



ORIGINAL ARTICLE

Reliability and validity of the Taiwan Chinese version of the Lower Extremity Functional Scale



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Background/Purpose: The Lower Extremity Functional Scale (LEFS) is a region-specific functional outcome measure designed for patients with lower extremity musculoskeletal dysfunction. In this study, a Taiwan Chinese version was adapted and its validity and reliability were tested.

Methods: The LEFS questionnaire was adapted and tested in 159 patients with lower extremity disorders from two university hospitals. The Cronbach α -coefficient value was calculated for internal consistency. Intraclass correlation coefficient (ICC), Bland–Altman plot, and minimal detectable change (MDC) were used for evaluating the test–retest reliability and agreement in 40 patients followed up within 7 days. Construct and convergent/divergent validity were examined by principal component analysis and correlation was examined with the Medical Outcomes Study Short Form-36 (SF-36) questionnaire.

Results: The internal consistency and test–retest reliability of the adapted LEFS questionnaire were satisfactory [Cronbach α : 0.98; ICC_(2,1), 0.97]. The Bland–Altman plot of the two tests showed a relatively consistent distribution, with limits of agreement in the range of –9.32 to 13.02. The MDC at 90% confidence interval was 9.6. One-factor model was confirmed by principal

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component analysis. Also, there was a moderate association between the LEFS and the physical component scores and several subscales of SF-36, but not with the mental component scores.

Conclusion: The Taiwan Chinese version of the LEFS questionnaire is a valid and reliable measure of health status for patients with lower extremity disorders.

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Introduction

Musculoskeletal disorders of the lower extremities are prevalent, and have great impact not only on personal locomotion but also on daily living, working, leisure activities, and quality of life. The impact of the disease on patients cannot be adequately reflected by laboratory examination or physical tests alone. Moreover, the physiologic measures do not always correlate well with self-reported functional ability or health. Therefore, it is important to include capacity or performance of functional activities to obtain a comprehensive evaluation of the influence of disease/injury on the health status. Among the many choices of measurement tools, self-reported measures have the advantage of good feasibility, high cost-effectiveness, and clinical relevance in patient-centered care.^{1,2} Generic instruments, such as the Medical Outcomes Study Short Form-36 (SF-36), are used commonly, but they contain items irrelevant to the disease of concern and may be less responsive than condition- or disease-specific measures.³ In contrast, disease-specific outcome measurements may be more sensitive to change than region-specific or generic measurements, but their application would be limited in cases with heterogeneous diagnoses. Consequently, the region-specific measures were hypothesized to be more applicable in patients with variable severity, more responsive to clinical changes than a generic instrument,⁴ and even similarly responsive in comparison with disease-specific outcome measurements.⁵

The Lower Extremity Functional Scale (LEFS), a 20-item region-specific self-reporting measure, is designed to assess the functional status of patients with orthopedic conditions of the lower extremity.⁶ The items are rated on a 5-point scale, from 0 (extreme difficulty/unable to perform activity) to 4 (no difficulty), which allows us to investigate about the degree of difficulty in performing different physical activities because of problems in the lower extremities. It gives the total score from 0 to 80, with high scores indicating better function. In the past decade, LEFS has been applied to a variety of lower extremity disorders, including fractures, degenerative conditions, or soft tissue conditions.^{2,5,7–10} It was also used for the evaluation of convergent validity of other measurements, such as Morton mobility index,¹¹ activity scale for arthroplasty patients,¹² and Cumberland ankle instability tool.¹³ However, it was not adapted in other languages, except for Italian.¹⁴

Cross-cultural adaptation of questionnaires helps to standardize outcome measurements between researches in different settings, and the process is proposed to follow standardized and systematic approaches.¹⁵ The psychometric properties should be examined for the adapted version and cultural and language differences should be addressed. For example, questions related to sexual activities had lower response rates in several versions of the

Disabilities of the Arm, Shoulder and Hand questionnaire, and this was attributed to a conservative attitude toward sexual issues.^{16,17} Also, while testing the extended activities of daily living scale, one item (manage own garden) was revised based on the authors' perception of a cultural difference and two items ("make hot snack" and "write letters") were later deleted because of a lack of discriminative value.¹⁸

There were only a few adapted self-report measurements for lower extremities in Chinese,^{19,20} and none of them were region-specific. Our goal was to generate a Taiwan Chinese version of LEFS and test its validity and reliability in native patients with lower extremity disorders. We hypothesized that the adapted version would have good reliability and validity. Internal consistency, test–retest reliability and agreement were tested. Besides, its construct validity would be examined by principal component factor analysis and convergent/divergent validity by correlating with the physical and mental component summary scores of a generic questionnaire, that is, SF-36.

Methods

Adaptation of the LEFS questionnaire

The adaptation of the original English LEFS questionnaire was authorized by the author of the original English version. The process of translation and adaptation followed the guidelines recommended by a previous publication.¹⁵ In summary, the questionnaire was translated by two bilingual translators whose first language was Chinese. Then a synthesized translation was formed and back-translated by a bilingual translator to check for possible inconsistencies between the translated and the original questionnaires. A pretest version was finalized after discussion among the researchers and a group of experts in rehabilitation medicine, occupational medicine, and physical therapy. The process of translation and pretesting was generally smooth and the back-translation corresponded well with the original version. For question 12 (walking a mile), the distance was converted into the metric equivalent as 1.6 km without rounding.

Patients

This was a prospective study, and involved recruiting a convenient sample of participants from the orthopedic wards and rehabilitation outpatient clinics in two university hospitals between October 2010 and February 2011. The eligible cases were at least 18 years old and had musculoskeletal disorders of the lower limbs. Those patients who were illiterate, cognitively impaired, or had neurological or cardiopulmonary comorbidities were excluded. The study was approved by the ethics committee of National Taiwan

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