

Reliability and Validity of Gujarati Version of Fatigue Assessment Scale (FAS) - A Cross-sectional Study

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ABSTRACT

Introduction: Fatigue is defined as a condition of unusual tiredness, weakness, and exhaustion and significantly lowers patients' quality of life. Being a subjective scale, FAS must be available in different languages to record the fatigue level.

Aims: The aim is to translate the FAS in Gujarati language and to test its validity and reliability in normal population.

Methods and Material: This is a cross-sectional study which was conducted in Ahmedabad, Gujarat from July 2022 to September 2022 with the permission from original author. The study was conducted in 3 steps that is translation, face and content validity and test-retest reliability. Beaton's guidelines were followed for the process of translation. Total 10 experts were taken for the process.

Result: Mean age of 34.89 ± 17.81 years, total 120 participants were included. Statistically, CVR ratio for item 4 and 10 was 0.8 and 1 for all other items of the scale. The I-CVI value for item 4 and 10 was 0.9 and 1 for all other items. The α value was 0.91 and Correlation Coefficient value was 0.92 showed that the Gujarati FAS has excellent test-retest reliability. For content validity, the kappa value of $k=0.75$ (95% CI: 0.749, 0.755, $p = 0.000$), which indicates substantial agreement between the raters.

Conclusion: The Gujarati FAS scale is a brief, easy-to-use, reliable, and valid scale for assessing fatigue in healthy Gujarati population.

Keywords: Translation, Fatigue, Reliability, Validity.

INTRODUCTION

Fatigue is defined as a condition of unusual tiredness, weakness, and exhaustion and significantly lowers patients' quality of life. [1] The feeling of fatigue has many different aspects and is influenced by many different factors. It can be postulated that fatigue may be understood as a network model, where exhaustion incorporates numerous biological, psychological, and social elements and includes, disease activity (inflammation), physical activity, sleep problems, obesity, psychological resilience, and vulnerability (emotions, cognitions, behavior) and also social factors (work, financial resources). All of these

reasons cause individuals to feel more tired during daily life activities.[2] Fatigue also plays a substantial role in the healthy population. Severe fatigue during a relatively long period can lead to sick leave and work disability.

In the assessment of fatigue, generally subjective self-rating scales are used. For instance, fatigue is one of the most pervasive symptoms experienced by patients suffering from chronic diseases like cancer [3], multiple sclerosis [4], sarcoidosis [5] and now in COVID [6]. As a result, numerous fatigue questionnaires—many of them multidimensional—have been created for various populations.

Ten questions on the Fatigue Assessment Scale (FAS) ask participants about their general feelings. The responses are graded on a 5-point scale with 1 being "never" and 5 being "always," resulting in a possible total score of 10 to 50. Reversed scoring is necessary for items 4 and 10. A high score means that your level of fatigue has increased. The FAS was created by doing a semantic analysis on four widely used tiredness measures, which resulted in the elimination of 40 questions in favor of a manageable number of five. Previous research on working population, and a population with sarcoidosis samples all demonstrated that the psychometric characteristics of FAS are good. Initial studies employing the FAS in populations with stroke have showed promising results.^[7]

Being a subjective scale FAS must be available in different languages to record the fatigue level. No Gujarati version of the FAS is available till now. Therefore, the aim of the study is to translate the FAS in Gujarati language and to test its validity and reliability in normal population.

MATERIALS & METHODS

This is a cross-sectional study which was conducted in Ahmedabad, Gujarat from July 2022 to September 2022. Permission was granted by the Institutional Ethical Committee to conduct the study. Written informed consent forms were taken from the participants who were willing to participate in the study. Participants which were included in the present study were recruited from in and around the community.

Inclusion Criteria:

1. Both male and female participants.
2. Participants older than 18 years.
3. Able to read and understand Gujarati language.

Exclusion Criteria:

1. Any medical, physical and mental disability.
2. Severe cognition impairment.

3. Any Visual deficit.

Sample Size Calculation:

Sample size was calculated based on 1:10 ratio with 20% dropout so total of 120 participants as per 10 items of the FAS were included in the study.^[8]

Study Protocol:

The author who created the Original English version of FAS scale gave permission and was granted for the translation into Gujarati language.^[7] According to the Beaton Guidelines and suggestions given by author, the process of translation of the FAS scale was carried out.^[9] The process consisted of forward translation, reconciliation, backward translation, and comparison with the original source.

Step 1:

Translation was done by two independent translators who are familiar with bilingual language. One translator (T1) with known medical care and knowledge of medical terminologies and other translator (T2) who is not related to the medical terminologies. The translators made a written report of the translation and comments were made to uncertainties.

Furthermore, the procedure of reconciliation (T12) of T1 and T2 was undertaken, and a written report was documented with each of the issued address and were resolved.

The next undertaking procedure was the backward translation of the reconciliation. Two backward translators (B1 & B2) were chosen, both with the knowledge of English and Gujarati language and those translators was not informed of the concepts explored, and they were without the medical background to avoid formation bias. Reconciliation (B12) of B1 and B2 was done and a prefinal version was constructed.

Step 2:

Cognitive debriefing:

Out of 120 participants, 20 participants were randomly selected for the approval of prefinal version based on terms, language

and nomenclature, explanation, and the accuracy of the response options provided. Based on the comments from participants, words like “often” (ઘણીવાર was changed to વારંવાર) and “always” (હંમેશા was changed to બધાજ સમયે) was changed for better understanding.

Step 3:

Face and content validity:

The prefinal version was given to the ten-expert committee with mean experience of 10.5 years from medical as well as non-medical field. Face and Content validity of the translated version was carried out by using consensus method. All the Experts examined each component of the scale based on grading, layout, phrasing, interpretation and administration. All the components of Gujarati FAS were accepted by all the experts.

For Content validity all the 10 expert's ratings were calculated using Content Validity Ratio (CVR) to measure consensus, the Content Validity of Individual items (I-CVI) to measure proportional agreement, and Fleiss Kappa (Cohen kappa adaptation for more than 3 raters) to measure experts agreements.

CVR value

For the process of content validation, all the expert committee members were asked to rate each item on the scale from 1 to 3 where 1 demonstrate rejected, 2 demonstrate accepted with modifications and 3 demonstrate accepted.

The Content Validity Ratio (CVR) proposed by Lawshe (1975) ^[10] is a linear transformation of a proportional level of agreement on how many “experts” within a panel rate an item “accepted” calculated in the following way:

$$CVR = \frac{N_e - (N/2)}{N/2}$$

Where,

CVR = Content Validity Ratio

N_e = number of expert committee members indicating an item “accepted”

N = number of expert committee members

CVR Value of 0.80 was accepted.

I-CVI value

All the experts were asked to score items on a 4 point ordinal scale where 1 indicating non-relevant 2 indicating somewhat relevant, 3 indicating quite relevant and 4 indicating highly relevant

The number of experts assessing an item as relevant or clear (rating 3 or 4) was divided by the number of content experts to create the content validity index (I-CVIs) for each item. Acceptability of all the Item on the scale is decided as follows: If the I-CVI is greater than 79 percent, the item will be considered appropriate. It needs to be revised if it is between 70% and 79 percent. It is discarded if the percentage falls below 70% ^[11]

Fleiss Kappa

Fleiss Kappa for more than 3 raters to measure expert agreements. Kappa coefficients of 0, 0.01–0.20, 0.21–0.40, 0.41–0.60, 0.61–0.80, and 0.81–1.00 represent poor, slight, fair, moderate, substantial, and almost perfect agreement, respectively ^[12]

Step 4:

Test-retest reliability study was carried out after taking a written informed consent of total 120 participants with the interval of one week between the test.

STATISTICAL ANALYSIS AND RESULT

All the data were analyzed by using the SPSS version 26.0. The participant's characteristics were evaluated by using descriptive statistics (Table 1).

Each item of the scale was calculated with the level of significance set at $p < 0.05$.

	Mean ± Standard Deviation
Age (years)	34.89 ± 17.81
BMI (kg/m ²)	22.92 ± 4.53

Table 1. Demographic characteristics of the participants (n=120)

Content and Face validity:

To determine the content validity, the CVR values for 8 items in Gujarati FAS was 1 so it was accepted by all the expert committee

members (n=10) except for item 4 and 10 which was 0.8 means it is accepted with modification by 1 expert. (Table 2)

	Acceptability of items of Gujarati FAS by expert committee members										No. of experts rated "accepted"	CVR value
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10		
1	3	3	3	3	3	3	3	3	3	3	10	1
2	3	3	3	3	3	3	3	3	3	3	10	1
3	3	3	3	3	3	3	3	3	3	3	10	1
4	2	3	3	3	3	3	3	3	3	3	9	0.8
5	3	3	3	3	3	3	3	3	3	3	10	1
6	3	3	3	3	3	3	3	3	3	3	10	1
7	3	3	3	3	3	3	3	3	3	3	10	1
8	3	3	3	3	3	3	3	3	3	3	10	1
9	3	3	3	3	3	3	3	3	3	3	10	1
10	2	3	3	3	3	3	3	3	3	3	9	0.8

Table 2- CVR values for 10 items in Gujarati FAS scale. M1, M2, M3 etc denotes the expert members of committee

To determine the Item Content Validity, I-CVI values were used. The I-CVI values for all the items were 1 except for item 4 and 10 which was 0.9. Each item of

Gujarati FAS is with I-CVI value greater than 0.79% which is suggestive of appropriateness of each item in the scale. (Table-3)

	Acceptability of items of Gujarati FAS by expert committee members										No. of experts rated 3 or 4	I-CVI value
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10		
1	4	4	4	4	4	4	4	4	4	4	10	1
2	4	4	4	4	4	4	4	4	4	4	10	1
3	4	4	4	4	4	4	4	4	4	4	10	1
4	2	4	4	4	4	4	4	4	4	4	9	0.9
5	4	4	4	4	4	4	4	4	4	4	10	1
6	4	4	4	4	4	4	4	4	4	4	10	1
7	4	4	4	4	4	4	4	4	4	4	10	1
8	4	4	4	4	4	4	4	4	4	4	10	1
9	4	4	4	4	4	4	4	4	4	4	10	1
10	2	4	4	4	4	4	4	4	4	4	9	0.9

Table 3- I-CVI values for 10 items in Gujarati FAS scale. M1, M2, M3 etc denotes the expert members of committee

For content validity, the Fleiss kappa statistic had a kappa value of k=0.75 (95%CI: 0.749, 0.755, p = 0.000), which indicates substantial agreement between the raters.

Reliability:

The internal consistency was assessed by Cronbach's alpha. Here, due to its significant Internal Consistency (α= 0.91) and high Correlation Coefficient (ICC= 0.92 with 95% CI 0.88- 0.94) the Gujarati FAS showed excellent test-retest reliability.

DISCUSSION

The aim of this study was to translate and develop a Gujarati Version of 10- item Fatigue Assessment Scale and to find its reliability and validity for the Gujarati population. A useful and effective evaluation is provided by FAS, given its simple and concise structure. It also provides a complete review from a one-dimensional view due to the fact that it was created by combining fatigue-related indicators from other surveys. The internal consistency of FAS was 0.91 and high

intraclass correlation coefficient which was 0.92 as well as kappa value of $k=0.75$ which indicates substantial agreement between the raters. Hence, according to the values of the result it can be said that the Gujarati version of FAS is a valid and reliable tool as well as easy to understand and administer for assessing fatigue.

Till date upto 7 translated versions of FAS are available. (Table 4). FAS's original version in English was created by Helen J. Michielsen et.al. from the department of Clinical Health and Psychology, Netherlands in 2002. The study concluded that the FAS had a high internal consistency (ICC=0.90). The pattern of correlations and factor analysis showed good convergent and

divergent validity. The FAS correlated strongly with the other fatigue scales⁽⁷⁾ The validity and reliability of the Chinese version were established in stroke patients who also have depressive symptoms. Their internal consistency was shown by the Cronbach's alpha (0.71-0.82). The test-retest ranged from 0.77 to 0.95. For the construct validity, it was shown that the Chinese FAS had a correlation with the Mental Fatigue Scale ($r = 0.68$) and FSS ($r = 0.57$).⁽¹³⁾ Postpartum ladies were tested on the Spanish version. The Cronbach alpha coefficient was 0.80, and descriptive and explanatory factor analysis was used to determine its validity.⁽¹⁴⁾

Translations of FAS	Authors	Place of study	Reliability	Validity
English version (original) (2002)	Helen J. Michielsen et.al. ⁽⁷⁾	Netherlands	ICC=0.90	Correlations and factor analysis showed good convergent and divergent validity
Swedish version (2016)	Anna Brändal et.al. ⁽¹⁵⁾	Sweden	weighted kappa ($k > 0.60$)	Correlation between FAS and SF-36 ($r = -0.73$) and with the GDS-15 ($r = 0.62$)
Spanish version (2017)	Antoni Cano-Climent et.al. ⁽¹⁴⁾	Spain	Cronbach's alpha =0.80.	Correlation between BSES-SF and FAS-e score was (-0.25 ; $p < .01$).
Persian version (2018)	Somayeh Lookzadeh et.al. ⁽⁵⁾	Iran	ICC for physical fatigue =0.94 Mental fatigue =0.89	KMO= 0.80
Chinese version (2020)	Lily Y. W. Ho et.al. ⁽¹³⁾	Hongkong	ICC=0.77-0.95; K= 0.38-0.83	Correlation between C-FAS and the Mental Fatigue Scale ($r_s = 0.68$), FAS ($r_s = 0.57$), Epworth Sleepiness Scale ($r_s = 0.36$) Fugl-Meyer Assessment of upper ($r_s = 0.24$) lower ($r_s = 0.24$) extremities
Arabic Version (2022)	Sara Alhanbali et.al. ⁽¹⁶⁾	Jordan Saudi Arabia	Cronbach's alpha for FAS-A was 0.88	KMO= 0.87
Turkish version (2022)	Mehmet Özkeskin et.al. ⁽¹⁷⁾	Turkey	ICC = 0.812. The Cronbach alpha coefficient was 0.914	Correlation of FAS and FSS ($r = 0.767$, $P < 0.01$) EQ-5D-3 L Index and FAS ($r = -0.500$, $p < 0.01$) EQ 5D- VAS and FAS ($r = -0.536$, r^2 , $P < 0.01$) BDS and FAS ($r = 0.540$, $P < 0.01$) BDSS and FAS ($r = 0.412$, $P < 0.01$)

[Table-4]: Reliability and Validity of various translations of FAS.

SF-36= Short Form Health Survey, GDS-15= The Geriatric Depression Scale, BSES-FS- short form of the Breast-Feeding Self Efficacy Scale, KMO- Kaiser-Mayer-Olkin Measures of Sampling, C-FAS- Chinese version of Fatigue Assessment Scale, FAS-A= Arabic version of Fatigue Assessment Scale, FSS- Fatigue Severity Scale, EQ-5D-3 L index= EuroQoL-5 Dimensions index, EQ 5D-3 VAS= EuroQoL-5 Dimensions Visual Analog Scale, BDS= Beck Depression Scale, EDSS= Expanded Disability Status Scale.

CONCLUSION

The Gujarati FAS scale is a brief, easy-to-use, reliable and valid scale for assessing fatigue in healthy Gujarati population. The Gujarati FAS scale can be used in researches as a clinical tool to identify both physical and mental fatigue.

Declaration by Authors

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