ORIGINAL ARTICLE

Cross-cultural adaptation and validation of the Turkish version of the Hip disability and Osteoarthritis Outcome Score–Physical function Short-form (HOOS-PS)

Ozlem Yilmaz · Ebru Demir Gul · Hatice Bodur

Abstract The purpose of this study is to adapt the Hip disability and Osteoarthritis Outcome Score–Physical function Short-form (HOOS-PS) to Turkish language and to evaluate the psychometric properties of the Turkish version in patients with primary hip osteoarthritis. After the translation from the source language (English) to the target language (Turkish), synthesis, back translation, revision, and pretest stages were done. Next, 50 patients with primary hip osteoarthritis were asked to fill out the Turkish version of the HOOS-PS two times with one week interval. Internal consistency was tested using the Cronbach's alpha coefficient, and test–retest reliability was assessed by calculating the intra-class correlation coefficient (ICC). Construct validity was investigated by comparing the results of the HOOS-PS and WOMAC, Lequesne questionnaries using Spearman's rank correlation coefficient. Internal consistency was good with a Cronbach's alpha of 0.778 (>0.7) and ICC was 0.911 (>0.7). Both scores verify that the Turkish HOOS-PS is a reliable tool. Spearman's rank correlation coefficients between the HOOS-PS and overall WOMAC ($r = 0.653$), WOMAC physical functions ($r = 0.626$), WOMAC pain ($r = 0.629$) subscales, overall Lequesne ($r = 0.650$), and Lequesne daily living activities ($r = 0.620$) subscales were high ($r > 0.6$), and moderate correlations were found between the HOOS-PS and WOMAC stiffness ($r = 0.511$), Lequesne pain ($r = 0.569$), and Lequesne-walking distance ($r = 0.578$) subscales ($0.6 > r > 0.2$), thus providing proof for the validity of the Turkish form. The Turkish HOOS-PS was found to be reliable and valid for patients with primary hip osteoarthritis.

Keywords Reliability · Validity · Turkish · HOOS-PS · Hip osteoarthritis

Introduction

It is essential to determine the functionality of the patients with hip osteoarthritis in order to assess both the beneficial effects of the conservative treatments and the need for surgical interventions. Questionnaires have been developed for this purpose. The Western Ontario and McMaster Universities (WOMAC) Osteoarthritis (OA) Index is a common instrument used to determine the level of pain, stiffness, and activity limitations of patients with osteoarthritis. The Hip disability and Osteoarthritis Outcome Score (HOOS) was developed by widening the scope of the WOMAC since that index does not include questions to evaluate more strenuous activities like sports [1]. HOOS-PS, which was developed by the The Outcome Measures in Rheumatoid Arthritis Clinical Trials/Osteoarthritis Research Society International (OMERACT/OARSI) by Rasch analysis of HOOS, consists of five questions evaluating the physical functions of the person [2].

It has been shown that the HOOS-PS is a valid and reliable scale for measuring the functional losses in patients with hip disability [3, 4], but it has not yet been adapted to the Turkish language. In our study, our aim was to adapt the HOOS-PS to the Turkish language and to test the validity and the reliability of the Turkish version.

O. Yilmaz (✉) · E. D. Gul · H. Bodur
Department of Physical Medicine and Rehabilitation, Ankara Numune Education and Research Hospital, Talatpasa Bulvari, Ankara Numune Hastanesi, FTR Klinigi Sıhhıye, Ankara, Turkey
e-mail: dr.ozlemyilmaz@gmail.com

Patients and methods

After receiving the consent of Dr. E. M. Roos and her colleagues to adapt the HOOS-PS to Turkish and check its validity and reliability, the approval of the local ethics committee was obtained for this study.

The American Association of Orthopedic Surgeons (AAOS) guidelines published by Guillamin and Beaton in 1993 and updated in 2000 were used for the adaptation of HOOS-PS into Turkish [5, 6]. At least two bilingual translators were required for this project, with one having a medical background. Additionally, the translator with the medical background needed to be informed regarding the content of the scale. In our study, the original form was translated independently into Turkish by two bilingual translators. One of the translators was a physiatrist and had been informed about the scope of the study. The other translator was a teacher. As is recommended in the AAOS guidelines, the target language was the native language of the translators. The translators created the Turkish form as a synthesis of the two independent translations. This form was then retranslated into English by two other professional translators who were not familiar with the topic. The retranslated form was compared with the original form by a commission of physiatrists to ensure that the two forms were in unison. Next, the Turkish form was evaluated by a Turkish philology teacher to check the grammar structure of the sentences, and a pretest version was obtained. This form was then filled out by 10 patients with hip osteoarthritis. They were asked to inform the researchers of any questions they could not understand. The study proceeded with the testing stage as there were no negative feedbacks. The original version and the Turkish version of the HOOS-PS are provided in "Appendices 1, 2"

Fifty patients who had been diagnosed with primary hip osteoarthritis according to the American College of Rheumatology (ACR) diagnostic criteria and who had grade 2 or 3 radiographic severity according to the Kellgren–Lawrence classification system were included in the study [7, 8]. These patients were recruited from the outpatient clinic of the physical medicine and rehabilitation department of Ankara Numune Education and Research Hospital. Patients with other musculoskeletal dysfunctions and inflammatory rheumatic diseases were excluded from the study. Patients with lumbar disk herniation causing hip pain, those who were more than 80 years old, and those with illnesses which affect cognitive functions, such as Alzheimer's or dementia, were also not included.

The HOOS-PS consists of five items: experiencing difficulty while descending stairs, getting in and out of bed, sitting, running, and twisting/pivoting on the loaded leg. Questions are rated on a scale of 0–4 according to difficulty. Therefore, a score between 0 and 20 is possible.

The patients answered the five questions on the Turkish HOOS-PS after they had been informed about the study, and written consent had been obtained. The literate participants read and answered the Turkish HOOS-PS by themselves. One of the investigators—the same investigator—read the questions to the illiterate patients and wrote their replies. She was not trained. The scores were normalized on a 0–100 scale, with 0 being the best score possible [1].

The WOMAC OA Index is commonly used throughout the world and is considered to be reliable and valid for evaluating the pain, stiffness, and functional limitations of patients with hip or knee osteoarthritis. It is composed of 24 questions and contains queries that investigate any difficulties patients experienced in the previous 48 h. A 100 mm VAS version of the WOMAC OA Index is available, but the 5-point Likert version was used in our study. The maximum possible score was 96 (0 = none, 1 = mild, 2 = moderate, 3 = severe, and 4 = extreme) [9–11]. A validation study of the Turkish WOMAC OA Index was performed by Tuzun et al. [12].

The Lequesne index for osteoarthritis has 11 questions that evaluate patients' pain (at night and while walking and sitting), morning stiffness, walking distance, and functional limitations during daily living activities. The total score is between 0 and 24, with the highest score indicating the worst situation. It has been approved by the ACR and accepted as one of the most valid measuring instruments available [13]. Validation of the Turkish version of the Lequesne index was proven by Basaran et al. [14].

The patients were also asked to answer the WOMAC OA and Lequesne indices in order to test the structural validity of the Turkish HOOS-PS. Subsequently, they were required to complete the Turkish HOOS-PS questionnaire again a week later.

Statistical analysis

The data analysis was made with the Statistical Package for the Social Sciences (SPSS) Windows version 11.5 (SPSS Inc., Chicago, IL, USA). The quantitative data were stated as the average ± standard deviation or median (minimum–maximum), while the qualitative data were stated as frequency (%). For repetitive values, the peak value was used instead of the average or median value.

Feasibility was assessed by calculating the percentages of missing items and by evaluating the floor and ceiling effects. If more than 15 % of the patients had the possible minimum or maximum scores, it was considered that there were floor and ceiling effects.

Internal consistency, which reflects the homogeneity of the scale, was determined by calculating Cronbach's alpha coefficient.

Table 1 Frequency of the question-based answers of the HOOS-PS

	None (%)	Mild (%)	Moderate (%)	Severe (%)	Extreme (%)	Total (%)
Question 1	16	40	32	10	2	100
Question 2	24	28	38	10	0	100
Question 3	4	34	34	26	2	100
Question 4	4	24	24	24	24	100
Question 5	4	6	24	42	24	100

Reliability means consistency in the scores of the tested scale is shown in repeated applications. More consistent results reveal a more reliable scale. An intra-class correlation coefficient (ICC) (95 % confidence interval) was used for the reliability analysis of the Turkish HOOS-PS. A Cronbach's alpha and ICC score of greater than 0.7 was accepted as satisfactory [15].

Validity shows how much the scale can measure the intended item to be measured. Construct validity was tested using the "convergent validity" method. For this purpose, the HOOS-PS was compared with the WOMAC OA and Lequesne indices since they also measure physical limitation. Spearman's correlation coefficient (r) was used for validity analyses. A Spearman's correlation coefficient greater than 0.6 represented a strong correlation, $0.3 < r < 0.6$ demonstrated a moderate correlation, and $r < 0.3$ showed a weak correlation [16].

A value of $p < 0.05$ was accepted as statistically significant.

Results

The mean age of the patients was 59.1 ± 9.2 ($41 - 77$). Thirty-seven of the participants were women (74 %), and 13 were men (26 %). The educational status of the patients was as follows: 32 % of them were illiterate ($n = 16$); 60 % of the patients were graduated from primary school ($n = 30$), and 8 % of them were graduated from high school ($n = 4$).

In the first round, all patients answered all the questions on the WOMAC OA Index, the Lequesne index, and the HOOS-PS. Then, a week later, all participants completed the HOOS-PS again. There were no missing items.

The average HOOS-PS score was found to be 37.7 (4.6–74.8). No ceiling or floor effect was observed.

Frequency of the each response category was presented in Table 1.

Internal consistency was measured by calculating Cronbach's alpha, and Cronbach's alpha was found as 0.778. It was greater than the common accepted border value of 0.70.

Reliability was examined using the test–retest method and by calculating the ICC. The ICC was found to be 0.911

Table 2 Scores of the questionnaires

Questionnaire	Median score (min–max)
HOOS-PS	37.7 (4.6–74.8)
WOMAC	
Pain	9 (1–16)
Stiffness	2 (0–15)
Physical function	31.5 (2–53)
Total	42 (3–82)
LEQUESNE	
Pain	4.5 (0–8)
Walking distance	1 (0–4)
DLA	3.75 (0–6)
Total	10 (1.5–18)

HOOS-PS Hip disability and Osteoarthritis Outcome Score–Physical function Short-form, *min* minimum, *max* maximum, *WOMAC* Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index, *DLA* daily living activities

for the total HOOS-PS score. The question-based ICC values were 0.874, 0.807, 0.846, 0.870, and 0.817, respectively, with $p < 0.001$ and a 95 % confidence interval for all values. All values were greater than 0.70, which proves that the Turkish HOOS-PS is a reliable scale.

The average values of the HOOS-PS, WOMAC OA, and Lequesne questionnaires are presented in Table 2. The Turkish HOOS-PS strongly or moderately correlated with total WOMAC and Lequesne and their subscales (Table 3). These correlations indicate that the Turkish HOOS-PS is a valid scale.

Discussion

Our study showed that the Turkish HOOS-PS is reliable and valid for patients with hip osteoarthritis.

The education status of our study group was very low. Illiteracy was seen in 32 % of the subjects, and 60 % had attended school for only 5 years. Nevertheless, they could all understand and answer all the questions on the Turkish form. This verified that the Turkish HOOS-PS is comprehensible, even by people at a lower educational level. Additionally, this supports the feasibility of the Turkish version since there were no missing items and no floor or ceiling effects.

Table 3 Construct validity of the Turkish HOOS-PS

Questionnaires	HOOS-PS	
	r	p
WOMAC total	0.653	<0.001
WOMAC pain	0.629	<0.001
WOMAC stiffness	0.511	<0.001
WOMAC physical function	0.626	<0.001
Lequesne total	0.650	<0.001
Lequesne pain	0.569	<0.001
Lequesne-walking distance	0.578	<0.001
Lequesne daily living activities	0.620	<0.001

HOOS-PS Hip disability and Osteoarthritis Outcome Score–Physical function Short-form, *WOMAC* Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index

It has been shown that the HOOS-PS is similar to the WOMAC 3.0 OA Index 17-item physical functions subscale with regard to construct validity and responsiveness [3]. It is also preferential in younger, more active patients since it also includes questions concerning more strenuous activities. Thus, it has gained wide acceptance throughout the world.

Transcultural adaptations of scales are needed to enable standardization between cultures and countries in multi-center studies or to obtain globally meaningful results from individual studies. A French version of the HOOS-PS is now available in printed form [17], and Danish, Dutch, German, Italian, Polish, and Swedish versions are accessible on the web site www.koos.nu.

The mean score of the Turkish HOOS-PS was higher than the mean score of the French HOOS-PS (37.7 vs. 51.1). This can be explained by the higher average age of the French patients when compared with Turkish patients in our study.

One of the parameters signifying the reliability of a scale is to measure the internal consistency. This states the conformity between the subunits of a scale and is found by calculating Cronbach's alpha coefficient. A high Cronbach's alpha shows that the subunits of the scale are similar when measuring the tested parameter. In our study, the Cronbach's alpha coefficient was 0.778, thus providing evidence of the internal consistency of the Turkish HOOS-PS. The internal consistency and reliability of the original English HOOS-PS were evaluated by a separation index that is equivalent to Cronbach's alpha and was found as 0.80 [2].

For a scale to be valid, it should also be reliable; in that, it should yield the same results when repeated. The time interval between the repetitions should be short enough that the clinical status of the subject does not change and long enough that the subject does not remember the first reply. In our study, the patients were asked to fill the forms one more time, a week later after the first testing. Then, we calculated the correlation of the results of the two tests and designated that as the ICC, which was 0.911 in this study. This value is above the bound value (0.70) and proves the reliability. By comparison, the ICC of the French HOOS-PS was reported as 0.859.

The HOOS-PS was more strongly correlated with the WOMAC total (r = 0.653), WOMAC pain (r = 0.629), and WOMAC physical functions (r = 0.626) than WOMAC stiffness (r = 0.511). Self-reported limitations in activities in hip or knee OA are largely dependent on pain and to a lesser extent on range of joint motion [18]. HOOS-PS is composed of questions related to self-reported physical functions. The stronger correlations noted between the HOOS-PS and WOMAC physical functions and WOMAC pain compared to WOMAC stiffness support the convergent and divergent construct validity of the Turkish HOOS-PS. In addition, there was a strong correlation between the Lequesne total (r = 0.650) and the Lequesne daily living activities (r = 0.620) when they were compared with the HOOS-PS. A much weaker correlation was revealed when the HOOS-PS was compared with the Lequesne pain (r = 0.569) and Lequesne-walking distance (r = 0.578). These findings also support the convergent and divergent construct validity of the Turkish HOOS-PS. Since the HOOS-PS contains questions related to physical functions, the stronger correlations between it and the Lequesne daily living activities were expected. Similar to our results, the validation study of the French HOOS-PS demonstrated a stronger correlation with the Osteoarthritis Knee and Hip Quality Of Life (QAKHQOL) physical activity (r = −0.665) than the QAKHQOL pain (r = −0.385). The correlation coefficients between the French version of HOOS-PS and the mental health subscale of QAKHQOL were −0.473, and there were not any significant correlations between HOOS-PS and the social support and social functioning subscales of QAKHQOL in this study [17].

One of the limitations of our study was the number of our patients. Larger number of patients would be more beneficial for validation studies, but actually, there is not a recommended number of patients for similar studies. Also, our study would be more valuable if we had tested the scale for responsiveness. Future studies are essential for this purpose. However, the responsiveness of the original HOOS-PS and the French version has been proven [3, 17].

In conclusion, the Cronbach's alpha and ICC values of the Turkish HOOS-PS were sufficiently high (>0.7), and WOMAC and Lequesne scales are commonly used worldwide and are known to be reliable and valid for osteoarthritis; the Turkish HOOS-PS also showed

moderate-to-strong correlations with these scales supporting our view that the Turkish HOOS-PS is a reliable and valid instrument for patients with hip osteoarthritis.

Appendix 1: Hip disability and Osteoarthritis Outcome Score (HOOS)—Physical function Short-form (HOOS-PS) English Version

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HOOS-Physical Function Shortform (HOOS-PS)

Today's Date :_____/_____/_____ Date of Birth: _____/_____/_____

Name:
_____

INSTRUCTIONS: This survey asks for your view about your hip. This information will help us keep track of how well you are able to perform different activities. Answer every questions by ticking the appropriate box, only <u>one</u> box for each question. If you are unsure about how to answer a question, please give the best answer you can so that you answer all the questions.

The following questions concern your level of function in performing usual daily activities and higher level activities. For each of the following activities, please indicate the degree of difficulty you have experienced in the **last week** due to your hip problem.

1. Descending stairs

  ☐**None** ☐**Mild** ☐**Modarate** ☐**Severe** ☐**Extreme**

2. Getting in/out of bath or shower

  ☐**None** ☐**Mild** ☐**Modarate** ☐**Severe** ☐**Extreme**

3. Sitting

  ☐**None** ☐**Mild** ☐**Modarate** ☐**Severe** ☐**Extreme**

4. Running

  ☐**None** ☐**Mild** ☐**Modarate** ☐**Severe** ☐**Extreme**

5. Twisting/pivoting on your loaded leg

  ☐**None** ☐**Mild** ☐**Modarate** ☐**Severe** ☐**Extreme**

Appendix 2: Kalça Yetersizliği ve Osteoartrit Sonuç Skoru (HOOS)—Fiziksel Fonksiyon Kısa Form (HOOS-PS) İngilizce Versiyonu

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Fiziksel Fonksiyon Kısa Form (HOOS-PS)

Bugünün Tarihi:_____/_____/_____ Doğum Tarihi: _____/_____/_____

İsim: _____

TALİMATLAR: Bu anket, kalça ekleminiz ile ilgili görüşlerinizi sormaktadır. Bu bilgiler, farklı faaliyetleri ne kadar iyi yapabildiğinizi takip etmemizde bize yardımcı olacaktır. Her soru için sadece uygun bir kutucuk işaretlenerek cevaplandırılacaktır. Eğer bir soruyu nasıl cevaplayacağınızdan emin değilseniz, bütün soruları yanıtlayabilmeniz için lütfen verebileceğiniz en uygun cevabı veriniz.

Aşağıda verilen sorular olağan günlük aktiviteleri ve yüksek düzey aktiviteleri gerçekleştirdiğinizdeki fonksiyon düzeyiniz ile ilgilidir. Aşağıda belirtilen her bir aktivite için **geçen hafta** kalça eklemi probleminizden dolayı yaşadığınız zorluk derecesini belirtiniz.

1. Merdivenlerden inmek

Yok	**Hafif**	**Orta**	**Şiddetli**	**Çok Şiddetli**
☐	☐	☐	☐	☐

2. Banyo veya duşa girmek, banyo veya duştan çıkmak

Yok	**Hafif**	**Orta**	**Şiddetli**	**Çok Şiddetli**
☐	☐	☐	☐	☐

3. Oturmak

Yok	**Hafif**	**Orta**	**Şiddetli**	**Çok Şiddetli**
☐	☐	☐	☐	☐

4. Koşmak

Yok	**Hafif**	**Orta**	**Şiddetli**	**Çok Şiddetli**
☐	☐	☐	☐	☐

5. Yük verdiğiniz bacağınız üzerinde dönmek/bükülmek

Yok	**Hafif**	**Orta**	**Şiddetli**	**Çok Şiddetli**
☐	☐	☐	☐	☐

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