



Original Article

Reliability and validity of the Korean version of the Short Musculoskeletal Function Assessment questionnaire for patients with musculoskeletal disorder

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Abstract. [Purpose] The purpose of this study was to establish the reliability and validity of the Short Musculoskeletal Function Assessment questionnaire, which was translated into Korean, for patients with musculoskeletal disorder. [Subjects and Methods] Fifty-five subjects (26 males and 29 females) with musculoskeletal diseases participated in the study. The Short Musculoskeletal Function Assessment questionnaire focuses on a limited range of physical functions and includes a dysfunction index and a bother index. Reliability was determined using the intraclass correlation coefficient, and validity was examined by correlating short musculoskeletal function assessment scores with the 36-item Short-Form Health Survey (SF-36) score. [Results] The reliability was 0.97 for the dysfunction index and 0.94 for the bother index. Validity was established by comparison with Korean version of the SF-36. [Conclusion] This study demonstrated that the Korean version of the Short Musculoskeletal Function Assessment questionnaire is a reliable and valid instrument for the assessment of musculoskeletal disorders.

Key words: Short Musculoskeletal Function Assessment (SMFA) questionnaire, Reliability, Validity

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INTRODUCTION

The physical deconditioning in patients with musculoskeletal disorders result in decreases in physical activity¹⁾. Functional assessment tools are used for the detection of functional disabilities, and they can be used to observe the progression of a disability over time and to make comparisons of patients' functional statuses with those of other healthy adults or other patients with similar disabilities²⁾. Disease or region-specific questionnaires have been created to evaluate results following musculoskeletal injury/disorder treatments³⁻⁷⁾. However, it is difficult to compare patients with multiple injuries with different groups of patients⁸⁾.

The 36-item Short Form Health Survey (SF-36) can be used for various types of diseases, but it lacks the sensitivity to detect score changes⁹⁾. The Musculoskeletal Function Assessment (MFA) questionnaire is an assessment tool with high

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ratings for feasibility and reliability, but it also requires a lot of time; thus, it is more often used in research than in clinics¹⁰.

The Short Musculoskeletal Function Assessment (SMFA) questionnaire is an assessment tool derived from the MFA and is capable of detecting the functional status of patients with musculoskeletal extremity disorders relatively quickly². It is a self-report questionnaire consisting of a dysfunction index (34 items) and a bother index (12 items). Each answer is scored on a scale of 0 to 5, with higher scores indicating higher disability. The SMFA is recommended by the American Academy of Orthopedic Surgeons as an instrument to evaluate the efficacy of treatments, and it is widely used in clinical practice¹¹.

Most of these standard questionnaires have been developed for English-speaking patients only. Translations of existing English-language questionnaires must be validated to deliver the same meaning as well as to ensure comparability of data¹². The SMFA has already been translated and adapted into different languages, including Dutch⁸, Swedish¹¹, Brazilian Portuguese¹³, German¹⁴, Spanish¹⁵, and Chinese¹⁶, with validated reliability.

However, the SMFA has not been adapted for the Korean culture, and no Korean versions are available. Thus, the objectives of this study were to translate the SMFA into Korean and to validate the translated version of the SMFA among Korean patients with skeletal muscle injuries in the upper or lower extremities.

SUBJECTS AND METHODS

A total of 55 outpatients who had musculoskeletal disorders and were receiving physical therapy at C Orthopedic Clinic clinics in Seoul were recruited for this study. The participating subjects had reported pain for at least 1 month. Those who did not agree to answer the questionnaire or did not understand its contents due to psychological or neurological problems were excluded from the study. After the subjects were informed about the study, those who agreed to participate provided signed consent forms. The study was approved by the Institutional Review Board of Gachon University. The SMFA is a questionnaire-type measurement tool designed to be completed by patients to evaluate their functional disability arising from a musculoskeletal disease. The questionnaire is divided into two primary categories: (1) the dysfunction index (34 items) and (2) the bother index (12 items). Each item is scored on a scale of 0 to 5, with higher scores indicating higher disability. Patients are instructed to mark their answers according to how each statement applies to them. The SMFA score is calculated by summing the scores for the response items and then transforming the scores using the formula (actual raw score-lowest possible raw score)/(possible range of raw score) × 100. The total score ranges from 0 (no disability) to 100 (maximum disability)².

The questionnaire was forward-translated by three different native Korean speakers in accordance with the guidelines suggested by Beaton et al¹⁷. Two of the translators were physical therapists with years of experience, and the other one was a person with no medical knowledge or education. The three translated Korean versions were integrated into a consensus version after the parts with vague interpretations had been discussed in a consensus meeting. Backward translation was done by two translators who were bilingual, fluently speaking both Korean and English, but did not have any medical knowledge. This time, the consensus version of the forward translation was backward-translated into English. The final Korean version was completed through comparison and revision of all the versions of the questionnaire by an expert committee including professors and language experts.

To evaluate reliability, the test-retest method was used. The questionnaire was completed twice, with the same questionnaire completed again 7 days after the first time¹⁸. The 7-day test-retest reliability was analyzed by considering the data using the intraclass correlation coefficient (ICC) (2,1). In standard-related validity analyses, correlations between the SMFA and SF-36 were evaluated by estimating the Pearson correlation.

The distribution of the total score was studied to evaluate the ceiling and floor effects. Potential ceiling and floor effects were measured by assessing the distribution of answers across categories and calculating the percentages of patients indicating the minimum and maximum possible scores in the SMFA¹⁹.

RESULTS

The general characteristics of the 55 subjects are shown in (Table 1).

The SMFA score was 5.93 ± 3.94 in the first assessment and 5.69 ± 3.43 in the second. The ICC was used for analyzing test-retest reliability, and the SMFA ICC (2,1) was 0.97 (90% confidence interval, 0.85–0.95) for the dysfunction index and 0.94 for the bother index (90% confidence interval, 0.85–0.95), showing high levels of reliability (Table 2).

The SMFA index values presented significant correlations in all eight dimensions of the Korean version of the SF-36 (Table 3). The strongest correlation for the SMFA dysfunction index was with SF-36 physical function and bodily pain.

DISCUSSION

In the current study, the results for the reliability and validity of the Korean version of the SMFA in patients with various musculoskeletal disorders confirmed that it was indeed a reliable and valid instrument for evaluation of the functional status of the patients.

Ponzer et al.¹¹ studied the reliability of the Swedish version of the SMFA by test-retest evaluation with a 25-day interval

Table 1. The demographic characteristics of study participants (n=55)

	Mean ± SD
Gender (Male/Female)	55 (26/29)
Age (years)	47.0 ± 17.6
Height (cm)	161.9 ± 10.1
Weight (kg)	61.0 ± 9.7
Pain duration (months)	15.5 ± 8.9
Injury location	
Upper extremity	15
Lower extremity	40
Operation status	
Yes	17
No	38

Table 2. Test-retest reliability for SMFA

SMFA	Mean ± SD (score)	ICC
Dysfunction index		
Day 1	35.2 ± 20.2	0.97
Day 2	30.2 ± 22.6	
Bother index		
Day 1	31.9 ± 16.3	0.94
Day 2	30.1 ± 20.0	

SMFA: Short Musculoskeletal Function Assessment; ICC: intraclass correlation coefficient

Table 3. Pearson's correlation coefficients of the SMFA with the SF-36

SMFA	GH	PF	SF	MH	RP	RE	BP	VT
Dysfunction index	0.50	0.72	0.60	0.25	0.61	0.40	0.68	0.49
Bother index	0.54	0.73	0.63	0.35	0.64	0.43	0.71	0.51

All correlations are significant at the 0.05 level.

SMFA: Short Musculoskeletal Function Assessment; SF-36: 36-item short form health survey; GH: general health; PF: physical function; SF: social function; MH: mental health; RP: role physical; RE: role emotional; BP: bodily pain; VT: vitality

and showed a lower rating than that of the Brazilian and Spanish versions.

If the evaluation period is short, memory effects can occur, but as the interval between assessments becomes longer, the improved functional status following treatment can create bias²⁰.

Taylor et al.¹³ reported that test-retest evaluation of the Brazilian version of the SMFA with a 7-day interval revealed significantly high reliabilities for the dysfunction index (0.99) and bother index (0.95). In the current study, test-retest evaluation of the SMFA was conducted with a 7-day interval, and the retest reliability (ICC) was found to be relatively high for both the dysfunction index (0.97) and the bother index (0.94). In the Spanish version, the SMFA was categorized into the upper extremity, lower extremity, and the bother index through factor analysis, and after conducting test-retest evaluation with a 7-day interval, the ICC values were found to be 0.93, 0.95, and 0.92, respectively¹⁵.

Additionally, after analysis of the correlation with the SF-36 to demonstrate the validity of the SMFA, significant correlation was found for both the dysfunction index and bother index. In the Spanish version developed by Guevara et al.¹⁵, there was a more than moderate level of correlation with SF-36, and a particularly high correlation with the physical function and body pain was observed. Furthermore, in the Spanish and Dutch versions, analysis of the correlation with the SF-36 after categorizing the SMFA into three types of indexes revealed that, the upper extremity index had a relatively low correlation with the SF-36. This was because the SF-36 mainly includes items related to the dysfunction of the lower extremity⁸. It was also reported in the Chinese¹⁶ and Dutch versions⁸ that the SMFA showed significant correlations not only with the SF-36 but also with other region-specific questionnaires such as the disabilities of the Arm, Shoulder, and Hand questionnaire, Hip Disability and Osteoarthritis Outcome Score, Knee Injury and Osteoarthritis Outcome score, and the Foot Function Index .

In this study, the ratio of the answers with the lowest and the highest score was used for studying ceiling and floor effects. If more than 15% of the subjects had either the lowest or highest score, it could indicate a ceiling or floor effect. In the Dutch version, a relatively high ceiling effect appeared, and this was due to the fact that the subjects were chronic patients for at least 6 months and all physical activity was limited; furthermore, most of the patients had injuries of the upper extremity resulting in less of an effect on physical activity limitations⁸. In the Chinese version, most of the subjects were patients with upper extremity injuries, and this created a ceiling effect in the arm and hand categories¹⁶. In the current study, most of the subjects were patients with a lower extremity injury for at least 6 months, and like the Chinese version, there was a slight ceiling effect in the category for the arm and hand.

Lower rates of missing values indicate that the questions were easy to understand. In the Swedish¹¹ and Chinese versions¹⁶, the topics related to driving and sex life were often left unanswered, and such results were assumed to be because the two countries have fewer drivers compared with America. There were unanswered sections regarding driving in the current study as well, but the topics were not deleted from the questionnaires. In addition, the Swedish version showed acceptable results upon verification of the responsiveness of the SMFA for patients in whom acute conditions could be improved⁸. Very

good responsiveness was also verified in the English version. The results of our study demonstrate that translating the SMFA into Korean and using it in patients with musculoskeletal disorders showed strong reliability, and the correlation analysis showed strong correlations between the SMFA and SF-36.

However, the responsiveness to detect changes over time was not assessed in this study. In future studies, we should measure the reliability by including a broader range of patients with musculoskeletal disorders and analyze the correlation between disease- and region-specific questionnaires.

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