

# **NONARTHRITIC HIP SCORE: TRANSLATION, CULTURAL ADAPTATION AND VALIDATION OF THE ITALIAN VERSION**

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## **ABSTRACT**

**BACKGROUND:** the aim of the study was to translate the Nonarthritic Hip Score (NAHS) questionnaire into the Italian language, to adapt it into the Italian culture and to validate it.

**METHODS:** Translation and cultural adaptation were performed following international guidelines. To assess the reliability of the tool internal consistency and test-retest reliability were evaluated through Cronbach's alpha and Intraclass Correlation Coefficient (ICC) respectively. Validity was evaluated by Pearson's correlation coefficient between the NAHS, the Lequesne Index of Severity for Osteoarthritis of the Hip (LISOH) and the Western Ontario and McMaster Universities Arthritis Index (WOMAC), that were administered together. These three questionnaires were applied to a population of 64 individuals between 19 and 82 years old with generic hip injuries or diseases.

RESULTS: The items of the original version of NAHS are similar or equal to the items of the Italian version of NAHS. Cronbach's  $\alpha$  was 0.614 (Pain); 0.821 (Symptom); 0.877 (Function); 0.896 (Activity). ICC for total score was 0.905. The correlation with the WOMAC was 0.850 ( $p < 0.01$ ) and with the LISOH was 0.738 ( $p < 0.01$ ).

CONCLUSIONS: The NAHS showed positive results for reliability and validity so it was translated into Italian language and was cross-culturally adapted to Italian culture. This questionnaire is a good instrument in clinical practice and scientific research for the evaluation of young and active individuals affected by hip injuries or diseases.

Key words: hip, pain, young, osteoarthritis

## **Introduction**

The Nonarthritic Hip Score (NAHS) was designed for the evaluation of joint diseases in young individuals with high physical demands and high treatment expectations. Before it the development scales designed for the evaluation of hip injuries and disorders were created only for older people, these scales focused their attention on arthritic and degenerative joint disease. So these scores were not appropriate to assess the younger and active population of people that have not severe hip injuries or diseases [1]. The NAHS is a scale for the evaluation of functional capacity of the hip in young and physically active individuals. It is a simple, short and self-administered questionnaire composed of 20 multiple choice questions divided into 4 sections: pain (5 components), function (4 components), mechanical symptoms (5 components) and physical activity level (6 components). Every question has the same five responses and each of the answers corresponds to a particular numerical value. The total NAHS score is calculated by adding together the values and multiplying by 1.25 to obtain the final score. The maximum score is 100 corresponding to a normal hip function [1]. The NAHS was developed in 2003 by Christian P. Christensen et al. in English language and it was also translated, validated and cross-cultural adapted in Portuguese language in Brazil in 2013[2]. The aim of this study was to translate, culturally adapt and validate NAHS into Italian Language. The most used scales for the evaluation of hip disorders that have been translated and validated into Italian language as the Harris Hip Score, Lequesne Index

of Severity for Osteoarthritis of the Hip (LISOH) and the Western Ontario and McMaster Universities Arthritis Index (WOMAC) [3] are appropriate only for individuals with moderate to severe hip osteoarthritis or with post-traumatic hip disorders with significant physical limitations. Thus with the increasing of hip diseases [2] between young individuals Italian clinicians and researchers had the need to validate a questionnaire for this population that still not have several functional limitations.

### **Materials and methods**

**Translation and cultural adaptation.** Once the consent of the developers of the Nonarthritic Hip Score (NAHS) was received, following the “Translation and Cultural Adaptation of Patient-Reported Outcomes Measures-Principles of Good Practice” guidelines the original tool was translated from English to Italian. The original English version of the NAHS was translated by two Italian physiotherapists familiar with English. Two English translators then translated the scales back into English. Finally a group of two Italian physiotherapists worked for the cultural adaptation, compared the original version with the back translations and they checked the final translation and corrected any remaining error to minimize any differences from the English original version.

**Participants.** According to preceding validations of the NAHS [1, 2] participants included in the study had to be aged 18 to 76 and they had to be affected by hip injuries or diseases for 6 months. Patients were excluded from the study if they had: visual or cognitive problems, severe functional hip limitations with decreased range of motion (less than 10° of internal rotation at 90° hip flexion), severe osteoarthritis, in treating for any therapy. All the participants included in the study gave their consent for the study.

**Reliability and Validity.** Following the “Consensus-Based Standards for the Selection of Health Status Measurement Instruments” (COSMIN) checklist, the reliability and validity of the culturally adapted scale were assessed. The internal consistency of NAHS was examined by Cronbach’s alpha ( $\alpha$ ), needed to be  $> 0.70$ . To calculate test-retest reliability the patients completed the NAHS after 48 hours. The questionnaires were given by one physiotherapist. NAHS-retest was administered after 48 hours. Test- retest reliability was measured with the Intraclass Correlation Coefficient (ICC). With an  $ICC > 0.70$  NAHS was considered stable. The participants completed the Italian version of the NAHS, the LISOH [4-7] and the WOMAC [8-9] questionnaires.

Validity was assessed using Pearson's correlation analyses to determine the association between NAHS and the Italian version of WOMAC and LISOH. Person's correlation coefficient needed to be  $>0.5$  or  $<-0.5$ , where positive values show positive linear correlation and negative values show negative linear correlation. The significance level has been set for p-value less than or equal to 0.05. All statistical analyses were performed using IBM-SPSS version 23.00.

## **Results**

**Translation and cultural adaptation.** The final Italian translation of NAHS was done following the guidelines for translation and cultural adaptation, elaborating a forward and a backward translation. Finally the Italian version of the (NAHS-I) was formed by all the items identical or similar to the original version.

**Participants.** Participants were recruited from April 2019 through "Policlinico Umberto I" and "Policlinico Italia", "Aeronautica Militare". Among the 64 patients recruited all agreed to participate (mean age  $\pm$  standard deviation (SD)= 48.48  $\pm$ 16,05) and completed the study without any loss. The characteristics of the participants are summarized in Table I.

**Reliability.** The NAHS-I showed a good level of internal consistency with a Cronbach's  $\alpha$  of 0.614 ("Pain"); 0.821 ("Symptom"); 0.877 ("Function"); 0.896 ("Activity") (Table II).

NAHS was administered for the second time after 48 hours from the first administration and as reported in table in Table III it was reliable with an ICC of 0.905 ( $p<0.05$ ) and the scale remains stable also after the second administration to the same individual.

**Validity.** The Italian versions of WOMAC and LISOH were also administered to the population. The Pearson's correlation coefficient of the total score of the NAHS with the Italian version of the WOMAC was 0.850 ( $p<0.01$ ) and with the Italian version of the LISOH was 0.738 ( $p<0.01$ ), proving that NAHS has a good validity and that it has all statistically significant correlations with the other two scales (Table IV).

## **Discussion**

The Nonarthritic Hip Score (NAHS) has been translated and culturally adapted into Italian language and culture. The NAHS is a very simple self-administered questionnaire and it request really short time to fill in. For this reasons it is a very good and practical instrument for the evaluation of patients in clinical practice and in research studies.

The instruments for the evaluation of patients affected by hip diseases available in the last century were developed for patients with osteoarthritis of the hip or subsequent to hip arthroplasty. So these scales were not appropriate enough for young and active patients with high physical demands. The most used scales for the evaluation of hip diseases, like the “Harris Hip Score” [10] and the “WOMAC” [8-9] focused their attention on older people predominantly affected by osteoarthritis. For this reason we have chosen a lower mean age of the patients (48.48) and patients affected by severe osteoarthritis were excluded compared to the validations of the LINOH [4-7] and WOMAC [8-9] scales. The LINOH’s evaluation skills were evaluated [5-6], but the sections of the scale have not been validated for independent administration [7]. Also in the Italian validation of the WOMAC [8] the Lequesne OA index was used as a comparison scale and it was proposed as an interview technique [7].

NAHS is composed only by twenty multiple choice questions, each one with the same five potential answers. The ten questions relating with pain and function come directly from WOMAC [8-9]. The other ten questions (six relating activity level and four relating mechanical symptom) were chosen after a long consultation with patients. The authors supported that only six questions about activity level and only four for mechanical symptom were enough to assess this kind of patients and to catch the disease [1].

Comparison with other studies. The results of this study demonstrate, evaluating Validity and Reliability, that the Italian version of the NAHS is a reliable and valid instrument of measure with good evaluation skills. Values of Cronbach  $\alpha$  are good for all NAHS’s sections, except for the first section. This demonstrate that the NAHS has a great internal consistency and a good interrelationship between items. One of the possible reasons of the not statistically significance of the first section of the NAHS could be the fact that the sample was composed only by 64 individuals. Furthermore we can see in all the items are important, because if an item were eliminated the value of the Cronbach’s  $\alpha$  would decrease and also the internal consistency would diminish. The Intraclass Correlation Coefficient (ICC) is  $> 0.7$ , so NAHS has a great stability and also with the administration of a second questionnaire after 48 hours, the instrument continues to be stable. As reported in Table 3, the NAHS was compared with the WOMAC [8] and LINOH [5-6] scales. The lower value of the Pearson’s correlation coefficient was 0.341 between the fourth NAHS’s section (“Activity”) and the second WOMAC’s section (“Stiffness”). The high value of the Pearson’s correlation coefficient between NAHS and WOMAC scores (0.850) demonstrate

that both scales assess similar features and show a close relation between them. This can be explained by the fact that ten NAHS's questions came directly from WOMAC. The evaluation of the Pearson's correlation coefficient demonstrates all statistically significant correlations with both scales, so all NAHS's items are correlated with all WOMAC's and LINOH items.

Limitations of the study. One limitation of the scale is the need of the research's participation in questionnaire administration to the individuals with low educational levels. Another limitation of the NAHS could be the short time (48 hours) between the two tests, because the patient could remember the answers of the first test administration. The limitation of the study is the small sample of individuals (64).

### **Conclusions**

This study showed that the NAHS is considered a good instrument for the evaluation of young and active patients with hip disease. NAHS is a good instrument in clinical practice and in research studies because it is very simple, self-administered and quick to complete (only 5 minutes) and to understand for a maximum compliance of the patient and it is specific for young and physically active individuals [11-22].

This study was conducted by a group of rehabilitation professionals from the "Sapienza" University of Rome, from "Rehabilitation and Outcome Measure Assessment" (ROMA) association. Even rehabilitation professionals from the Aerospace Medicine Department of the Italian Air Force of the Diagnostic Therapeutic Center and aero-medical rehabilitation were part of the team research who conducted the study. ROMA association in the last few years has dealt with the validation of many outcome measures in Italy.

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## NOTES

*Conflicts of interest.* The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

*Congresses.* 9<sup>th</sup> I.S.Mu.L.T. Congress Open mind and new technologies in muscles, ligaments and tendons on November 29-30, 2019.

## TABLES

Table I.— Demographic characteristic of the 64 participants.

	Sample (n=64)
Age mean (standard deviation)	48.48 (16,05)
Females number (%)	35 (54.7)
Diagnosis number (%)	
Rheumatoid arthritis	1 (1.6)
Aspecific hip pain	43 (67.2)
Femoroacetabular impingement	1 (1.6)
Periarticular tendonitis	2 (3.1)
Initial osteoarthritis	12 (18.75)
Osteoporosis	2 (3.1)
Petrochanteric bone cysts	1 (1.6)
Osteonecrosis	1 (1.6)
Petrochanteric pain syndrome	1 (1.6)

Table II. Internal consistency: Cronbach's alpha for the subscales and Cronbach's alpha if item deleted.

	Cronbach's alpha if item deleted
item1	0.458
item2	0.525
item3	0.624
item4	0.630
item5	0.541
total alpha "PAIN"	0.614
item6	0.750
item7	0.778
item8	0.746
item9	0.817
total alpha "SYMPTOM"	0.821
item10	0.850
item11	0.849
item12	0.841
item13	0.865
item14	0.849
total alpha "FUNCTION"	0.877
item15	0.865
item16	0.855
item17	0.875
item18	0.858
item19	0.863
item20	0.874
total alpha "ACTIVITY"	0.896

Table III. Stability: Intraclass correlation coefficient (ICC) between test and retest of 64 participants.

	test	retest		
	Mean Score $\pm$ Standard Deviation	Mean Score $\pm$ Standard Deviation	Intraclass Correlation Coefficient	Confidence interval 95% [lower limit-upper limit]
PAIN	15.22 $\pm$ 2.68	15.22 $\pm$ 3.12	0.779	0.64 - 0.87
SYMPTOM II	11.47 $\pm$ 3.35	12.03 $\pm$ 3.21	0.858	0.77 - 0.91
FUNCTION III	15.62 $\pm$ 3.89	15.75 $\pm$ 3.84	0.933	0.89 - 0.96
ACTIVITY IV	16.23 $\pm$ 4.63	16.69 $\pm$ 4.18	0.912	0.85 - 0.95
TOTAL	73.18 $\pm$ 15.36	74.61 $\pm$ 15.03	0.905	0.84 - 0.94

Table IV. Validity: Pearson's correlation coefficient between Western Ontario and McMaster Universities Arthritis Index (WOMAC), Lequesne Index of Severity for Osteoarthritis of the Hip (LISOH) and Nonarthritic Hip Score.

	PAIN	STIFFNESS	PHYSICAL FUNCTION	TOTAL	PAIN	MAXIMUM DISTANCE WALKED	ACTIVITIES OF DAILY LIVING	TOTAL
Pain	-0.694**	-0.375**	-0.677**	-0.690**	.848**	0.847**	-0.691**	-0.542**
Sympom	-0.685**	-0.551**	-0.554**	-0.614**	.768**	0.770**	-0.614**	-0.374**
Function	-0.629**	-0.580**	-0.904**	-0.875**	.866**	0.870**	-0.875**	-0.794**
Activity	-0.480**	-0.341**	-0.718**	-0.678**	.879**	0.875**	-0.678**	-0.707**
TOTAL	-0.718**	-0.544**	-0.855**	-0.850**	.999**	10.000**	-0.850**	-0.738**

\*\* . Significant correlation  $p < 0.01$  (two-tailed).