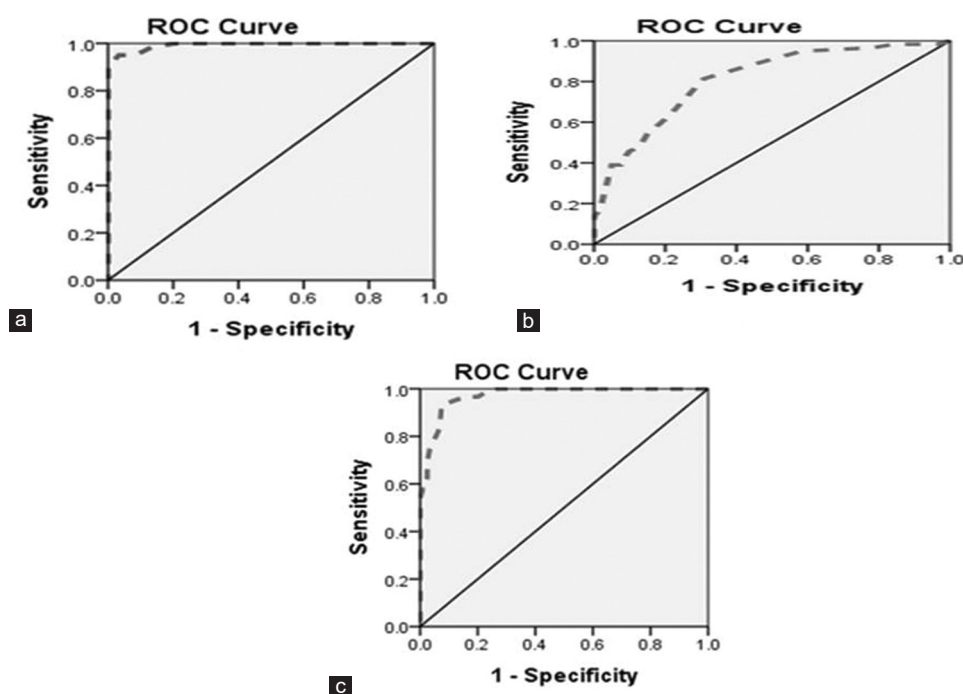
CI, confidence interval; VSS-A, autonomic-anxiety subscale; VSS-SF, Vertigo Symptom Scale-Short Form; VSS-V, vertigo-balance subscale. *Significant.

Table 4 Discriminative ability of the Vertigo Symptom Scale-Short Form and subscales

	AUC	Cutoff	Sensitivity%	Specificity%	Accuracy%	PPV%	NPV%
VSS-SF	0.97	11.5	97.0	84.0	88.0	75.0	98.0
VSS-V	0.99	4.5	98.0	87.0	91.0	79.0	99.0
VSS-A	0.81	6.5	81.0	70.0	82.5	57.0	87.5

AUC, area under the curve (the probability that a classifier will rank a randomly chosen positive instance higher than a randomly chosen negative one assuming 'positive' ranks higher than 'negative'); NPV, negative predictive value; PPV, positive predictive value; VSS-A, autonomic-anxiety subscale; VSS-SF, Vertigo Symptom Scale-Short Form; VSS-V, vertigo-balance subscale.

Figure 1



Receiver-operating characteristics (ROC) curve: (a) ROC curve for (VSS-V), (b) ROC curve for (VSS-A), (c) ROC curve for (VSS-SF). VSS-A, autonomic-anxiety subscale; VSS-SF, Vertigo Symptom Scale-Short Form; VSS-V, vertigo-balance subscale.

6 and 15 by removing 'swimmy' as it is difficult to understand in Arabic. The remaining words and meanings were kept close to the original VSS-SF as they were considered suitable for dizzy patients in the Arabic culture. Response categories and scoring system were modified to include numerical values for the scale points.

In the current study, the mean age was 33.45 ± 6.78 in the control group ($n = 120$) and 35.33 ± 7.45 in the vertigo group ($n = 60$); there was no significant difference between the groups regarding their age $P = 0.093$ or sex $P = 0.091$ using t test and χ^2 , respectively.

Reliability and validity of the VSS-SF were assessed in the study and control groups. Reliability of any questionnaire consists of internal consistency and test-retest reliability. Internal consistency concerns the extent to which items of the questionnaire are measuring the same thing, while test-retest reliability provides an indication of stability over time. The Arabic VSS-SF showed good internal consistency tested by Cronbach's α coefficient which was 0.766 in the control group and 0.810 in the study group. These results are in agreement with the original version of VSS-SF (α coefficient was 0.88) [10], the Japanese version of VSS-SF (α coefficient was 0.866) and Norwegian VSS-SF [16].

Internal consistency of the two subscales was also satisfactory and within the recommended limits [19] as α coefficient of Arabic subscales were; 0.803 and 0.755 for VSS-V and 0.880 and 0.716 for VSS-A in the study and control groups, respectively, which are in agreement with the Norwegian and Japanese version [15,16].

Test-retest reliability of the Arabic VSS-SF measured by Spearman's correlation coefficient was excellent for the total scale and both subscales (range, 0.985–0.988), indicating high stability of the Arabic VSS-SF over time. The English VSS-SF version showed moderate long-term test-retest reliability in the control group (over a 6-week period was $r = 0.60$) [10]. In the Norwegian and Japanese versions, test-retest reliability was evaluated by the intraclass correlation and it was high on all the scales.

The reliability of the Arabic VSS-SF was higher than that of the English original version; this may be explained by a shorter test-retest interval (1–2 days) in the Arabic version. There is no documented guidelines that report the duration between the first and second administration of the questionnaires. However, it should not be quite long to ensure the stability of the symptoms [19]. High repeatability of

the questionnaires is very important when it comes to evaluating the therapeutic effect and the VSS-SF developed mainly to follow up cases of vestibular rehabilitation.

The validity of Arabic VSS-SF was examined by content and construct validity. Content validity is the ability of the instrument to cover the range of meanings included within a concept that is being measured; the Arabic VSS-SF was measured by asking the participants to rate the questionnaire and detect any difficulties in understanding words or items and then to rephrase each item to detect any confusing or misleading words.

Construct validity is a measure of how meaningful the scale or instrument is when it is in practical use. Construct validity has two components: convergent and discriminant validity; in our study we measure the discriminant validity.

The Arabic VSS-SF discriminative ability was excellent to discriminate between healthy people and people with vertigo using the Mann-Whitney test and the ROC curve. Determining the cutoff values is useful in identifying patients from healthy individuals. In our study, the Arabic VSS-SF and its subscale show higher cutoff values than the Norwegian version [16], that is may be due to the difference in the sample size, cultural difference, as a large number of the Egyptian people may overestimate their complaint, and the higher anxiety cutoff value may be due to the difference in the environment and lifestyle, as the hot weather, stressful life conditions that people are exposed to in Egypt as well as the healthy people had some degree of somatic expression of anxiety symptoms, such as a headache and palpitation or excessive sweating, therefore the VSS-A subscale was not a strong measure to discriminate between vertiginous patients and healthy individuals. However, patients with a high level of anxiety could be easily detected by this subscale; additional research may be needed to clarify its discriminative ability.

Conclusion

The results suggest that the Arabic version of VSS-SF is a valid and reliable tool for evaluating vestibular-balance symptoms and associated anxiety in clinical practice, and it is definitely able to distinguish between dizzy patients and healthy groups among the Egyptian and Arabic populations.

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Conflicts of interest

There are no conflicts of interest.

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