Physiotherapy Section

Translation, Cross-Cultural Adaptation and Reliability of the Lower Extremity Functional Scale into a Gujarati Version and Validation

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ABSTRACT

Introduction: Lower Extremity Functional Scale (LEFS) is one of the most commonly used scales to assess wide range of patients with lower extremity problems. It was originally developed in English and later was translated to many other languages. The LEFS is currently not available in Gujarati language so there is a need to develop a Gujarati version of LEFS which can be used by the Gujarati language speaking population, other researchers and even clinicians throughout Gujarat.

Aim: To translate and cross-culturally adapt the LEFS into the Gujarati language and to test the validity and reliability of this version.

Materials and Methods: A two-stage observational study was conducted. The LEFS was initially translated to Gujarati language through double forward and backward translation and then it was cross-culturally adapted. The translation and its comparative analysis with the original version was assessed and approved by the experts of the committee formed. The reliability and validity of finalized version of Gujarati LEFS was subsequently completed with the sample size of 10 participants including both the genders for various lower limb conditions.

Results: The Gujarati version of the LEFS has high internal consistency (Cronbach's α=0.809) and test-retest reliability (intraclass correlation coefficient=0.809, 95% CI: 0.58, 0.94).

Conclusion: The translation of the LEFS into a Gujarati version was successful in preserving the semantic and measurement properties of the original version and was shown to be valid and reliable in a Gujarati population.

Keywords: Function, Gujarat, Lower limb, Psychometric properties

INTRODUCTION

Functional ability refers to an individual's ability to perform the activities and tasks of daily living that are required in order to cope with personal and environmental demands [1]. Functional ability is directly related to quality of life and its assessment is essential in clinical practice [2]. The level of functional ability determines the decision making process and sets the goals of therapeutic intervention. Physical examination and complementary imaging are considered insufficient to establish the functional level of an individual following injury or surgery [3]. Accurate assessment of function has been shown to be of value for rehabilitation to help provide treatment based primarily on individual disabilities and not solely on clinical status generated from diagnostic exams [4]. Assessing patients' perception about their quality of life and improvements in clinical and functional status is becoming more routine in the scientific and clinical communities [5].

The LEFS was developed by Binkley JM et al., [6]. It is a simple and user friendly scale. The LEFS was developed to measure "patients' initial function, ongoing progress, and outcome" for various lower-limb conditions. When compared with SF-36, LEFS showed good validity and reliability [6].

The LEFS has been modified from its original English version and validated in different languages like Greek [2], German [7], Italian [8], Dutch [9], Persian [10], Brazilian Portuguese [11], Malaysian [12], etc. In all of these studies, the cross-culturally adapted LEFS was found to be reliable and valid.

LEFS can differentiate pain and functioning and so can be used as an alternative to WOMAC-PF [13]. It can also be used to know the functional status of an individual during the postoperative period [14]. LEFS has excellent test-retest reliability, internal consistency and construct validity [6,13,14].

The LEFS has been used for measuring the activity limitation and the functional outcomes in research projects related to patients with osteoarthritis of the hip or knee undergoing total joint arthroplasty [5], after hip fracture [15], with anterior knee pain [16], after anterior cruciate ligament reconstruction [17], with ankle sprains [18], with ankle fractures [19], with post-traumatic distraction osteogenesis [20], and for inpatients of orthopedic rehabilitation wards [21]. Hart DL et al., reported that functional status, as assessed using LEFS, represents the "activity dimension" of the World Health Organization's International Classification of Functioning, Disability, and Health [22].

For LEFS there are no translations available in any Indian languages. The objectives of this study were, to translate the lower extremity functional scale from Original English to Gujarati language, to cross culturally adapt the LEFS into Gujarati language and to create a reliable and valid Gujarati version of LEFS by translation and adaptation.

MATERIALS AND METHODS

An observational study was conducted in two phases namely the translation phase and the validation phase. Each phase was carefully conducted so as to eliminate bias and to produce reliable results. Ethics approval was obtained from Medilink Ethics Committee, Ahmedabad. Before starting the translation work of LEFS, a written approval from the original author Binkley JM was obtained. The copyright holder of the original LEFS authorised the study and publication of the work. The study period was 3 months, from July 2017 to September 2017.

The LEFS is a 20-item questionnaire designed to be applicable to individuals with musculoskeletal conditions of the lower extremity. Each item of the LEFS scores on a 5-point scale ranging from 0 to 4 points. When scoring the LEFS, up to four missing item responses are permitted. LEFS scores range from 0 to 80 points, with higher scores representing higher levels of functioning [6].

Procedure: Translation of the LEFS from its original English version to the Gujarati version was performed following the forward/backward translation guidelines [23]. This method was performed to ensure the translated version is grammatically sound and the terms used are correct. At the same time the meaning and contents of original LEFS are well preserved.

First, translation into Gujarati was performed independently by two Gujarati native speakers, one familiar with healthcare and its terminology and the other not familiar with healthcare and its terminology (T1 and T2, respectively). Subsequently, a version combining both initial translations (T1/T2) was written, based on consensus of the two initial translators. Some adaptations of the original questionnaire were defined during the translation process to suit the Gujarati culture and traditions. This synthesised version was then back-translated into English by two independent professional translators (BT1 and BT2) to allow verification of consistencies with the original English version.

These versions (BT1 and BT2) were then sent for a comparative analysis with the original version to experts of the committee composed of orthopedic surgeons, physical therapists, and researchers for the dissemination in Guajarati [Table/Fig-1]. Each item was analysed as accepted, accepted with modification or rejected. Their reviews and feedback were considered and modifications were done accordingly.

No.	Designation	Specialty	Experience	Age
1	Orthopedic Surgeon and HOD/Professor in Medical College	MS (Orthopedics)	30 years	55 years
2	Orthopedic Surgeon	MS (Orthopedics)	28 years	53 years
3	Anaesthesiologist/Chief operating officer in medical college and Hospital	MD (Anaesthesia) and Hospital administration	24 years	53 years
4	Principal of Physiotherapy College	MPT-Orthopedics	22 years	45 years
5	I/C Principal/Sr. Lecturer of Physiotherapy College	MPT-Orthopedics	7.6 years	31 years
6	Clinical Therapist	MPT-Orthopedics	11 years	35 years
7	Assistant Professor in Medical College	PhD Biostatistics	24 years	54 years
8	HOD/Associate Professor, Statistics Dept.	M.Sc., PhD	25 years	49 years
9	Associate Professor in Gujarati	MA, B.Ed. in Gujarati	23 years	45 years
10	Associate Professor and HOD English Dept.	MA, B.Ed. in English	24 years	47 years
11	Principal of Physiotherapy College	MPT-Neuro rehab.	9.4 years	34 years

[Table/Fig-1]: Experts committee.
HOD: Head of Department, I/C: Incharge

This pre-final version was presented in a group of 10 patients [Table/Fig-2] with a variety of lower limb conditions to explore the clarity of the questionnaire. Sample size was set as 10 for the initial target number of respondents for validation of the 20-item LEFS and the participants were selected by the simple random sampling method. The participants were selected from those visiting the Physiotherapy department of Ahmedabad. The inclusion criteria for the respondents were males or females in the age group from 25-85 years with ability to read and understand Gujarati and an examination suggestive of lower limb affection. The exclusion criteria were any systematic disease or neurologic condition other than musculoskeletal pathologies. Participants who were eligible for this study were informed about the purpose of the study and the methodology. Written informed consent was obtained and questionnaire was handed to them to fill up. All patients were asked whether they understood the items and whether they could interpret the questionnaires correctly.

S No.	Age (Years)	Gender	Diagnosis
1	25	Male	Right Chronic Ankle Sprain
2	83	Male	Bilateral Osteoarthritis Knee
3	65	Female	Right Osteoarthritis Knee
4	60	Male	Right Total Hip Replacement
5	54	Male	Left Knee Strain
6	62	Female	Right Total Knee Replacement
7	28	Male	Left ACL Reconstruction
8	32	Male	Post traumatic stiffness Right Knee
9	58	Male	Right Hip Trochanteric Bursitis
10	35	Female	Left Heel Pain

[Table/Fig-2]: Study population.

The scores were calculated for each participant and recorded. The participants were ensured of the confidentiality of the study. This procedure was repeated after a week again with the same participants and scores were recorded (To know the test-retest reliability of the LEFS). The completed questionnaires were evaluated to determine the presence of missing responses and language difficulties. There was no specific difficulty in translated LEFS. Thus, this version was accepted for use in a larger patient population.

The findings were discussed among the translators, resulting in only minor changes to the final Gujarati version of the LEFS. The final version of the LEFS in Gujarati was then approved by the expert committee and validated using appropriate statistical analysis. Test-retest reliability and internal consistency were assessed using SPSS version 20.

RESULTS

The mean age of the participants was 50.2 years including 7 males and 3 females. All 20 items listed in the LEFS questionnaire were validated to measure lower limb function in various aspects.

Reliability concerns the degree to which the results of measurement are consistent across repeated measurements. Test-retest reliability of the Gujarati LEFS was determined by means of Intraclass Correlation Coefficients (ICC) at 95% confidence intervals and internal consistency, an indicator for the homogeneity of a questionnaire was assessed with Cronbach's alpha. The Gujarati version of the LEFS had high internal consistency and test-retest reliability with Cronbach's $\alpha=0.809$ and intraclass correlation coefficient=0.809 (95% CI: 0.58, 0.94). The reliability was high for inter-interviewer measures too with an ICC of 0.98 (95% CI: 0.95, 0.99) [Table/Fig-3].

Intraclass correlation coefficient			
	Intraclass correlation	**95% Confidence interval**	
		Lower bound	**Upper bound**
Average measures	0.809	0.581	0.943

[Table/Fig-3]: ICC for reliability.

DISCUSSION

The study was conducted as there was a need for an instrument to measure health related quality of life, especially concerning lower limb in Gujarati population. Being a self-report questionnaire, LEFS provides us an important applicability in both clinical and educational settings. Therefore, it is important to employ a validated health related outcome measures. Adaptation may be required to ensure it is both culturally and linguistically appropriate.

The primary objective of this study was to create a reliable and valid Gujarati version of LEFS by translation and adaptation. No difficulties were encountered in the translation phase of the study; the structure of the original LEFS was not altered and all items were maintained.

Total 7 items (Questions 3, 5, 10, 11, 12, 15, and 19) were modified as per suggestions given by experts and considering the Gujarati population. None of the items were rejected. No change was made in sequence of item presentation. Also the items were numbered in Gujarati, However, in the Brazil version [3] of the LEFS the items were sequenced alphabetically instead of numbers as in Original LEFS.

The item 3 of original LEFS "Getting into or out of the bath" was modified to "while taking bath". Bathing was considered as an activity of daily living which was important to perform. Some people in India, squat on the floor and have a bath, so it was important to keep the question. However, many houses may not have a built in bath tub and so was modified as above. In Brazil version [3] of LEFS this item was changed to "Overcoming an obstacle 50 cm high, such as getting into or out of a bathtub."

The item 5 of original LEFS "Putting on your shoes or socks" was modified to "Putting on your shoes, socks, chappal or sandal" as in Gujarati population the regular use of shoes and socks varies, specifically among females. So, common types of shoe wears were included in that item in Gujarati LEFS.

Considering the use of public transportation in Gujarati population, the item 10 of original LEFS "Getting into or out of a car" was modified to "Getting into or out of a car, rickshaw, bus or train".

The item 11 of original LEFS "Walking two blocks" was modified to "walking a short distance of about 250 meters" as there is no block system in Gujarat.

The item 12 of original LEFS was "Walking a mile". The distance measurement was changed from mile to meters as India-Gujarat uses the metric system, most people in Gujarat would not understand the distance a mile represents. So it is converted from 1 mile to the nearly equivalent distance of about 1.5 km. However, in Brazil [3] and Italian [8] version of LEFS, they replaced 1 mile by 1 km.

Item 15 "Sitting for 1 hour" required more discussion among group members regarding its applicability in Gujarati population. In original LEFS the type of sitting is not specified. The most common complaints of lower limbs in Gujarati people was related to cross-sitting on the floor and getting up from that position. So this item was modified accordingly to "Getting up and down from the floor from cross-leg sitting position". The authors of the Malaysian adaptation [12] also discussed a similar view of it not being clearly specified. The item 'sitting for one hour' in the context of Malaysian population may mean sitting on a chair or sitting cross-legged on the floor or even kneeling on the floor. However, as per the Greek version, [2] most of the participants asked for clarification before answering item 15. Specifically, they asked whether they were allowed to stretch their legs while in the seated position or whether their knee joints had to remain in flexion. Since the original LEFS was not specific concerning the proper position of the subjects' lower limbs, the authors of the Greek version told all participants to answer item 15 according to their own interpretation of the question.

Item 19 of original LEFS "Hopping" was explained as "To move with a small jump either with one foot or both the feet off the ground."

During the study it was observed that there was a decrease in LEFS scoring with increasing age. It would be more appropriate to do a separate study for different age categories.

Though no statistical analysis was done on relation of pain and function, clinically it was observed that the LEFS score was less with acute and severe pain.

Other studies also suggested the correlation of gender and socioeconomic status with LEFS score. Among them one study [24], concluded that men have higher LEFS score than women and there was no significant correlation with the socioeconomic status and LEFS score.

Future studies should include large sample size including other lower limb conditions. Future research work can also investigate the association of LEFS-Gujarati version with other functional measures.

CONCLUSION

The translation of the LEFS into a Gujarati version was successful in preserving the semantic and measurement properties of the original version and was shown to be valid and reliable in a Gujarati population.

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