Validity and Reliability of the Thai Version of the Modified Harris Hip Score for Patients With Hip Abnormalities

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Background: The modified Harris Hip Score (mHHS) is one of the more commonly used patient-reported outcome measures to evaluate and monitor treatment in patients with hip abnormalities and has been translated into several languages.

Purpose: To develop a Thai version of the mHHS (TH-mHHS) and evaluate the validity and reliability of the measure.

Study Design: Cohort study (diagnosis); Level of evidence, 3.

Methods: The TH-mHHS was developed using the forward-backward translation method. Patients who presented with hip pain during the first clinic visit completed the Thai version of questionnaires including the mHHS, 36-item Short Form Health Survey (TH-SF36), and Hip disability and Osteoarthritis Outcome Score (TH-HOOS). The validity between the measures was tested using the Spearman correlation coefficient. The test-retest reliability of the TH-mHHS was assessed using the intraclass correlation coefficient, and internal consistency was assessed using the Cronbach alpha.

Results: A total of 64 patients were enrolled who had a mean age of 52.8 ± 16.6 years (range, 17-80 years). There were 64% female and 36% male participants. The TH-mHHS showed a moderate correlation with all subscales of the TH-HOOS and the total TH-HOOS ($r = 0.50$-0.65; $P < .01$) and a high correlation with the physical functioning subscale and physical component summary of the TH-SF36 ($r = 0.73$ and 0.75, respectively; $P < .01$). The test-retest reliability was excellent, with an intraclass correlation coefficient of 0.95 (95% CI, 0.92-0.97; $P < .001$). The internal consistency was acceptable, with a Cronbach alpha of .71. No floor or ceiling effects were observed.

Conclusion: The TH-mHHS showed a moderate to high correlation with the TH-SF36 and TH-HOOS, excellent test-retest reliability, and acceptable internal consistency. This measure can be effectively used for evaluating Thai patients with hip disorders, especially an older and arthritic population.

Keywords: modified Harris Hip Score; hip abnormality; validity; reliability; Thai version

Hip pain is a common symptom presenting in both young adult and elderly patients with various hip abnormalities.[4,15,25,26] Pain can present in different locations around the hip and may be accompanied by other symptoms such as limited range of motion, snapping or clicking sensations,[3] and interference with the patient's quality of life and function.

Patient-reported outcome measures are useful for assessing a patient's health condition.[27] Many such measures were developed to evaluate symptoms and function in patients with hip disorders and assess outcomes after treatment. The Harris Hip Score (HHS),[7,10,13,16,17] the Hip disability and Osteoarthritis Outcome Score (HOOS),[20] and the International Hip Outcome Tool–33 (iHOT-33)[28] were developed and have been commonly used for the clinical evaluation of patients with various hip diseases.

The HHS is a clinician-based outcome measure for various hip disorders. The modified HHS (mHHS)[5] was specifically developed to evaluate pain and function in patients who underwent hip arthroscopic surgery. The mHHS is one of the more commonly used patient-reported outcome measures to evaluate and monitor treatment in patients with hip abnormalities. The outcomes of hip arthroscopic surgery,[2,5,6] hip fracture,[36] femoroacetabular impingement,[8,26,31] hip replacement,[12] and osteoarthritis of the hip[9] can be evaluated using the mHHS.

The mHHS has been translated and validated into several languages.[1,33] The purpose of this study was to translate and cross-culturally adapt the mHHS to create a Thai version of the mHHS (TH-mHHS) and determine the validity and reliability of the TH-mHHS. We hypothesized that the TH-mHHS would be a valid and reliable instrument for assessing pain and function in Thai adults with hip abnormalities.

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METHODS

Study Design and Sample

This is a cross-sectional study conducted over 10 months from July 2021 to April 2022 with a targeted population of patients with intra- and extra-articular hip disorders at Thammasat University Hospital. The study protocol was reviewed and approved by the ethics committee of our institution, and all participants signed an informed consent form. The inclusion criteria were Thai patients with hip disorders who spoke Thai and were aged between 17 and 80 years. Exclusion criteria were patients with predominant back or buttock pain from spinal problems as well as patients with communication problems. All patients were enrolled in the study before they received any operative or nonoperative treatment.

Based on an alpha of .05 and power of 90%, the minimum acceptable correlation coefficient between the mHHS and 36-item Short Form Health Survey (SF-36) was 0.40. The sample-size calculation in this study indicated that at least 64 patients were required for adequate power. Data collection was performed from patients who met the inclusion and exclusion criteria. The collected demographic and clinical data included age, body mass index, side of the affected hip, score from the Thai version of the SF-36 (TH-SF36), score from the Thai version of the HOOS (TH-HOOS), and TH-mHHS score. In case of bilateral hip problems, the patients were informed that the more affected side would be evaluated.

The test-retest reliability of the TH-mHHS was examined at 10 to 14 days from the initial administration by a telephone interview along with the global perceived effect (GPE) scale.[34] The 10- to 14-day interval was considered sufficiently long to prevent the recall of previous responses and recent enough to ensure minimal clinical changes.[34] Patients who needed medications were allowed to receive acetaminophen and nonsteroidal anti-inflammatory drugs for a period of 1 week.

Development of the TH-mHHS

After receiving permission from the original authors, Byrd and Jones,[5] the translation process for the mHHS was conducted using the forward-backward translation method, in accordance with the guidelines established by Guillemin et al.[11] Initially, 3 certified English-Thai translators independently translated the original English version into Thai. The forward translation was conducted by a consensus panel consisting of translators and 2 authors (S.C., A.A.), and the backward translation was performed by 3 independent certified translators who were blinded to the original mHHS. Then, the backward translations were checked for their equivalence to the original instrument by an expert panel consisting of 1 hip arthroscopic surgeon, 1 hip traumatologist, and 2 hip replacement orthopaedic surgeons (A.A., S.C., P.P., and B.P.). During the translation process, it was determined that no cross-cultural adaptation was required. As the final step, the TH-mHHS was used in 20 patients with hip pain as a pilot test, with no additional changes.

Patient-Reported Outcome Measures

The mHHS[5] is a questionnaire for patients with hip disorders that consists of 3 main domains, including (1) pain (maximum of 44 points), (2) function: gait (limp: 11 points; support: 11 points; distance walked: 11 points), and (3) functional activities (stairs: 4 points; socks/shoes: 4 points; sitting: 5 points; public transportation: 1 point). The questionnaire focuses principally on pain and function in patients who have undergone hip arthroscopic surgery, so the range of motion and deformity sections of the original HHS have been removed (deletion of 9 points). Hence, the total mHHS score adds up to 91 points. A multiplier of 1.1 is then used for a total possible score of 100. A higher mHHS score indicates a higher functional activity level and a lower level of pain.

The SF-36[37] is a self-administrated questionnaire that has been popularly used for health assessment, research, and clinical application. The SF-36 consists of 36 questions: 35 questions in 8 subscales that include physical functioning, role limitations due to physical health problems, bodily pain, general health perceptions, social functioning, vitality, role limitations due to emotional problems, and mental health and 1 question for reported health transition. In addition, 2 summary scores can be calculated: a Physical Component Summary (PCS) and a Mental Component Summary. The overall SF-36 score is transformed into a scale ranging from 0 (maximum disability) to 100 (no disability). The TH-SF36 has been validated.[24]

The HOOS[30] is a hip disability questionnaire that consists of 40 items with a 5-point Likert scale, divided into 5 subscales: symptoms, pain, activities of daily living, sports and recreation, and hip-related quality of life. The HOOS score is transformed into a scale ranging from 0 to 100 points for each separate subscale and also for the total score. A higher score represents higher function and a lower degree of symptoms. The TH-HOOS has been validated.[35]

The GPE scale is a patient's health status assessment that asks the patient to rate how much of his or her health condition changed from baseline.[18] We used an 11-point

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GPE scale ranging from –5 (vastly worse) to 0 (unchanged) to +5 (completely recovered). This GPE scale was administered in the second interview along with the TH-mHHS. The patients who had minimal clinical changes with a GPE scale score of –1, 0, or +1 were included for test-retest reliability of the TH-mHHS.

Statistical Analysis

Statistical analysis was performed using STATA 14.2 (StataCorp). A Bland-Altman plot was also produced via STATA 14.2. Patient demographics and characteristics were summarized with descriptive statistics. Categorical variables were shown as numbers and percentages. Normally distributed continuous variables were represented as the mean, standard deviation, and range.

Construct validity was tested by comparing the TH-mHHS with the TH-SF36 and TH-HOOS using the Spearman correlation coefficient (r), with r values interpreted as negligible (0.0-0.29), low (0.3-0.49), moderate (0.5-0.69), high (0.7-0.89), and very high (0.9-1.0).[29] The correlation was considered to be satisfactory at $P < .05$.

The test-retest reliability was examined using the intraclass correlation coefficient (ICC) with a 2-way mixed-effects model[21] by comparing the TH-mHHS score obtained from 2 subsequent sessions with a 10- to 14-day interval. The ICC values were interpreted as poor (<0.50), moderate (0.50-0.74), good (0.75-0.90), and excellent (>0.90).[21] The internal consistency of the TH-mHHS, which represents the homogeneity of questions, was assessed using the Cronbach alpha in which an alpha of <.70 indicated a lack of correlation among items, .70 to .95 indicated ideal, and >.95 indicated a redundancy of questions.[34]

RESULTS

There were no major differences in terms of content between the forward-backward translations of the 3 independent translators and the final version of the TH-mHHS. The results of our pilot study on 20 patients with hip pain showed that the questions were clear and relevant to their hip conditions.

A total of 64 patients were enrolled for the TH-mHHS. The mean age of the patients was 52.8 years. The patient demographics and characteristics are presented in Table 1.

The TH-mHHS was highly correlated with the TH-SF36 physical functioning subscale and the TH-SF36 PCS ($r = 0.73$ and 0.75, respectively; $P < .01$), but it showed a low correlation with the TH-SF36 general health perceptions subscale. The TH-mHHS was moderately correlated with all 5 TH-HOOS subscales as well as the total TH-HOOS ($r = 0.50$-0.65; $P < .01$). The correlations between outcome measures are summarized in Table 2.

The test-retest reliability was excellent, with an ICC of 0.95 (95% CI, 0.92-0.97; $P < .001$). The Bland-Altman plot to evaluate the test-retest reliability of the TH-mHHS is shown in Figure 1. The internal consistency was acceptable, with a Cronbach alpha of .71. No floor and ceiling effects were observed. No minimum or maximum of the TH-mHHS score was observed in the study (range, 19.8-97.9).

TABLE 1
Patient Demographics and Characteristics (N = 64)[a]

	Value
Sex	
Female	41 (64.1)
Male	23 (35.9)
Age, y	52.8 ± 16.6 (17-80)
Body mass index, kg/m^2	24.7 ± 4.0 (16.8-34.9)
Side	
Left	30 (46.9)
Right	34 (53.1)
Diagnosis	
Osteoarthritis of hip	38 (59.4)
Iliopsoas tendinitis	7 (10.9)
Femoroacetabular impingement	6 (9.4)
Synovitis	7 (10.9)
Osteonecrosis of hip	3 (4.7)
External snapping hip syndrome	1 (1.6)
Adductor tendinopathy	1 (1.6)
Synovial chondromatosis	1 (1.6)

[a]Data are shown as No. (%) or mean ± SD (range).

TABLE 2
Correlation of TH-mHHS With TH-SF36 and TH-HOOS[a]

	r Value
TH-SF36	
Physical functioning subscale	0.73
Role limitations due to physical health problems subscale	0.62
Role limitations due to emotional problems subscale	0.64
Vitality subscale	0.68
Mental health subscale	0.55
Social functioning subscale	0.58
Bodily pain subscale	0.67
General health perceptions subscale	0.40
Physical component summary	0.75
Mental component summary	0.66
TH-HOOS	
Symptoms subscale	0.50
Pain subscale	0.54
Activities of daily living subscale	0.65
Sports and recreation subscale	0.58
Quality of life subscale	0.59
Total	0.63

[a]TH-HOOS, Thai version of Hip disability and Osteoarthritis Outcome Score; TH-mHHS, Thai version of modified Harris Hip Score; TH-SF36, Thai version of 36-item Short Form Health Survey.

DISCUSSION

In this study, the TH-mHHS was highly correlated with the TH-SF36 physical functioning subscale and TH-SF36 PCS

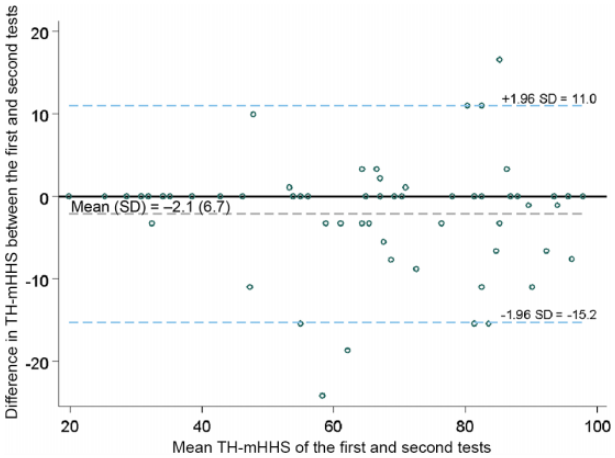

Figure 1. Bland-Altman plot to evaluate the test-retest reliability of the Thai version of the modified Harris Hip Score (TH-mHHS).

($r = 0.73$ and 0.75, respectively; $P < .01$), and it was moderately correlated with all TH-HOOS subscales as well as the total TH-HOOS ($r = 0.50$-0.65; $P < .01$). The test-retest reliability of the TH-mHHS was excellent (ICC = 0.95 [95% CI, 0.92-0.97]; $P < .001$). The internal consistency was acceptable (Cronbach alpha = .71). No floor or ceiling effects were observed. The TH-mHHS has the same pattern as the original English version and includes all 3 main questions of a total of 8 questions. Validity and reliability testing showed that the TH-mHHS is a valid, internally consistent, and reliable measurement tool for evaluating Thai patients with hip disorders.

A study by Stasi et al[33] regarding the Greek version of the mHHS showed that it correlated strongly with the Greek versions of the Lower Extremity Functional Scale and the Western Ontario and McMaster Universities Arthritis Index (Pearson $r = 0.801$ and –0.783, respectively; $P < .001$). In a study by Potter et al,[32] a comparison of the English version of the mHHS with the SF-36 in 31 patients after arthroscopic acetabular labral debridement revealed good to excellent positive correlations between the mHHS and the SF-36 physical functioning subscale ($r = 0.71$), bodily pain subscale ($r = 0.73$), and PCS ($r = 0.85$) ($P < .05$). These findings are similar to our study results. However, the SF-36 Mental Component Summary demonstrated a fair to poor correlation with the mHHS ($r = 0.50$) in the Potter et al[32] study, while our study revealed a moderate correlation ($r = 0.66$).

A study on the association between the mHHS and HOOS in patients with femoroacetabular impingement[14] at 2 years postoperatively revealed the highest correlations were between the mHHS and the HOOS subscales of pain ($r = 0.86$; $P < .001$) and activities of daily living ($r = 0.85$; $P < .001$). Preoperative testing showed a moderate to high correlation between the mHHS and HOOS (symptoms: $r = 0.63$; pain: $r = 0.74$; activities of daily living: $r = 0.76$; sports: $r = 0.65$; and quality of life: $r = 0.57$), while our study revealed moderate correlations between the TH-mHHS and TH-HOOS (symptoms: $r = 0.50$; pain: $r = 0.54$; activities of daily living: $r = 0.65$; sports: $r = 0.58$; and quality of life: $r = 0.59$).

TABLE 3
Reliability and Consistency of TH-mHHS and Other Language Versions[a]

	Test-Retest Reliability (ICC)	Internal Consistency (Cronbach Alpha)
TH-mHHS	0.95	.71
Greek version of mHHS[33]	0.88	.61
Arabic version of mHHS[1]	0.94	.79
English version of mHHS[19,22]	0.91	.95

[a]ICC, intraclass correlation coefficient; mHHS, modified Harris Hip Score; TH-mHHS, Thai version of modified Harris Hip Score.

The TH-mHHS in this study showed excellent test-retest reliability (ICC = 0.95) with acceptable internal consistency (Cronbach alpha = .71); a comparison between the TH-mHHS with different language versions (Greek,[33] Arabic,[1] and English[19,22]) is summarized in Table 3.

In our study, the TH-mHHS lacked floor and ceiling effects. The participants included in this study were preoperative and nonoperative patients before receiving their respective treatment; hence, this cohort may not represent all patients, particularly postoperative patients, who have shown problems with the high ceiling effect of the mHHS.[15,19,25]

Thai-translated versions of hip measures such as the TH-HOOS[35] and the Thai version of the iHOT-33 (TH-iHOT33)[23] have been shown to be effective and useful for the Thai population. The TH-mHHS can be effectively used for evaluating Thai patients with hip disorders as well. A strong correlation between the TH-mHHS and TH-iHOT33 would potentially strengthen the validity of the TH-mHHS.

Limitations

The limitations of this study were that the patients were older (mean age, 52.8 years [range, 17-80 years]) than those typically undertaking the original mHHS (with a mean age of 38 years) which aims to evaluate patients who have undergone arthroscopic surgery. This is because we included nearly 60% of patients with hip osteoarthritis in our study population, and these patients are generally older. In addition, testing was performed under pretreatment conditions; therefore, responsiveness and interpretability (minimal important change) were not evaluated. Longitudinal cohort studies could help us to evaluate the responsiveness of the TH-mHHS by comparing changes from before treatment to after treatment at different points in time. Finally, because of the pretreatment conditions of the patients, the ceiling effect of the maximum mHHS score could not be detected.

CONCLUSION

The TH-mHHS showed a moderate to high correlation with the TH-SF36 and TH-HOOS, excellent test-retest reliability, and acceptable internal consistency. This outcome measure can be effectively used for evaluating Thai patients with hip disorders, especially an older and arthritic population.

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