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Original Article

The reliability and validity of the Korean version of the foot function index for patients with foot complaints

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Abstract. [Purpose] The purpose of this study was to establish the reliability and validity of the Foot Function Index translated into Korean for use in patients with plantar fasciitis and foot/ankle fracture. [Subjects and Methods] Thirty-six subjects with foot complaints, 14 males and 22 females, participated in the study. Reliability was determined by using the intra-class correlation coefficient and Cronbach's alpha for internal consistency. Validity was examined by correlating Foot Function Index scores with the Short Form-36 and the Visual Analog Scale scores. [Results] Test-retest reliability was 0.90 for the pain subscale, and 0.94 and 0.91 for the disability and activity limitation subscales, respectively. The criterion-related validity was established by comparison with the Korean version of the Short Form-36 and Visual Analog Scale. [Conclusion] The Korean version of the Foot Function Index was shown to be a reliable and valid instrument for assessing foot complaints.

Key words: Foot Function Index, Reliability, Validity

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INTRODUCTION

It is reported that about 25% of adults have experienced foot pain. Plantar fasciitis accounts for the largest share of foot-related injuries[1, 2)], experienced by10% percent of the population at some point in their lives[3)]. However, there are few individual self-evaluation forms available for reporting foot and ankle pain, unlike those for hip or knee joint pain[4, 5)]. The American Orthopedic Foot and Ankle Society (AOFAS) uses a clinician-based rating score, which is the most widely used evaluation tool to evaluate foot and ankle surgery results, but it is known to have low construct validity[6)].

The Foot Function Index (FFI) is a disease-specific tool, which was designed to evaluate foot pathology, function, and pain in rheumatoid arthritis patients[7)]. In a review by Van der Leeden[8)], the FFI has been the most widely used foot complaint-related evaluation tool, together with the Leeds Foot Impact Scale.

The FFI consists of 23 items, divided into 3 subscales of activity limitation, disability, and pain. The higher the score goes, the more severe pain or limitation of function is witnessed[7)]. The evaluation is relatively easy and can be completed within 10 minutes. For this reason, it is widely used in clinics[9–11)]. Moreover, it has high reliability and validity for patients with

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not only rheumatoid arthritis, but also plantar fasciitis, posterior tibial tendinitis, and ankle instability[11–14]. It is currently available in many languages including Italian[15], Taiwan Chinese[16], Danish[17], and German[18], confirming its credibility and validity.

However, the reliability and validity of the FFI translated into Korean have not yet been confirmed. This study aimed to determine the reliability and validity of a Korean version of the FFI.

SUBJECTS AND METHODS

A total of 36 outpatients with musculoskeletal disorders receiving physical therapy at C Orthopedic Clinic in Seoul City were recruited for this study. The participating subjects had reported pain for at least 1month. Those who declined to complete the questionnaire or did not understand the contents, or who had psychological or neurological disorders preventing completion were excluded from the study. After the subjects were informed about the study, they agreed to participate and signed consent forms.

The study was approved by the Institutional Review Board of Gachon University (1044396-201504-HR-025-01).

The FFI is a questionnaire-type measurement tool designed to be completed by patients to evaluate pain and functional disability arising from foot complaints. The questionnaire includes 23 items divided into 3 subscales: 1) pain (9 items), 2) disability (9 items), and 3) activity limitation (5 items). Each answer is scored from 0 to 9, with a higher score indicating more severe disability. The FFI score is calculated by summing the response items, then dividing by the maximum possible score for all rated items, and finally multiplying by 100[7].

The forward- and back-translations of the FFI presented no major language problems for an expert committee including professors and language experts.

To evaluate reliability, the test-retest method was used. The questionnaire was to be completed once, and again in 7 days. The 7-day test-retest reliability was analyzed according to the intra-class correlation coefficient (2,1). In standard-related validity analyses, correlations between FFI and the Short Form-36 (SF-36) and Visual Analog Scale (VAS) were evaluated by estimating Pearson's correlation.

Distribution of the 3 subscale scores was studied for ceiling and floor effects. These were considered present if more than 15% of the participants achieved the highest or lowest possible score. The level of statistical significance was set at 0.05. SPSS 12.0 (SPSS, Chicago, IL, USA) was used for statistical analysis.

RESULTS

The general characteristics of the 36 subjects are shown in Table 1. The ICC was used for test-retest reliability, and the FFI ICC (2,1) was 0.90 (90% confidence interval [CI] =0.85−0.95) for pain, and 0.94 and 0.91 for the disability and activity limitation subscales (90%CI=0.85−0.95), respectively, showing a high level of reliability (Table 2).

The FFI index values showed significant correlations with the Korean version of all categories of the SF-36 and VAS (Table 3). The strongest correlation for the FFI was with the SF-36 Physical Component Summary and the VAS.

DISCUSSION

The study showed high reliability and validity for the Korean version of the FFI for use inpatients with foot and ankle injuries. The test-retest reliability of the Danish[17] and German versions[18] was measured 7 days apart and was found to be very high. The test-retest reliability of the Korean version was measured in the same way and was also high.

The Italian[15], Danish[17], and German versions[18] of the FFI showed a high correlation with the SF36 and VAS when evaluated for validity. For the Taiwan Chinese version, the correlation between physical function and pain of the SF36 was especially high. To reduce bias, some studies removed 2 items regarding the use of assistive devices, for which answers are not given. However, Wu et al.[16] said that all 23 items should be used since they influence validity. For this reason, all 23 items were used to measure validity even though responses were not given for 2 items, and showed a high correlation between the FFI and the SF 36 and VAS.

Ceiling and floor effects may restrict responsiveness. Some studies measured these effects in the FFI for non-traumatic ankle and foot complaints, and found ceiling effects for the activity limitation scale regarding the use of a tool[16, 17]. This means that when the FFI is used for patients with minor conditions, it might restrict sensitivity and responsiveness to changes. In the present study, most participants were patients with plantar fasciitis of relatively low severity. For this reason, ceiling effects were found in the activity limitation subscale.

Significant changes in the FFI score in clinical use were observed for 12 scores for pain, 7 scores for disability, and the total score. The FFI was found to have high responsiveness for treatment effects in many versions, including the English version[19]. In the Taiwan Chinese version, there was no difference in the FFI total score between trauma and non-trauma patients. However, there was a difference in scores between groups for pain and activity limitation. This finding was consistent with a study stating that disease- or region-specific outcome measurement is more sensitive than a generic questionnaire[16].

This study translated the FFI into Korean and confirmed its high reliability and validity. However, the finding cannot be

Table 1. Demographic characteristics of study participants (N=36)

	Mean ± SD
Total (male/female)	36 (14/22)
Age (years)	39.8 ± 23.2
Height (cm)	164.3 ± 15.1
Weight (kg)	63.4 ± 10.2
Pain Duration (months)	12.2 ± 10.1
Injury type	
Plantar fasciitis	25
Fracture	11

Table 3. Pearson's correlation coefficients for the FFI for correlation with the SF36 and VAS

	FFI		
	Pain	Disability	Activity limitation
SF-36			
MCS	0.10*	0.05*	0.21*
PCS	0.49*	0.52*	0.56*
VAS	0.79*	0.65*	0.60*

All correlations are significant at the 0.05 level.
MCS: mental component summary score; PCS: physical component summary score; VAS: visual analog scale

Table 2. Test-retest reliability for FFI

FFI		Mean ± SD (score)	ICC
Pain	Day 1	42.45 ± 22.31	
	Day 2	44.97 ± 19.98	0.90
Disability	Day 1	44.64 ± 18.86	
	Day 2	45.58 ± 16.72	0.94
Activity limitation	Day 1	20.21 ± 18.19	
	Day 2	22.35 ± 16.33	0.91

generalized since the number of participants was small and responsive, and changes over time were not evaluated. More research is needed to measure reliability for a broader range of foot disorders, and correlation with an evaluation tool for foot-related functional disorders is required.

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