

Cross-cultural adaptation and validation of the reliability of the Thai version of the Hip disability and Osteoarthritis Outcome Score (HOOS)

Warayos Trathitiphan¹ · Permsak Paholpak¹ · Winai Sirichativapee¹ ·
Taweekok Wisanuyotin¹ · Pat Laupattarakasem¹ · Kamolsak Sukhonthamarn¹ ·
Polasak Jeeravipoolvarn¹ · Weerachai Kosuwon¹

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Abstract HOOS was developed as an extension of the Western Ontario and McMaster Universities' Osteoarthritis Index questionnaire for measuring symptoms and functional limitations related to the hip(s) of patients with osteoarthritis. To determine the validity and reliability of the Thai version of the Hip disability and Osteoarthritis Outcome Score (HOOS) vis-à-vis hip osteoarthritis, the original HOOS was translated into a Thai version of HOOS, according to international recommendations. Patients with hip osteoarthritis ($n = 57$; 25 males) were asked to complete the Thai version of HOOS twice: once then again after a 3-week interval. The test–retest reliability was analyzed using the intraclass correlation coefficient (ICC). Internal consistencies were analyzed using Cronbach's alpha, while the construct validity was tested by comparing the Thai HOOS with the Thai modified SF-36 and calculating the Spearman's rank correlation coefficients. The Thai HOOS produced good reliability (i.e., the ICC was greater than 0.9 in all five subscales). All of the Cronbach's alpha showed that the Thai HOOS had high internal consistency (Cronbach's alpha greater than 0.8), especially for the pain and ADL subscales (0.89 and 0.90, respectively). The Spearman's rank correlation for all five subscales of the Thai HOOS had moderate correlation with the Bodily Pain subscale of the Thai SF-36. The

pain subscale of the Thai HOOS had a high correlation with the Vitality and Social Function subscales of the Thai SF-36 ($r = 0.55$ and 0.54)—with which the symptom subscale had a moderate correlation. The Thai version of HOOS had excellent internal consistency, excellent test–retest reliability, and good construct validity. It can be used as a reliable tool for assessing quality of life for patients with hip osteoarthritis in Thailand.

Keywords HOOS · Thai · Reliability · Validity · Cross-cultural adaptation

Introduction

The Hip disability and Osteoarthritis Outcome Score (HOOS) questionnaire was developed for measuring symptoms and functional limitations related to hip in patients with hip osteoarthritis [1]. The HOOS represents an improvement on the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) [2]; in terms of validity among young and active patients with high functional demand [1].

The HOOS questionnaire has been translated into French, Dutch, German, Chinese, Turkish, Japanese, and Korean [3–8]. It has not, however, been translated and tested for use in Southeast Asia, where the incidence of hip OA and socioeconomic and cultural factors are different.

The aim of this study was to translate the HOOS into Thai—in accordance with international publishing recommendations—and to test its reliability and validity in the Thai context.

Methods

This is a reliability and validity testing of Thai HOOS questionnaire.

Warayos Trathitiphan and Permsak Paholpak are co-first authors and they contributed equally to this paper.

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✉ Weerachai Kosuwon
weera_ko@kku.ac.th

¹ Department of Orthopedics, Faculty of Medicine, Khon Kaen University, 123, Khon Kaen 40002, Thailand

We first sought permission from Roos and colleagues to create a Thai version of the HOOS questionnaire. Our protocol was then reviewed and approved by the Khon Kaen University Research Ethics Committee. We created the Thai HOOS according to guidelines for cross-cultural adaptation of self-reported measures [9]. The HOOS English version was first translated into Thai independently by one of the authors (WK, an orthopedic surgeon) and a Thai, non-medical professional (an English teacher), not apprised of the objectives of the questionnaire. Then, one of the authors (WT) created the Thai form of HOOS by synthesizing the two translations. The Thai form was then independently back-translated by two native English speakers who have lived in Thailand for more than 20 years. The expert committee (comprising two professors of orthopedics, one physiatrist and one native English speaker) then compared the two back-translations with the original English version to ensure conceptual fidelity. Ten patients were then asked to (a) complete the final Thai form of the HOOS questionnaire and (b) report whether any questions they did not understand or were ambiguous.

We included all patients diagnosed with hip osteoarthritis in our hospital between December 2013 and December 2014. The diagnosis was done using the clinical and radiographic criteria of the American College of Rheumatology, which requires at least two of three features (i) an erythrocyte sedimentation rate (ESR) less than 20 mm/h (ii) radiographic femoral or acetabular osteophytes, and (iii) radiographic joint space narrowing [10]. Our exclusion criteria were (a) Rheumatoid arthritis (b) spondyloarthropathy (c) septic arthritis of hip joint, and (d) a previous injection in the hip joint within 3 months.

The respective maximum and acceptable correlation coefficients of two questionnaires (HOOS and SF-36 questionnaires) were 0.85 and 0.5, and the effect size was 5.6. A sample size of 57 patients was estimated, based on 80 % power to detect a difference and a 95 % confidence interval of the ICC [11, 12].

Statistical analyses were performed using SPSS version 17.0 (SPSS Inc, Chicago, IL, USA). The ICC was used to test–retest reliability, while the Cronbach’s alpha coefficient was used to test the internal consistency of the questionnaire. A Cronbach’s alpha and an ICC of greater than 0.7 were considered satisfactory [13, 14]. The Spearman’s rank correlation was used to test the questionnaire construct validity with respect to the Thai SF-36. The latter is a valid and reliable generic health status questionnaire, containing eight subscales: [Physical Function (PF), Role limitations because of physical problems (RF), Bodily Pain (BP), General Health perception (GH), Vitality (VT), Social Function (SF), Role limitations because of Emotional problems (RE), Mental Health (MH)] [15]. The SF-36 has been translated and validated in Thai [16].

A Spearman’s correlation coefficient (r) of greater than 0.5 defined a strong correlation, while 0.35–0.5 a moderate one, and less than 0.35 a weak one [17]. The floor and ceiling effects were calculated. When greater than 15 % of the respondents reached the highest and lowest possible score, floor and ceiling effects were considered present [18]. A P value of less than 0.05 was used as the level of statistical significance.

Results

There were 57 patients (32 females) (mean age 46.6 ± 14.87) for whom the most common cause of hip osteoarthritis was secondarily from avascular necrosis of the femoral head (87.7 %) followed by post-trauma (8.8 %) and congenital (3.5 %). All of the patients had a Kellgren and Lawrence score of grade three or greater.

All 57 patients completed the Thai HOOS questionnaire and the Thai SF-36 form, and all participated in the test–retest evaluation (after 3 weeks). As for test–retest reliability (Table 1), all of the parameters showed an ICC of greater than 0.9. The highest agreement was in the Activity subscale (ICC = 0.95), the lowest in the Symptoms subscale (ICC = 0.91).

The internal consistency reliability of the Thai HOOS is presented in Table 2. All the Cronbach’s alpha results showed high internal consistency (greater than 0.8), especially for pain and ADL (0.89 and 0.90, respectively).

Table 3 presents the Spearman’s rank correlation coefficient for construct validity testing of the Thai HOOS versus the Thai SF-36 form.

There were no floor and ceiling effects found in this study.

Discussion

Our study demonstrated that the Thai version of HOOS is a reliable and valid tool for assessment of hip osteoarthritis patients. The test–retest reliability was ICC greater than 0.9 in all five subscales of the Thai version HOOS, indicating

Table 1 Intraclass correlation for test–retest reliability

Parameter	Test	Retest	Test–retest ICC
	Mean \pm SD	Mean \pm SD	
Symptoms	35.18 \pm 21.96	37.11 \pm 19.29	0.91
Pain	40.39 \pm 20.34	42.19 \pm 20.63	0.94
ADL	37.20 \pm 18.02	38.65 \pm 17.76	0.95
Sport and recreation	28.29 \pm 17.36	29.17 \pm 17.49	0.92
Quality of life	37.5 \pm 18.49	38.27 \pm 19.77	0.93

Table 2 Cronbach's alpha for testing internal consistency of the Thai HOOS questionnaire

Parameter	HOOS subscale (no. of items), sample size = 57				
	Symptoms (5)	Pain (10)	ADL (17)	Sport and recreation (4)	Quality of life (4)
Cronbach's alpha	0.77	0.89	0.90	0.80	0.83

Table 3 Spearman's rank correlation coefficient between Thai HOOS questionnaire and Thai SF-36 questionnaire

Parameter	Symptoms	Pain	ADL	Sport and recreation	Quality of life
SF-36 domain					
Physical Function (PF)	0.01	0.05	0.12	0.27	0.25
Role Physical (RF)	0.12	0.20	0.12	0.37	0.25
Bodily Pain (BP)	0.38	0.49	0.50	0.46	0.46
General Health (GH)	0.18	0.31	0.12	0.1	0.01
Vitality (VT)	0.41	0.55	0.30	0.29	0.27
Social Function (SF)	0.41	0.54	0.34	0.27	0.43
Role Emotion (RE)	0.16	0.29	0.19	0.29	0.23
Mental Health (MH)	0.41	0.52	0.31	0.20	0.28

excellent reliability. The respective internal consistency was comparable to other language versions of the HOOS [3–7, 19]. The Cronbach's alpha was highest for the ADL subscale (0.90), which agrees with previous validation studies (0.94, 0.98/0.95, 0.96, and 0.97 in the French, OA/THA Dutch, Korean, and Japanese version, respectively).

As for construct validity, all five subscales of the Thai HOOS indicated a moderate correlation for the BP subscale of the Thai SF-36. The pain subscale had a high correlation with the VT and the SF subscales of the SF-36. The symptom subscale also had a moderate correlation with the VT and SF subscales of the SF-36. Compared with the Dutch, Korean, and Japanese versions, which used the SF-36 for validation, all parameters of the Thai HOOS showed weaker correlation in the PF and RF subscales. For the BP subscale, the Thai HOOS demonstrated a moderate-to-high correlation for all parameters as did the Japanese version, but these correlations were weaker than with the Korean and Dutch versions. The Thai HOOS showed weak correlation with the GH subscale as did the Japanese and Korean HOOS, while the Dutch HOOS had a nominally stronger correlation. The Thai HOOS had a similar correlation as the Japanese HOOS, but a stronger correlation than the Korean and Dutch HOOS in the VT subscale. In the SF subscale, the Thai HOOS yielded a stronger correlation than the Japanese and Korean HOOS, but a weaker one than the Dutch HOOS. The Thai and Japanese HOOS had similar weak correlations in the RE subscale, while the Korean and Dutch versions showed stronger correlations. In the MH subscale, the Thai HOOS showed stronger correlation than the Dutch and Korea versions and a comparable correlation as the Japanese HOOS. The validation results demonstrated that the Thai HOOS correlation results were closer to the Japanese and Korean

versions over against the Dutch version. These may be because of differences in culture and daily living activities between Asia and the West [4, 7].

The limitations of this study were: (a) the small number of patients with primary hip osteoarthritis because of the low prevalence of primary OA hip in Thailand; (b) the sample patients might not represent the population of general hip osteoarthritis patients as most of them had more severe symptomatic OA than the general population; and (c) the hip osteoarthritis staging of all of the sample patients was not widely distributed because in our study as only those with a Kellgren and Lawrence score of three or greater were included. Daily activities in Thai culture differ from western and some Asian countries. Thailand is still largely rural and agricultural. Significantly, more than 90 % of the population are practicing Buddhists for whom deferential seating positions on the floor are common (i.e., squatting, cross-legged, kneeling). Thais may, therefore, need more hip function than in western and other Asian countries where sitting on chairs or on benches is more common.

In conclusion, the Thai HOOS questionnaire yielded high test-retest reliability, high internal consistency, and relevant construct validity (i.e., comparable to other language version of the HOOS). No floor or ceiling effects were found. The Thai version HOOS was found to be a valid and reliable questionnaire for evaluating the outcomes of hip osteoarthritis patients and osteoarthritis-related treatment(s) in Thailand and to provide a basis for future clinical trials integrating the self-assessments of Thai patients.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or National Research Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Our University Ethical Committee reviewed and approved this study (Reference HE551419).

Informed consent Informed consent was obtained from all individual participants included in the study.

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