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Original Research Article

CROSS-CULTURAL ADAPTATION OF THE DISABILITY OF ARM, SHOULDER, AND HAND QUESTIONNAIRE (DASH): ENGLISH IN TO SINHALA TRANSLATION

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ABSTRACT

Background: The purpose of this study was to perform a cross-cultural adaptation of the original version of the Disability of the Arm, Shoulder, and Hand (DASH) questionnaire to the Sinhala language.

Materials and Methods: Five steps were followed for the cross-cultural adaptation: forward translations into Sinhala, synthesis of the translations, back translations into English, revision by an expert committee, and field testing of the pre-final version done with 40 patients in The National Hospital of Sri Lanka (3000 bed). Psychometric characteristics of reliability and construct validity were evaluated for the final version of the Sinhala questionnaire.

Results: Internal consistency of the final version was high (Cronbach's á = 0.97) and the item-total correlations were moderate (ranged from (0.48 to 0.88).

Conclusion: These results are similar to previous studies undertaken on the cross cultural adaptation of the DASH questionnaire that have been accepted as being valid and reliable. This version of the DASH in Sinhala is thus considered valid and reliable.

KEY WORDS: Cross-cultural adaptation, Disability of Arm, Shoulder and Hand questionnaire, Sinhala, Upper extremity evaluation.

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INTRODUCTION

There are many tools available for the evaluation of outcomes of the functions of the upper limbs. Useful and reliable evaluation of the upper limb is important in research and clinical practice [1].

A common problem when conducting rehabilitation related research studies in SriLanka is the lack of measurement tools translated into the Sinhala language; this is the language predominantly spoken in Sri Lanka and adapted for Sri Lankan culture especially that have been confirmed as being valid and reliable. It has often been suggested [2] that a comprehensive patient assessment should include a self reported measure of performances, including the

patient's ability to carry out daily living tasks and work activities, and psychological factors. The Disability of the Arm, Shoulder, and Hand (DASH) questionnaire has fulfilled the requirement of a self -report measure and is increasingly used around the world [2].

The Disability of the Arm, Shoulder, and Hand (DASH) questionnaire is a reliable and valid measure used to evaluate upper extremity function in clinical trials [3].

Adapting a health questionnaire to fit the purpose for a particular culture, rather than developing a new one, is preferred, as it is more economical, faster, and it may facilitate future comparisons among populations [4]. In order to maintain validity of the original instruments while considering important cultural differences, mere linguistic translation of an instrument does not suffice. Mulero-Portele AL, Colon-Santaella CL, and Cruz-Gomez C. have shown that guideline developed for the cross-cultural adaptation of questionnaires should be followed. The adaptation process applied to the questionnaire allows for the aggregation of data from several cultures in clinical trials. Adaptation also helps with the efficacy and effectiveness of procedures and reduces the need for developing new instruments that have the same purpose [4]. A complex translation process must be performed, and requires forward translation, back translation, consensus among experts, and field testing. These components are important to ensure a complete cultural adaptation of the questionnaire being translated [3, 4].

As the DASH questionnaire had not been translated into Sinhala, the most commonly use language in Sri Lanka, the purpose of this study was to perform the cross-cultural adaptation of the original version of the DASH questionnaire to the Sinhala language and to evaluate its content validity and internal consistency.

MATERIALS AND METHODS

The research proposal was approved as adhering to the established ethical standards of the Ethical Review committees by the Faculty of Medicine University of Kelaniya and The National Hospital of Sri Lanka. Written informed consent was obtained from the patients who took part in the study.

Instrument: The DASH questionnaire was originally developed in English [5]. It is a self report measure of physical, psychological and social role function [5]. It has 30-items related to the three areas. It measures the degree of difficulty a person has in performing various daily physical activities because of an upper extremity problem (21 items), the severity of pain , activity-related pain, tingling, weakness and stiffness (5 items), and the effect of the condition on psycho-social activities (1 item), work (1 item), sleep (1 item), and self-image (1 item). Scores of all items are added to calculate a DASH score ranging from 0 to 100. Lower scores indicate less disability [6]. The DASH includes two optional modules of four items of each, which measure function at work, in sports and in performing arts [6].

Setting: This study was undertaken in the National Hospital of Sri Lanka where the official language is Sinhala. It is also the most commonly used. This is the biggest hospital in South Asia region and has 3000 inpatient beds.

Participants: The sample for this study was drawn from participants who were referred for physiotherapy to the inpatient and outpatient services at the Burn and Reconstructive surgical unit and the Department of Rheumatology and Rehabilitation (Special) of the National Hospital of Sri Lanka. Both male and female were included in equal numbers. Initially the sample comprised of 56 participants.

The study participants included 40 Sinhala-speaking clients (20 male and 20 female) with various upper limb conditions.

The inclusion criteria for the participants' selection were: A participant with any of the variety of upper limb conditions such as tendon injuries, nerve injuries, fractures, ligament injuries, joint dislocations, joint stiffness, inflammation of joints and tendons, burns and fractures. The participant was able to read and understand the Sinhala DASH questionnaire.

The exclusion criteria were: A patient with psychological or psychiatric disorder, Primary language of participants not being Sinhala, Younger than 12 years of age.

Procedure: The guidelines for the cross-cultural adaptation of health status measures supported

by the American Academy of Orthopedic Surgeons and the Institute for Work and Health were followed [7, 8]. The guidelines require five stages for the adaptation process. Forward translation into the Sinhala language, synthesis of the translation, back translation into English, revision by a committee of experts and a test of the pre-final version [7, 8, 9].

The final step is that the test has to be submitted to the Institute for Work and Health for approval before conducting the validity and reliability.

Step 1: Forward Translation: Two bilingual persons whose native language is Sinhala; independently translated the English version of the DASH in- to the Sinhala language. Both translators were graduates from a master in arts program in translation. These translators have worked extensively in translating and interpreting documents for several years. One of the translators had clinical experience as a counselor, and therefore understood the use and purpose of the DASH upper extremity outcome measure. The other translator was unaware of its use and purpose and therefore did not understand its main concepts. Each translator produced a written report of their translation, identifying concepts, phrases, or words that represented a challenge in the translation, along with a rationale for the final selection of their wording. The goal of this stage 1 was to compare the translations and identify discrepancies between them.

Step 2: Synthesis of the Translations: To develop a common translation of the questionnaire, both Sinhala versions were reviewed and discussed by two unbiased members of the research team. Discrepancies between the two versions were identified and were resolved by consensus between the translators and the researchers. This allowed the research group to produce a new version of the DASH questionnaire in Sinhala.

Step 3: Back Translations into English: Two professional translators, fluent in Sinhala and English, translated the new version produced in the synthesis stage back into English. To eliminate bias in the translation, these translators were independent, and they were unaware of the DASH concept. The main goals of the back translation stage is to identify inconsistencies and assess the semantic and conceptual equivalence between the translated Sinhala version and the original DASH. Thus, the two independent translators had to identify challenging wordings. The aim of this stage was to obtain some - what different back translation versions.

Step 4: Expert Committee: The expert committee of reviewers consolidated all versions (forward translations, translation synthesis, back translations) and developed a pre-final version of the Sinhala DASH. The expert committee included translators, synthesis mediator, health care professionals, a methodologist, and language professionals who knew about The Dash and participated for this study willingly. The role of this committee was to identify discrepancies between the two back translation versions, clarify any uncertainties related to previous stages, and reach consensus regarding the pre-final Sinhala version.

Step 5: Testing of the pre-final Sinhala Version: The last stage of the cross-cultural adaptation process was to test the pre-final Sinhala version of the DASH through conducting face- to- face interviews with Sinhala speaking clients who had various upper extremity conditions which were relevant to using The DASH. Probes were used to ensure clarity and understanding of the questionnaire instructions, items, and responses. Examples of probes were: are the instructions/items/responses clear, are the wordings of the instructions/items/responses clear and understood, did you have difficulty reading or understanding the instructions/items/responses, explain to me what you understood about the instructions/items/responses, do you recommend any linguistic and/or cultural changes, is the format/style clear and appealing to the answerer, and what is your overall impression about the questionnaire. Before administering the DASH questionnaire, data on age, sex, duration of symptoms, job type and diagnosis were collected. Each participant was then asked to answer the DASH questionnaire.

Data Collection Procedures: Data were collected from 40 randomly selected clients with random numbers from the Department of Rheu-

matology and Rehabilitation (Special) and the Burns and Reconstructive Surgical Unit of the National Hospital of Sri Lanka. The purpose of the study was explained to all participants; and informed consent was obtained prior to the participants completion of the Sinhala version of the DASH questionnaire. To maintain confidentiality an identification number was given to each participant and their names were not recorded. Before completing the questionnaire items, the clients were asked to read the instructions and indicate their understanding of it. After the participants completed the questionnaire, they were interviewed by the researcher "face to face" as to the clarity of each questionnaire item in the Sinhala language and relevance to the Sri Lankan culture.

Data Analysis: Descriptive statistics were used to examine the distribution of responses so that the proportion of missing and misunderstood responses could be identified. For example, if a majority of the sample population missed a particular question on the questionnaire, this questionable item will be closely examined. A content analysis of the clients' feedback was performed to explore the linguistic/cultural relevance of these items to the Sinhala population/ culture.

To evaluate internal consistency, two reliability coefficients were calculated: inter item consistency using the Cronbach's coefficient á (index range from0.00 to 1.00 which is highest) and item-to-total correlation using the Pearson product–moment correlation coefficient [10]. To evaluate correlations construct validity, nonparametric statistics, Spearman rank correlation coefficients, were all calculated. The criterion used to assess the correlations was as follows: correlations ranging from 0.00 to 0.25 indicated minimal to no relationship; those from 0.25 to 0.50 indicated fair correlation; those from 0.50 to 0.75 indicated moderate to good; and those above 0.75 indicated good to excellent [8]. All data were entered and analyzed using Statistical Package for the Social Sciences (SPSS), version 17.0 for Windows (SPSS Inc., Chicago, Illinois, USA).

RESULTS

Patients' Characteristics: The demographic variables and patient characteristics analyzed were age, gender, educational level, occupation, type of injury and location of injury. The age range of the patients who completed the Sinhala DASH questionnaire ranged from 12 to 75 years (mean age = 43.87 years, SD= 17.37 years). There was an equal number of male and female subjects (20 males and 20 females) (Table 1).

Table 1: Demographic and clinical characteristics of the sample (n = 40).

Demographic and clinical characteristics	
	Mean (SD)
Age in years	43.87 (17.37)
Gender	**Numbers (%)**
Male	20 (50.0)
Female	20 (50.0)
Job type	**Numbers (%)**
Manual Worker	7 (17.5)
School Teacher	3 (07.5)
Office worker	5 (12.5)
Retirement	6 (15.0)
Student	4 (10.0)
House wife	9 (22.5)
Garment Factory Worker	4 (10.0)
Do not work	2 (05.0)
Diagnosis	**Numbers**
Elbow/upper arm/shoulder	28
Shoulder tendonitis	3
Lateral/Medial epicondylitis	5
Capsulitis of the Shoulder	12
Fracture	4
Burns	4
Hand/wrist/forearm	12
Fracture	2
Burns	4
Arthritis	2
Trigger finger	4
Duration of work disability	**Number (%)**
0–3 months	22 (55)
4–6 months	16 (40)
7–12 months	02 (5)
>12 months	00 (0)

The patients presented with various types of upper limb injuries including fractures, dislocations, tendon and ligament injuries, tendon and joint inflammation, joint stiffness, and burns. The upper extremity joints were affected as follows: 19 patients (47.5%) shoulder, 9 patients (22.5%) elbow, 4 patients (10%) wrist, and 08 patients (20%) hand injuries (Table 1).

Descriptive statistics: The mean score on the 30-item function/symptom scale of the DASH was 35.95 (SD=24.59); scores ranged from 0 to 88.33. Upon review of the data, five patients (12.5%) didn't respond to item 21 of the Sinhala DASH questionnaire "sexual activity". They were unmarried males and females. In the optional section, 19 patients responded to the work related section only (47.5%). 13 answered both

the work related section and the sport activity section (32.5%).There were 8 patients (20%) who did not response to either the work or the sport section.

Psychometric Properties of the Pre-final Version

Content validity: Completeness of item response was very good. The scores were adequately distributed. The mean DASH score for the elbow, upper arm and shoulder section was 35.35(SD=24.53) compared with 34.06 (SD=26.46) for hand, wrist and forearm disorders section. The mean scores for the sport/ music and work modules were 9.12(SD=4.17) and 10.45(SD= 4.86) respectively. The item responses had a good distribution ranging from 1.88 to 3.32. There was no floor or ceiling effect.

Internal consistency: In order to estimate the internal consistency of the Sinhala DASH, the internal consistency coefficient (Cronbach's alpha) was assessed. For the 30 items of the Sinhala DASH, the Cronbach's alpha was 0.970 which was high. The item-total correlations were moderate (0.48 to 0.88).

Language and cultural relevance of the Sinhala DASH: After reading the questionnaire instructions 10 clients (25%) had difficulty understanding the following instructions "it doesn't matter which hand or arm you use to perform the activity". The aim of these instructions was to assess the disability level of the clients regardless of which hand they used to perform the activity whether it was injured hand or the uninjured one. These Sinhalese clients did not understand this concept. As a result these instructions were explained to them, so that they were able to fill out the questionnaire correctly. Item one of the DASH Questionnaire "open a tight or new jar" was translated to Sinhala with more simple language and with examples because the word "jar" is not widely used. In response, the head of the expert review committee, while conducting the face to face interview with the Sinhalese patients, explained its meaning by giving another Sinhala synonym so that this question was clear and fully understood (Table 2). For item 15 "put on a pullover sweater", due to cultural differences in Sri Lanka, dress is not the same. Every country/ culture has their own dress that they are accustomed to. When translating this item to Sinhala, consideration of cultural differences was made. In questions 17, 18, and19 of DASH questionnaire without changing the idea presented by the original activity in the DASH, the activity was changed to one with more relevance to their day-today activities; as there were no similar recreational activities for Sinhalese men and women. For example instead of playing Frisbee cutting grass with a sickle was substituted. There were no other misunderstood items (Table 2).

Table 2: Examples of issues and their resolution.

Issue	Resolution
Selection of vocabulary that describes the functions and customs of Sinhala speaking people.	Item 1: "open a tight or new jar" was translated with more simple language with examples because the word "jar" is not widely used. (eg. Jam bottle or Horlicks bottle) Item 13: the term "wash or blow dry" was translated in to more generally used Sinhala term. (Wash and wipe your hair) Item 15: dress is not the same. Consider for Sri Lankan dress, as an example "Put on a T shirt".
Selection of equivalent culturally appropriate functional activities for Sri Lanka.	Items 18 and 19: for recreational activities substituted as an example, such as using a cutting grass with a sickle, an activity common for Sri Lankans.

DISCUSSION

The purpose of this study was to perform a cross-cultural adaptation of the DASH questionnaire into a Sinhala version following a systematic standardized process. The use of this systematic process assures that the score on the new version of the questionnaire will reflect true differences in health status rather than differences caused by translation.

The translators and expert committee members were carefully chosen to respect the recommendations of the cross-cultural adaptation guidelines. Issues discussed and resolved by the committee led to the clarification of important points and ensured that the questionnaire was understood. The pre-final version of the study also helped to identify some ambiguities found in the questionnaire. The content validity of the pre-final version was supported by the completeness of item responses, adequate score distri-

bution, and the absence of a floor or ceiling effect, as indicated by the statistics of Cronbach's á (excellent at 0.97), indicating that the items measure the same attributes. The á coefficient for this version is slightly higher (0.97) than the reported Cronbach's αfor other cultural adaptations of the DASH: 0.95 for the Dutch version [13]; 0.95 for the Spanish for Spain version [14]; 0.94 for the Cantonese Chinese version [15] and 0.94 for the Canadian French version [5]. A Cronbach's á value of 0.97 has been reported for the original DASH English version [4, 5, 6, 8, 12, 13].

Internal consistency was also assessed by conducting an item-to-total correlation, examining how each item on the test relates to the instrument as a whole [10].The values ranged from 0.48 to 0.88 indicating moderate to good correlation (Table 3). In the original DASH English version, values ranged from 0.49 to 0.85 [16]. The values obtained in this study were higher than the reported item-to-total correlations of the English version. Other versions of the DASH, for example, in the Cantonese Chinese version[15] the values ranged from 0.29 to 0.74; and for the Canadian French version [5] the values ranged from 0.27 to 0.88. This demonstrates that different countries have different values and therefore studies need to be done in countries with their own cultural groups in order to obtain normative data for that group and to find out the values specific to the country.

The mean DASH score found in our study was similar to the results of other studies [12, 13]. Splitting hand, wrist, and forearm disorders from elbow, arm, and shoulder disorders, gave a mean DASH score of (34.06 versus 35.35). This scoring pattern was also seen in several other studies where patients with shoulder and elbow problems obtained a higher mean score then those with wrist and hand problems [18, 19]. The adapted questionnaire translated into Sinhala provides a valuable data collection tool for the Sri Lankan population. This study has shown that the modified-translated DASH questionnaire can be used as an out- come measurement tool for patients with upper limb injuries in Sri Lanka. No validation of reliability data have previously been obtained for the DASH questionnaire in Sri Lanka.

Table 3: Item-to-total correlation.

S.No.	Item	Pearson coefficient
1	Open a tight jar	0.49
2	Write	0.75
3	Turn a key	0.75
4	Prepare a meal	0.76
5	Push open a heavy door	0.78
6	Place an object on a shelf above your head.	0.73
7	Do heavy household chores (e.g., wash walls, wash floors)	0.84
8	Garden or do yard work.	0.84
9	Make a bed.	0.83
10	Carry a shopping bag or briefcase.	0.8
11	Carry a heavy object (over 10 lbs).	0.82
12	Change a light bulb overhead.	0.77
13	Wash or blow dry your hair.	0.74
14	Wash your back	0.73
15	Put on a pullover sweater.	0.74

CONCLUSION

The results of this study confirmed that the process used for the cross-cultural adaptation of the questionnaire was successful. The Sinhala version of the DASH demonstrated good acceptability and psychometric properties. Our results were comparable to those obtained with the original version of the DASH and other adaptations of the questionnaire. Researchers and clinicians may benefit from using this questionnaire as an outcome measure to evaluate the effect of treatments or rehabilitation programs. Because the DASH has been translated into various languages, its use will promote greater uniformity in research and allow comparison between studies from different countries. Clinicians can use the DASH as a validated and reliable questionnaire to enhance their evaluation of patients. A better understanding of the patient's perception of his or her health status will allow the development of more accurate patient-centered interventions.

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ABBREVIATIONS

DASH- Disability of the Arm, Shoulder, and Hand

Conflicts of interest: None

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