Validity and Reliability of Thai Version of the Foot and Ankle Ability Measure (FAAM) Subjective Form

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Background: *Self-administered questionnaires have become an important aspect for clinical outcome assessment of foot and ankle-related problems. The Foot and Ankle Ability Measure (FAAM) subjective form is a region-specific questionnaire that is widely used and has sufficient validity and reliability from previous studies.*
Objective: *Translate the original English version of FAAM into a Thai version and evaluate the validity and reliability of Thai FAAM in patients with foot and ankle-related problems.*
Material and Method: *The FAAM subjective form was translated into Thai using forward-backward translation protocol. Afterward, reliability and validity were tested. Following responses from 60 consecutive patients on two questionnaires, the Thai FAAM subjective form and the short form (SF)-36, were used. The validity was tested by correlating the scores from both questionnaires. The reliability was adopted by measuring the test-retest reliability and internal consistency.*
Results: *Thai FAAM score including activity of daily life (ADL) and Sport subscale demonstrated the sufficient correlations with physical functioning (PF) and physical composite score (PCS) domains of the SF-36 (statistically significant with $p<0.001$ level and ≥ 0.5 values). The result of reliability revealed highly intra-class correlation coefficient as 0.8 and 0.77, respectively from test-retest study. The internal consistency was strong (Cronbach alpha = 0.94 and 0.88, respectively).*
Conclusion: *The Thai version of FAAM subjective form retained the characteristics of the original version and has proved a reliable evaluation instrument for patients with foot and ankle-related problems.*

Keywords: *Foot and Ankle Ability Measure (FAAM), Validity, Reliability, Short form 36 general health outcome (SF-36), Questionnaire*

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Clinical outcomes of orthopaedic patients can be evaluated in both subjective and objective dimensions. Self-administered questionnaires were developed to use as subjective evaluations[1]. These questionnaires focus on functional status and symptoms, and are more relevant to patients' perception. In addition to the short form (SF)-36 subjective form, a few measures have been developed and used to evaluate the disability caused by foot and ankle disorders and outcome of treatment.

In 2005, Martin et al, from Duquesne University, Pittsburgh, PA, developed the Foot and Ankle Ability Measure (FAAM) subjective form as the aims to assess physical function for individuals with foot and ankle-related impairments. The questionnaire was also designed to evaluate pre-operated and post-operated status, and to follow-up the outcome. Evidence for reliability, validity, and responsiveness supporting the use of the FAAM in a general orthopaedic population is available[2].

The FAAM subjective form has been widely used and translated into many languages in different cultural setting[3]. The purposes of the present study were to translate the original English version of FAAM into a Thai version by using Guillemin's guidelines[4], which is the widely accepted cross-cultural adaptation method, and to evaluate the validity and reliability of the Thai version of the FAAM subjective form in patients with foot and ankle-related problems.

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Material and Method

The Foot and Ankle Ability Measure (FAAM) subjective form

The FAAM subjective form contains two separate subscales: the activity of daily life (ADL) and the sport subscales[2,5,6]. The ADL subscale consists of

21 items investigating basic functional activities. The sport subscale comprises eight items referring to more skilled and intensive physical activities occurring during sport. Each item is scored on a five-point Likert scale from 4 (no difficulty at all) to 0 (unable to do), and a "non-applicable" category additionally exists. To calculate the total score of each subscale, the result of each item is added. So, the highest potential scores are 84 for the ADL and 32 for the sport subscales. To get a percentage value, the total score of each subscale is divided by the highest potential score and multiplied by 100. A higher score represents a higher level of function for each subscale.

At the end of each FAAM subscale, a global function rating scale is added. The level of function has to be specified from 0% (inability to perform the listed exercises) to 100% (function before the injury). In conclusion, a four-point Likert scale from normal to severely abnormal is added to categorize the functional status of the ankle (Appendix 1).

Translation procedure

The translation of the FAAM subjective form into Thai was performed by using a forward-backward translation protocol according to the guidelines of Guillemin et al[4,7]. This process involved two translations of the questionnaire from English into Thai, which were made independently by one professional translator and one Foot and Ankle Fellowship-trained orthopedic surgeon. Then the two translations were discussed, and concluded to one version. The backward translation was then carried out independently into English form which was compared and proved for uniformity with the original English version as question by question to ensure that the preliminary translated version contained the same meanings as in the original English version.

The short form-36

The SF-36 is a generic self-completed questionnaire used in clinical practice and research, health policy evaluations, and general population surveys[8,9]. SF-36 contains 36 questions that measured eight health concepts and health transition. These concepts are physical functioning (PF), role physical (RP, role limitation due to physical problems), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE, role limitation due to emotional problems), and mental health (MH). To reduce the number of statistical comparisons, eight health profiles can be summarized into two major components, which are Physical Component Summary (PCS) and Mental Component Summary (MCS). The PCS comprises five scales including PF, RP, BP, GH, and VT whereas MCS comprises five scales including GH, VT, SF, RE, and MH.

Since the questions in SF-36 vary in number of possible answers and direction, standardization of scores is needed to derive eight health dimensions. In the standard SF-36 scoring method, a score for each question is first recorded. A raw scale score is then computed by summing all item scores in that scale. These raw scale scores are finally transformed to a 0-100 scale so that very low scores for the PCS indicate severe physical disorder, distressing bodily pain, frequent tiredness, and unfavorable evaluation of health status. Very low scores for the MCS indicate frequent psychological distress and severe social and role disability due to emotional problems.

The SF-36 was generally used in the previous studies including the original English version to access the validity of the questionnaire[10]. Therefore, the Thai translated SF-36, which was already validated[11], was also used in the present study.

Patients and testing

The final Thai version of FAAM subjective form and the SF-36 were administered to the Thai speaking-reading patients with foot and ankle-related problems while waiting for their physicians in the waiting room. The clinical assessment, including physical examination and imaging (if needed), were performed and recorded in all patients as to confirm the diagnosis. The exclusion criteria were as followed: age less than 18 years, drug abuse, psychiatric diseases, and neurological diseases. Then, questionnaires were collected and scored as recommended by the developers.

The distribution of scores, the ceiling, and floor effects were calculated by examining the item responses. The construct validity was evaluated by comparing the scores of the FAAM subjective form with the scores of the SF-36. To determine the test-retest reliability, all patients were asked to complete the second questionnaires with a 7-day interval.

Statistical analysis

Statistical analysis was implemented by using the SPSS 13.0 (SPSS: Chicago, IL). Kolmogorov-Smirnov test was applied to assess the distribution of the data. Pearson's correlation coefficient (r) was used to investigate the correlation of the score values between the FAAM and the SF-36. The correlation was

considered to be satisfactory at $p<0.05$ level and $r>0.5$ values. The intraclass correlation coefficient (ICC) was used to evaluate for the test-retest reliability. Cronbach's alpha was used to assess internal consistency.

Results

Sixty patients with foot and ankle related problems were enrolled to answer the questionnaires. The average age of the patients was 47 years (range 18-75 years). The characteristics of the patients are shown in Table 1.

Item responses were well-distributed for the FAAM subjective form. The mean FAAM ADL and Sports subscale scores for the entire sample were 51 (range, 2 to 100; SD 22) and 39 (range, 6 to 100; SD 21), respectively.

FAAM ADL and Sport subscales were well-correlated to the SF-36 physical functioning domain (r = 0.59, 0.53) and physical component summary score (r = 0.54, 0.5) while being less related to the SF-36 mental health domain (r = 0.3, 0.19) and mental component summary score (r = 0.36, 0.26). Table 2 summarizes data and statistical analysis of correlation between the FAAM subjective form (ADL and sport subscale) and SF-36 scores.

The test-retest reliability was assessed in sixty patients. The ICC of ADL and sport subscale were 0.80 ($p<0.001$; 95% confidence interval, 0.66-0.88) and 0.77 ($p<0.001$; 95% confidence interval, 0.62-0.86), respectively. The internal consistency evaluated by Cronbach's alpha for ADL and sport subscales were 0.94 and 0.88, respectively.

Discussion

The validation process of the Thai FAAM subjective form in the present study showed that it maintained the characteristics of validity and reliability comparable to the original English version[2]. The strong correlation between the Thai FAAM subjective form and the SF-36 scores supported its validity. The test-retest assessment also showed an excellent reliability. In addition, the high internal consistency reflected the strong point of this questionnaire.

The Thai FAAM subjective form was more strongly related to concurrent measures of physical function than it was used to measure emotional function. These results proved that the FAAM subjective form is a valid measure of symptoms, function, and activities. The strong correlation between the FAAM subjective form and the physical functioning domain and physical component summary

Table 1. Subject demographics (n = 60)

Variables	n	%
Age, mean (SD)	47 (17)	
Gender		
Male	18	30
Female	42	70
Diagnosis		
Deformity		
Equinus contracture	3	5
Pes planus	12	20
Pes cavus	4	7
Hallux valgus	8	13
Osteoarthritis (OA)		
OA ankle and hindfoot	6	10
Hallux rigidus	5	8
Sport injury		
Ankle instability	1	2
Ankle or subtalar impingement	5	8
Peroneal tendon injury	2	3
Nerve related problem		
Tarsal tunnel syndrome	1	2
Morton's neuroma	3	5
Achilles tendinopathy	10	17

SD = standard deviation; n = number of patients

Table 2. FAAM subjective form and SF-36 scores and statistical analysis

Score types	Mean score values (SD)	Correlation with FAAM form
FAAM ADL subscale	51 (22)	
SF-36 (PF)	38 (28)	r = 0.59
		$p<0.001$
SF-36 (MH)	66 (20)	r = 0.30
		$p<0.02$
SF-36 (PCS)	43 (18)	r = 0.54
		$p<0.001$
SF-36 (MCS)	57 (16)	r = 0.36
		$p<0.01$
FAAM sport subscale	39 (21)	
SF-36 (PF)	38 (28)	r = 0.53
		$p<0.001$
SF-36 (MH)	66 (20)	r = 0.19
		p = 0.16 (NS)
SF-36 (PCS)	43 (18)	r = 0.50
		$p<0.001$
SF-36 (MCS)	57 (16)	r = 0.26
		$p<0.05$

FAAM = Foot and Ankle Ability Measure; ADL = activity of daily life; SF-36 = short form-36; PF = physical functioning; MH = mental health; PCS = physical composite score; MCS = mental composite score; SD = standard deviation; r = Pearson's correlation coefficient and its statistical significant p; NS = not significant

Table 3. Correlation coefficient values between the scores of the FAAM subjective form and the scores of the SF-36, and comparing with original version

Short form-36	FAAM subjective form			
	ADL subscale		Sport subscale	
	Thai version*	Original version*	Thai version*	Original version*
Physical functioning (PF)	0.59	0.84	0.53	0.78
Mental health (MH)	0.30	0.18	0.19	0.11
Physical composite score (PCS)	0.54	0.84	0.50	0.80
Mental composite score (MCS)	0.36	0.05	0.26	-0.02

ADL = activity of daily life; FAAM = Foot and Ankle Ability Measure; SF-36 = short form-36
* Using Pearson's correlation coefficient

of the SF-36 showed values comparable to the original questionnaire[2]. Table 3 demonstrates correlation between the Thai FAAM subjective form and the scores of SF-36 compared with original version[2].

In addition to the SF-36 and the FAAM subjective form, the American Orthopaedic Foot and Ankle Society (AOFAS) Clinical Rating Systems and Foot Function Index (FFI) are instruments commonly reported in the foot and ankle orthopaedic literature. The AOFAS Clinical Rating Systems were developed to be used with individuals with a broad range of foot and ankle musculoskeletal disorders. The FFI was developed to be used for individuals with rheumatoid arthritis. There is limited evidence to support the usefulness of the AOFAS Clinical Rating Systems and the FFI. The AOFAS Clinical Rating Systems had poor relationship to measures of physical function and therefore its ability to measure health status has been questioned[12,13]. The evidence of reliability and validity to support the use of the FFI can only be generalized to individuals with rheumatoid arthritis[14,15].

A systematic literature review detected only a few patient-assessed, valid and reliable questionnaires for foot and ankle disorders[16]. The FAAM subjective form was announced to be one of the most advisable research tools to quantify functional disabilities in persons with foot and ankle-related problems. The FAAM as a region-specific measure is designed to be sensitive to changes in physical function specifically related to the foot and ankle. This makes it well-suited to allow for comparisons of scores between groups. The FAAM subjective form is also simple to complete and score which makes it easy to add to the clinical evaluation process. The evidence to support the use of the FAAM as an outcome instrument continues to grow.

There are disadvantages associated with the FAAM. Because the FAAM is region specific, it does not contain particular items for specific disease. Another potential disadvantage is that the FAAM is based entirely on a self-report of physical function and does not include items that assess symptoms or objective physical exam measures. The weakness of the FAAM may be overcome if it is complemented with additional measures, such as disease specific instruments and/or physical exam finding measures[17].

Conclusion

The Thai version of the FAAM subjective form was evidently an excellent outcome instrument as it retained good validity and reliability after translation. It can be used for the evaluation of the physical function, symptoms, and activities in Thai patients with foot and ankle-related problems.

What is already known on this topic?

The FAAM subjective form is a region-specific questionnaire that is widely used and has sufficiency of validity and reliability. The FAAM subjective form was announced to be one of the most advisable research tools to quantify functional disabilities in persons with foot and ankle-related problems.

What this study adds?

The Thai version of the FAAM subjective form was an excellent outcome instrument as it retained good validity and reliability after translation. It can be used for the evaluation of the physical function, symptoms, and activities in Thai patients with foot and ankle-related problems.

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Potential conflicts of interest

None.

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Appendix 1.

มาตรวัดความสามารถของเท้าและข้อเท้า
ตัววัดย่อยสำหรับกิจวัตรประจำวัน

กรุณาตอบทุกคำถามโดยเลือกเพียงคำตอบเดียวที่ใกล้เคียงกับอาการของท่านในช่วงสัปดาห์ที่ผ่านมามากที่สุด
ถ้ากิจกรรมใดที่ทำไม่ได้เนื่องจากมีข้อจำกัดอื่นให้ระบุว่า "ไม่ทราบ/ไม่แน่ใจ"

	ไม่ยาก	ยากเล็กน้อย	ยากปานกลาง	ยากมาก	ทำไม่ได้	ไม่แน่ใจ
ยืนเฉย ๆ	□	□	□	□	□	□
เดินบนพื้นราบ	□	□	□	□	□	□
เดินบนพื้นราบโดยไม่สวมรองเท้า	□	□	□	□	□	□
เดินขึ้นเนินหรือทางลาด	□	□	□	□	□	□
เดินลงเนินหรือทางลาด	□	□	□	□	□	□
เดินขึ้นบันได	□	□	□	□	□	□
เดินลงบันได	□	□	□	□	□	□
เดินบนพื้นไม่เรียบ	□	□	□	□	□	□
ก้าวขึ้นลงขั้นบันไดหรือขอบถนน	□	□	□	□	□	□
นั่งยอง ๆ	□	□	□	□	□	□
ยืนเขย่งปลายเท้า	□	□	□	□	□	□
เดินระยะใกล้ ๆ	□	□	□	□	□	□
เดินไม่เกิน 5 นาที	□	□	□	□	□	□
เดินประมาณ 10 นาที	□	□	□	□	□	□
เดินมากกว่าหรือเท่ากับ 15 นาที	□	□	□	□	□	□

มาตรวัดความสามารถของเท้าและข้อเท้า
ตัววัดย่อยสำหรับกิจวัตรประจำวัน หน้า 2

ปัญหาเรื่องเท้าและข้อเท้าของท่าน ทำให้ท่านทำกิจกรรมต่อไปนี้ได้

	ไม่ยาก	ยากเล็กน้อย	ยากปานกลาง	ยากมาก	ทำไม่ได้	ไม่แน่ใจ
ทำงานทั่วไปในบ้าน	□	□	□	□	□	□
กิจวัตรประจำวัน	□	□	□	□	□	□
ความสามารถในการช่วยเหลือตนเอง	□	□	□	□	□	□
ทำงานเบา ๆ (เดินหรือยืนเฉย ๆ)	□	□	□	□	□	□
ทำงานหนัก (ลากหรือเข็นของ ยกหรือแบกของ)	□	□	□	□	□	□
กิจกรรมสันทนาการ (เดินป่า ปีนเขา)	□	□	□	□	□	□

ท่านคิดว่า ท่านมีระดับความสามารถในการประกอบกิจวัตรประจำวันได้.....เปอร์เซ็นต์ (ระหว่าง 0-100 เปอร์เซ็นต์)
โดย 100 คือ ระดับความสามารถปกติของท่าน ก่อนที่จะมีปัญหาเรื่องเท้า
0 คือ ท่านไม่สามารถทำกิจวัตรประจำวันได้เลย

มาตรวัดความสามารถของเท้าและข้อเท้า
ตัววัดย่อยสำหรับการเล่นกีฬา

จากปัญหาเรื่องเท้าและข้อเท้าของท่าน ท่านมีความยากลำบากในการทำกิจกรรมต่อไปนี้มากหรือน้อยอย่างไร

	ไม่ยาก	ยากเล็กน้อย	ยากปานกลาง	ยากมาก	ทำไม่ได้	ไม่แน่ใจ
วิ่ง	□	□	□	□	□	□
กระโดด	□	□	□	□	□	□
การลงสู่พื้นดินระหว่างเล่นกีฬา	□	□	□	□	□	□
ขึ้น ลงบันได	□	□	□	□	□	□
เริ่มต้นและหยุดได้อย่างรวดเร็ว	□	□	□	□	□	□
การเคลื่อนไหวตัดหรือด้านข้าง	□	□	□	□	□	□
ความสามารถในการดำเนินกิจกรรมด้วยเทคนิคปกติของท่าน	□	□	□	□	□	□
ความสามารถในการมีส่วนร่วมในกีฬาที่ท่านชอบได้นานเท่าที่ต้องการ	□	□	□	□	□	□

ท่านคิดว่า ขณะนี้ท่านมีระดับความสามารถในการทำกิจกรรมที่เกี่ยวกับการกีฬา.....เปอร์เซ็นต์ (ระหว่าง 0-100 เปอร์เซ็นต์)
โดย 100 คือ ระดับความสามารถปกติของท่าน ก่อนที่จะมีปัญหาเรื่องเท้า
0 คือ ท่านไม่สามารถทำกิจวัตรประจำวันได้เลย

ท่านคิดว่าท่านมีระดับความสามารถในการทำกิจกรรมโดยรวม เป็นอย่างไร
□ ปกติ□ ใกล้เคียงปกติ□ ผิดปกติ□ ผิดปกติอย่างรุนแรง

ความถูกต้องเที่ยงตรงและความน่าเชื่อถือของแบบสอบถาม Foot and Ankle Ability Measure subjective form ฉบับภาษาไทย

มารุต อรุณากูร, ปรียพรรณ อรุณากูร, ชาคริตร์ สื่อศิริธำรงค์, ชญานิน อ่างทอง, บัญชา ชื่นชูจิตต์

ภูมิหลัง: *ปัจจุบันการประเมินอาการผู้ป่วยที่มีปัญหาเท้าและข้อเท้าโดยให้ผู้ป่วยตอบแบบสอบถามด้วยตนเองเป็นการประเมินผลการรักษาที่สำคัญอีกรูปแบบหนึ่ง Foot and Ankle Ability Measure Subjective Form (FAAM) ฉบับต้นแบบภาษาอังกฤษเป็นแบบสอบถามที่ได้รับความนิยม และได้รับการศึกษามาแล้วว่ามีความถูกต้องเที่ยงตรงและความน่าเชื่อถือที่เพียงพอ*

วัตถุประสงค์: *แปลแบบสอบถามเป็นภาษาไทย และประเมินความถูกต้องเที่ยงตรงและความน่าเชื่อถือของแบบสอบถามฉบับภาษาไทย*

วัสดุและวิธีการ: *แบบสอบถาม FAAM ฉบับต้นแบบภาษาอังกฤษได้รับการแปลเป็นภาษาไทยโดยวิธีการแปลไปและแปลกลับ ผู้ป่วยที่มีปัญหาเท้าและข้อเท้า จำนวน 60 ราย ได้รับแบบสอบถาม FAAM และ short form-36 ฉบับภาษาไทยเพื่อตอบด้วยตนเอง สำหรับความถูกต้องเที่ยงตรงนั้นได้จากการประเมินความสัมพันธ์ของคะแนน จากทั้งสองแบบสอบถามเรื่องของความน่าเชื่อถือนั้นได้จากการประเมินจากการตอบแบบสอบถาม FAAM ซ้ำ (test-retest) และ internal consistency*

ผลการศึกษา: *คะแนนรวมของแบบสอบถาม FAAM ฉบับภาษาไทยทั้งในส่วนของ activity of daily life (ADL) และ sport นั้นมีความสัมพันธ์กับคะแนนด้าน physical functioning, physical component summary ของแบบสอบถาม short form-36 อย่างมีนัยสำคัญ ($p<0.001$ level and Pearson's correlation coefficient ≥ 0.5) สำหรับความน่าเชื่อถือนั้นได้ผลดีโดยมีค่า intra-class correlation coefficient: 0.8, 0.77 และค่า Cronbach alpha: 0.94, 0.88*

สรุป: *แบบสอบถาม FAAM ฉบับภาษาไทยสามารถคงลักษณะของแบบสอบถามต้นแบบ และมีความน่าเชื่อถือในการใช้ในการประเมินอาการของผู้ป่วยซึ่งมีปัญหาเท้าและข้อเท้า*