

# Cross Cultural Translation, Reliability, and Validity of Vestibular Disorder Activities of Daily Living Scale-Gujarati Version for Subjects with Vestibular Disorder: A Correlational Study

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**Abstract:** Background: Parts of brain and internal ear forms the vestibular system. It helps to relay sensory information require for controlling balance and eye movements. If there is any lesion or pathology to this system may lead to vestibular disorder. Along with common symptoms, patients have decreased independence in self-care and mobility skills. Scales available to measure quality of life in patients with vestibular disorder are DHI, ABC, VHQ, and VADL. There are total 28 activities mentioned in the VADL scale which is further administer in different 3 sub skills including functional, ambulation and instrumental. The scale has been translated, reliable and valid in multiple languages. However no psychometrically validated Gujarati version is available. Aim: To assess the reliability and validity of Gujarati version of vestibular disorder activities of daily living scale (VADL) among the subjects with vestibular disorder. Methods: 200 subjects with vestibular disorder were recruited for the study, which was carried out under 3 primary phase. Phase 1 was translation of the scale into Gujarati language. Subsequently it was tested for understandability of the prefinal version. Later on to the final version was tested to find out its reliability and validity. Result: Intraclass Correlation Coefficient (ICC) had used to determine test re-test reliability, total score of VADL-G was 0.992, which indicated excellent reliability. Content validity was examined by Content Validity Index (CVI). The value of I-CVI for 28 items is 0.80 to 1.00 and S-CVI/Ave of 0.98 that showed excellent content validity for VADL-G. Conclusion: On the basis of findings, (VADL-G) is a reliable and valid screening tool for assessing ADL difficulties among Gujarati population with vestibular disorder.

**Keywords:** Health related quality of life, outcome measure, psychometric properties, vestibulopathy, Vertigo

## 1. Introduction

The vestibular system is a complex set of structures and neural pathways that serve a wide variety of functions that contribute to our sense of proprioception and equilibrium. There are main 3 segments composing vestibular system are peripheral sensory system, central processing unit and motor output. A peripheral sensory apparatus consists of a group of motion sensors that send information to the central nervous system—specifically, the vestibular nucleus complex, and to the cerebellum—about head rotation around axis, and head linear movement. This information get through to the central nervous system and combine with additional sensory information to regulate head and body orientation. The output of the central system goes to the ocular muscles and spinal cord to serve three important reflexes, the vestibulo ocular reflex (VOR), the vestibulocollic reflex (VCR), and vestibulospinal reflex (VSR).<sup>[1]</sup>

Role of the vestibular system in postural control:<sup>[1] [2]</sup>

Vestibular system is both a sensory system, and a motor system, it plays many roles in postural control.

- Sensing and perceiving position and motion
- Orienting the body to vertical
- Controlling center of body mass

- Stabilizing the head and trunk

Any lesion or pathology in the vestibular system leads to vestibular disorder. Vestibular disorder is a wide- ranging term, which categorized into central and peripheral components. Peripheral vestibular disorder again as broad term which comprise Benign Paroxysmal Positional Vertigo (BPPV), Ménière's disease, Endolymphatic hydrops, vestibular neuritis.<sup>[4]</sup> Symptoms of the vestibular disorder are of two types. Static symptoms are that happen within the absence of head movements nausea, vomiting, vertigo, and imbalance. Dynamic symptoms which happen during head movements including loss of vision, blurring of vision, and confusion in complex sensory situation.<sup>[5]</sup> Prevalence rate of the vestibular disorder is 15%-20% in India.<sup>[1]</sup>

Vestibular disorder has impact over daily basic activities and personal care of the patients. Self-administered surveys of function, developed specifically for vestibular disorders.

**HELEN S. COHEN** has invented a scale named Vestibular Disorders Activities of Daily Living Scale (VADL) for a broad range of vestibular disorders.<sup>[9]</sup> The scale has more specific to the details of activities of daily living (ADLs). There are total 28 activities in the scale,

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which further distributed in three subtasks. **1. Functional** comprise 12 basic personal care tasks., **2. Ambulation** consists 9 ambulation mobility skills, and **3. Instrumental** covers 7 instrumental activities skills. The scale has 10 points in which 1 indicates independent and 10 indicates unable to perform. Scoring of the scale is depend upon the mean and median value of the total score, and of the three sub score.<sup>[7]</sup>

Various measures developed in English and intended to be used only in English-speaking countries. So the clinician and researchers face lacking of acceptance within the local language. Detection of the functional limitation becomes crucial for pertinent treatment in order to promote functional independence. There is lack of literature supporting its translation into regional language. Hence, it is need to translate the scale in Gujarati language and evaluate the reliability and validity for an equivalent.

## 2. Methodology

The study proposal was approved by Ethics Committee, School Of Physiotherapy, RK University (ECR/ 259/ Indt/ 2016), and CTRI (Clinical trial registry - India) CTRI/ 2021/ 01/030659. Total 200 subjects were taken with all covid 19 precautions. All the subjects were explained about study prior to enrolment in study. Informed written consents were obtained from the subjects who fulfilled the inclusion and exclusion criteria and were willing to participate in study. Inclusion criteria;

- Male and female both gender included
- Age group between 41 to 60 years
- Subjects diagnosed with vestibular disorder
- Subjects having MMSE score >25 Exclusion criteria
- Premorbid history of existing visual, hearing, psychiatric or neuronal illness leading to any cognitive deficit

### Materials and Appartus:

- Pen
- Consent form
- Assessment form
- Mini-Mental State Examination
- Vestibular disorder activities of daily living scale- Gujarati version The study was carried out in following phase:

#### 1) To translate the questionnaire

##### Forward Translation:

The first step was to translate the scale from the original language which was English to the target language Gujarati. At least two independent translators did it. Ideally, the bilingual translators translated the questionnaire into their mother tongue. One translator be well known about the concepts the questionnaire intend to measure, another translator, who was uninformed of the objective of the questionnaire.

##### Synthesis of Translations:

To produce synthesis of the two translations, a third neutral person combine both Gujarati translations after resolving the conformity.

##### Backward Translation:

The translation was done independently back translated (i.e., translate back from the target language into the original language) by two bilingual translators, to confirm the ascertainment of the translation. To avoid bias, back-translators should not be informed, totally blind to original version.

##### Expert Committee

Constituting an expert committee was suggested to produce the prefinal version of the translation. Members of the committee include experts who are familiar with the construct of interest, a methodologist, forward and backward translators, and if feasible, developers of the original questionnaires. The role of expert committee was to analyze all versions of the translations and verify whether the translated and original versions achieve semantic, idiomatic, experiential, and conceptual equivalence and develop the pre-final version of questionnaire for field-testing.

#### 2) Test of the Pre-Final version

A new developed questionnaire, the prefinal version of the translated questionnaire filled by the patients, preferably 15–30 from a targeted setting. After finishing the questionnaire, the subjects were asked to elaborate what they thought was meant by each questionnaire item and their response. This approach helps the investigator to make sure that the translated items maintained the same meaning as the original items, there was no confusion regarding the translated questionnaire. This process may be repeated and patients were selected according to inclusion criteria to confirm the final translated version of the questionnaire.

#### 3) Validity and Reliability Testing

##### Face validity:

Face validity is a subjective assessment of whether the result appears relevant to the ones to be measured by asking, 'Do you think this questionnaire is relevant in daily activities?' The answer was noted as 'yes' or 'no'. Face validity of VADL was established when all 200 patient questioned about the relevance of the questionnaire to them in daily activities.

##### Content Validity:

Content validity was evaluated by using the Content Validity Index (CVI). The panels of experts were asked to rate each item based on relevance, clarity, simplicity and ambiguity on the four-point scale. CVI value was calculated for each item on a scale as (I- CVI) was calculated by rating given to the items out of 4 divided by number of members in expert panel, and for overall scale (as S-CVI) is calculated using the average calculation method (S-CVI/Ave). The I-CVI of each item should be at least 0.78 and SCVI/Ave should be  $\geq 0.90$

**Test-Retest Reliability:**

Test-retest reliability of the questionnaire was assessed through the score get scale refilling by patients. Patients completed the VADL-G twice with an interval of 48 hours.

**3. Result**

Statistical analysis was done by the SPSS version 21 for windows. Microsoft Word and Excel were used to generate graphs and tables.

Test-retest reliability was determined by Intra-class Correlation Coefficient (ICC). Level of significance was set to 0.05.

**Table 1:** Age Distribution of patients

Age Group (in years)	No. of Patients
41-45	59
46-50	43
51-55	41
56-60	57
Total	200

Table 1 shows age distribution of the patients between 41 to 60 years.

Table 2 shows higher no. of female in gender distribution which inclined towards more prevalence of the vestibular disorder.

**Table 2:** Gender Distribution of patients:

Gender	No. of Patient
Male	79
Female	121
Total	200

Table 2 shows higher no. of female than male.

**Table 3:** Mean Age and SD of patients:

N	Minimum (Years)	Maximum (Years)	Mean (Years)	SD (Years)
200	41	60	50	6.15

Table 3 signifies the mean age and sd of patients.

**Table 4:** Mean and SD of Gujarati version of Vestibular disorder activities of daily living scale:

Administration	N	Mean	Std. Deviation
RATERA1	200	2.3866	.60729
RATERA2	200	2.4199	.59450

Table 4 shows Mean and SD of vestibular disorder activities of daily living scale in patients.

Depends upon findings and result, Table 5 shows ICC for subscale and total score of the scale was > 0.85 that indicating very high correlation.

**Table 5:** ICC and Test retest reliability of sub score and total score VADL-G:

ITEM	ICC	CRONBACH'S ALPHA
Functional	0.989	0.994
Ambulation	0.978	0.989
Instrumental	0.901	0.948

Total VADL-G	0.996	0.992
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Table 5 shows ICC for each item and total scale was > 0.85 that indicating very high correlation.

**Table 6:** Content validity index of VADL-G

CVI	I-CVI	Ave-CVI
	0.80 to 1.00	0.98

Table 6 indicating Content validity index of each item (I-CVI) and for overall scale (as Ave-CVI) was 0.80 to 1.00 and 0.98 respectively that shows significant high validity.

It shows significant high validity for i-cvi and Ave-cvi for each item and for whole scale respectively. So, based on the analysis of the result, the null hypothesis was rejected and the experimental hypothesis was accepted which suggests that Gujarati version of the (VADL-G) is reliable and valid tool for assessing ADL difficulties among Gujarati speaking subjects with vestibular disorder.

**4. Discussion**

**Dorcas E. Beaton et al**, mentioned if given task which is translatable but may not be experienced in a different culture, should replace by a similar task.<sup>[10]</sup> In the 1<sup>st</sup> phase of the translation of the scale from original English to targeted Gujarati language, a activity was adapt according to the local culture. Activity F8 "putting on shoes" was revised because not all the Indian women wear shoes which is very basic function. So F8 activity was translated as "પગરૂપા પહેરવ" in Gujarati version which give generalized aspect to put on footwear.

The translation procedure corresponds to the guidelines for cross-cultural adaptation<sup>[10]</sup> and did not pose any problem. The panel accepted all the items. Although some semantic and grammatical were suggested. And at the end of backward translation both versions have same conceptual meaning.

A study done by **Dr. R.G. Marx et al**, on comparison of two time intervals of test re-test reliability of health status instruments found that there were no statistically significant difference in the test re-test reliability( intra class correlation coefficient statistic) for the two time intervals at 2 days and 2 weeks<sup>[11]</sup>. While examine the test- retest reliability of the presented study was excellent when the VADL-G was administered twice with a gap 48 hours to the patients with vestibular disorder. ICC value confirms that the VADL-G is valid tool to assess daily activities among the patients with vestibular disorder. Internal consistency which measure construct of the items, that shows high value of the presented study of the total score of the VADL-G scale, such as functional independency of the patients suffering from vertigo and imbalance. **Polit and Beck et al**,<sup>[16]</sup> have criticized the content validity index details and they recommended using Lynn's criteria for calculating the I-CVI (I-CVI = 1 with 3 or 5 experts and a minimum I-CVI of 0.78 for 6 to 10 experts) and an Ave-CVI of 0.90 or higher to have an excellent content validity of an instrument. **Janine R. documented** a VADL scale as outcome measure

intended to provide better intervention measure to vestibular rehabilitation.<sup>[17]</sup>

## 5. Conclusion

On the basis of the result and findings, Vestibular disorder activities of daily living scale Gujarati version (VADL-G) is a reliable and valid screening tool for assessing ADL difficulties among Gujarati population with vestibular disorder. The development of the VADL-G meets the objective of screening by subjective evaluation that can be used for early diagnosis providing ways for early intervention in context to vestibular disorder.

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