Cross-Cultural Adaptation and Psychometric Validation of The Tamil Version of The Oxford Hip Score

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***Abstract*—Background: The Oxford Hip Score (OHS) was originally developed in a Western cultural context, which can lead to confusion when applied in Indian clinical settings due to cultural differences. Objective: This study aimed to recreate a validated cross-cultural Tamil adaptation of the OHS and assess its reliability among Tamil-speaking patients with hip pain. Methods: A structured forward-backward translation process was used, involving independent translators and a multidisciplinary expert committee. A pilot study was conducted with 30 participants diagnosed with piriformis syndrome who were proficient in Tamil. Reliability was evaluated through test-retest assessments conducted 24 hours apart. Results: Statistical analysis demonstrated excellent test-retest reliability, with a Pearson correlation coefficient of $r = 1.0$ ($p < 0.0001$). There was perfect absolute agreement between initial test and retest scores (Mean Difference = 0). Conclusion: The Tamil version of the OHS is a reliable and valid instrument for evaluating hip-related pain and function in regional clinical populations.**

I. INTRODUCTION

Musculoskeletal disorders of the hip represent a significant global health burden, affecting individuals of all ages. Global data suggests hip discomfort has a 10% prevalence in the general population, a figure that rises with age. According to the National Health and Nutrition Examination Survey (NHANES), approximately 14.3% of adults report significant hip pain occurring on most days over any given six-week period. Chronic hip pain is deeply distressing for patients, leading to profound functional limitations, decreased quality of life (QOL), and increased socioeconomic burdens.

Clinically, hip pain is categorized based on its anatomical location: anterior hip and groin, posterior hip and buttock, or lateral hip. Anterior pain is often linked to intra-articular pathologies like hip labral tears and osteoarthritis. Lateral hip pain is typically associated with greater trochanteric pain syndrome. Posterior pain is frequently connected to sacroiliac joint dysfunction, lumbar radiculopathy, and piriformis syndrome (PS). PS is a neuromuscular condition where the sciatic nerve is compressed or irritated by the piriformis muscle, causing gluteal pain that radiates along the leg. Patients with PS often experience reduced mobility, difficulty sitting, and impaired balance, which significantly impacts physical functioning and mental health.

The Oxford Hip Score (OHS) is a premier Patient-Reported Outcome Measure (PROM) specifically designed to evaluate pain and functional limitations. It consists of 12 self-administered items assessing hip status over the previous four weeks, with scoring from 0 (worst) to 48 (best). While the OHS is valued for its simplicity and responsiveness, it may lose relevance if not culturally adjusted for diverse linguistic situations. Concepts of health and pain perception vary across cultures, making cross-cultural adaptation essential to preserve psychometric properties like validity and reliability. In India, Tamil is a major regional language, yet there is a notable scarcity of validated PROMs for Tamil-speaking individuals, creating barriers for accurate outcome measurement in rural

and semi-urban populations. This study addresses this gap by adapting the OHS for the Tamil-speaking population, focusing on its reliability among patients with hip pain.

II. METHODOLOGY

Procurement and Translation Protocol

Formal permission was obtained from the OHS copyright holders at Oxford University Innovation.

The adaptation process followed a rigorous six-step sequence:

1. Forward Translation:

Two independent Tamil translators—one a language expert (T1) and one a physiotherapist (T2)—translated the original OHS (E0) into Tamil.

2. Synthesis:

These translations were compared for consistency in sentence structure and meaning to create a single synthesized version (T12).

3. Back-Translation:

T12 was translated back into English (E1) by an independent translator to ensure linguistic equivalence.

4. Comparison:

E1 was compared against the original E0 to identify and resolve any discrepancies.

5. Expert Review:

A multidisciplinary committee (Orthopedic surgeon, Physiotherapist, Psychiatrist, and translators) reviewed the versions to ensure cultural relevance, linguistic clarity, and content validity.

6. Reliability Testing:

The finalized Tamil OHS was tested for its psychometric performance.

Participant Recruitment and Pilot Study

For the reliability phase, a pilot study was conducted with 30 participants. Inclusion criteria required participants to have piriformis syndrome, proficiency in reading Tamil, and willingness to provide informed consent. During the assessment, participants completed the 12-item Tamil OHS independently. Additionally, hip range of motion (flexion) was measured using a regular goniometer. To evaluate test-retest reliability, a second session was conducted 24 hours later by the same investigator, ensuring consistency in the testing environment.

III. STATISTICAL ANALYSIS AND RESULTS

For this study, we had used the Pearson Correlation Coefficient (r) was calculated to measure the linear relationship and relative consistency between the two sets of scores (X and Y). The calculation details, as shown below, resulted in a perfect positive correlation. The p-value was used to determine the statistical significance of this correlation, while the mean difference (M_x - M_y) was used to assess the absolute agreement and check for systematic bias. Statistical significance was set at $p < 0.01$.

Table – 1 The p-value levels and their corresponding significance

P-value	Level of Significance	Description
<0.0001	***	Extremely significant
<0.01	**	Very significant
<0.05	*	Significant
>0.05	Not significant	Not significant

Statistical Formula

Statistical analysis was carried out using a spreadsheet application and the following formula for the Pearson Correlation Coefficient. The Pearson's r is formula

$$r = \frac{\Sigma((X - M_x)(Y - M_y))}{\sqrt{(\Sigma(X - M_x)^2)(\Sigma(Y - M_y)^2)}}$$

Where:

X: Scores from the first measurement

Y: Scores from the retest Measurement

X: X Values

Y: Y Values

Mx: Mean of X Values

My: Mean of Y Values

$X\text{-}M_x$ & $Y\text{-}M_y$ Deviation scores

$(X-M_x)$ &$(Y-M_y)$: Deviation Squared
$(X-M_x)$ $(Y-M_y)$: Product of Deviation Scores

Result Details & Calculation
X Values
∑=2552
Mean= 85.067
$\sum(X-M_x)^2$=SSx=13765.867

Y Values
∑=2552
Mean= 85.067
$\sum(Y-M_y)^2$=SSy= 13765.867
X and Y Combined
N= 30
$\sum(X-M_x)$ $(Y-M_y)$ = 13765.867
R Calculation
r=∑((X-My(Y-Mx)/√((SSx)(SSy)
r=13765.867 /√ ((13765.867)
(13765.867)) = 1

Table – 2 Measurement Data

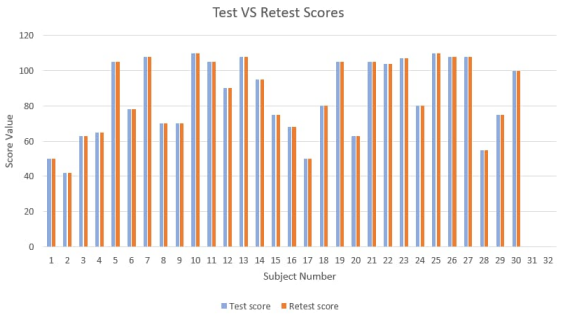
Measurement	N	Mean	S. D	Variance
Test Score (x)	30	85.067	21.787	474.685
Retest Score (y)	30	85.067	21.787	474.685

Meta Numeric (cross-check) r =1
Total number of samples Calculation Details:
Given
N=30
$\Sigma(X-M_x)^2$=13765.867
$\Sigma(Y-M_y)^2$=13765.867
$\Sigma(X-M_x)$ $(Y-M_y)$ =13765.867

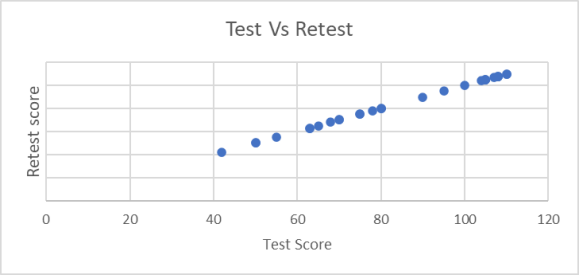
Plugging this value unto the formula

$$r = \frac{\Sigma((X - M_x)(Y - M_y))}{\sqrt{(\Sigma(X - M_x)^2)(\Sigma(Y - M_y)^2)}}$$

$$r = \frac{13765.867}{\sqrt{(13765.867)(13765.867)}} = 1$$



Graph – 1 Test VS Retest Scores



Graph – 2 Linear relationships between the Test and Retest Score

Statistical Conclusion

Table – 3 The analysis yielded the following results:

Test	Statistics	Value	Conclusion
Pearson' correlation	r	1.0	Perfect positive correlation (perfect relative consistency)
Coefficient of determination	R^2	1.0	The variables are perfectly associated
Correlation p- value	p	<0.0001	The relationship is highly statistically significant
Mean difference	M_x - M_y	0	Perfect agreement (no systemic bias)

Perfect Relative Consistency:
A Pearson correlation coefficient of r = 1.0 was found, signifying a flawless linear relationship between the

initial test scores (X values) and the retest scores (Y values). This indicates that the relative position of each subject's score within the group was maintained perfectly from the first test to the second. The correlation was also highly statistically significant, with a p-value of <0.0001, confirming that this perfect relationship is not due to chance. The Coefficient of Determination (R^2) was also 1.0, which means 100% of the variance in the retest scores can be explained by the variance in the initial test scores.

Perfect Absolute Agreement:
The analysis revealed a mean difference (M_x - M_y) of exactly 0, which demonstrates perfect absolute agreement between the two sets of measurements. This finding is critical as it confirms the complete absence of systematic bias, ensuring that the OHS produces the same score on repeated administration for the same subject. The bar chart visually reinforces this, showing identical scores for each subject between the test and retest administrations.

Interpretation
These statistical findings provide strong validation of the reliability of the translated OHS, confirming its appropriate and consistent use for assessing hip pain and function in Tamil-speaking patients.

IV. DISCUSSION

This study highlights the importance of cultural relevance in clinical assessments. The OHS, while effective, can be confusing for Indian patients if not adjusted for regional nuances. By accounting for local idioms and common modes of expressing pain, this adaptation ensures the tool is meaningful for Tamil speakers.

Validity and Reliability Comparison:
The expert committee confirmed the content validity, and the statistical findings (r = 1.0) verified the reliability of the Tamil OHS. These results mirror the success of previous Tamil adaptations like SPADI and DASH. While international literature (e.g., German and Spanish versions) often focuses on Total Hip Replacement (THR) or hip osteoarthritis patients, this study utilized participants with piriformis syndrome. This population was chosen due to local patient availability and study time constraints. Despite the difference in patient diagnosis, the scale maintained its robust psychometric properties, suggesting high versatility.

Clinical Implications:
The availability of a validated Tamil OHS allows clinicians in South India to accurately assess patient outcomes in their native language. This is particularly vital for rural populations where English proficiency is limited, ensuring that clinical decisions are based on accurate patient self-reports.

V. LIMITATIONS AND RECOMMENDATIONS

The primary limitation was the focus on piriformis syndrome rather than THR or hip osteoarthritis, which are the more traditional populations for OHS application. Additionally, the pilot study featured a relatively small sample size of 30 participants. It is recommended that future studies:

1. Validate the Tamil OHS in larger cohorts specifically undergoing Total Hip Replacement or diagnosed with Hip Osteoarthritis.
2. Assess the long-term responsiveness of the scale to clinical improvements following surgical interventions.

VI. CONCLUSION

The cross-culturally adapted Tamil version of the Oxford Hip Score is a reliable and valid instrument for assessing hip pain and disability. It demonstrated perfect test-retest consistency and was well-received by the target population. Its implementation in regional clinical settings will significantly enhance the standardization of outcome measurement and patient care for Tamil-speaking individuals.

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