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Reliability and Validity of The Translated Version of Duruoz Hand Index (DHI) in Patients with Type II Diabetes Mellitus

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ABSTRACT

Introduction: Duruoz Hand Index (DHI) is a functional disability scale that can be used successfully to assess the functional disabilities of the hands. The hands are frequently involved in diabetic patients, due to soft tissue thickening in these areas referred to as atrophy, leading to wasting of the muscles. The DHI is currently not available in Gujarati language so there is a need to develop a scale which can be used by the Gujarati language speaking population.
Materials & methods: An observational study was conducted in the Ahmedabad city. The scale was translated into Gujarati language through double forward and backward translation. Each question was scored by experts as accepted, rejected or accepted with modification. The reliability and validity of the finalized Gujarati version was subsequently completed with the sample size of 20 participants including both the genders in type II diabetes mellitus patients. Face and content validity along with internal consistency and test-retest reliability was also examined.
Result: In the validation process of Gujarati version of DHI total 18 questions existed; one question was accepted with modification. The Gujarati version of the DHI has high internal consistency (Cronbach's α=0.890) and test-retest reliability (intra-class correlation coefficient=0.809, 95% CI: 0.58, 0.94).
Conclusion: The translation of the DHI into a Gujarati version was successful in preserving the semantic and measurement properties of the original version and was valid and reliable scale for the Gujarati population.

Keywords: DHI, Type II Diabetes Mellitus, Validity, Reliability

INTRODUCTION

Diabetes mellitus (DM) is the most common endocrine disorder worldwide, and is characterized by metabolic abnormalities and chronic complications which involve eyes, kidneys, nerves, muscles and blood vessels. Diabetes mellitus is associated with several musculoskeletal disorders of hands and shoulder that can be debilitating (1). The hands are frequently affected in diabetic patients (2,3). Complications involving foot have received much attention in clinical practices and in the literatures. Much less attention has been afforded towards the hands though hand function is crucial for the productivity and quality of life (4). Impaired hand function has an immense impact on occupational performances and activities of daily living among people with diabetes. Activities of daily living can lead to disabilities in self-care activities. These reduced interpersonal interactions, loss of independence, financial burden and overall reduced quality of life gets affected (5). Limited joint mobility is observed very frequently in type II Diabetes mellitus patients. Joint movement becomes stiff owing to the fibrotic thickening of the flexor tendon sheaths and dermal and subcutaneous sclerosis. The disease causes

non painful, non inflammatory movement restriction and functional limitations (6).

The Duruoz hand Index scale was developed for evaluating the functional status of the hand in French patients also known as Cochin Hand Functional Disability Scale. It consists of 18 questions related to the hand activities. It has five components such as kitchen (1-8 items), dressing (2 items), personal hygiene (2 items), office tasks (2 items), and others (4 items). Every item has to be scored between 0-5 and total score is between 0-90. It takes only about 3 minutes to completely fill the scale by the patient. Higher scores indicate severe hand-related disabilities. There are French, English, and Turkish versions of the DHI scale that are already published. The reliability and validity of DHI have been studied in hand osteoarthritis (7), traumatic hand flexor tendon injuries,[8], diabetic hands, etc.

For the Duruoz Hand Index there are no translations available in Gujarati language. The need of this study was to translate the Duruoz Hand Index scale from Original English language to Gujarati language, to cross culturally adapt the DHI into Gujarati language and to create a reliable and valid Gujarati version of DHI by translation and adaptation.

MATERIALS & METHODS

A cross-sectional observational (methodological study) was conducted in Ahmedabad, Gujarat, India after the approval from the Institutional ethical committee. It was conducted in two phases namely the translation phase and the validation phase. Each phase was carefully conducted so as to eliminate bias and to produce reliable results. Permission was obtained from one of the authors Goksen Goksenoglu. (9).

Translation of the DHI from its original English version to the Gujarati version was performed following the forward/backward translation guidelines. This method was performed to ensure the translated version is grammatically sound and the terms used are correct. At the same time the meaning and content of the original DHI were well preserved. First, translation into Gujarati was performed independently by two Gujarati native speakers, one familiar to healthcare and its terminologies and the other who was not familiar with healthcare and its terminologies (T1 and T2, respectively). Subsequently, a version combining both initial translations (T1/T2) was written, based on consensus of the two initial translators. Some adaptations of the original questionnaire were defined during the translation process to suit the Gujarati culture and traditions. This synthesized version was then back-translated into English by two independent professional translators (BT1 and BT2) to allow verification of consistencies with the original English version. These versions (BT1 and BT2) were then sent for a comparative analysis with the original version to experts of the committee composed of orthopedic surgeons, physical therapists, and researchers for the dissemination in the Gujarati language. Each item was analyzed as accepted, accepted with modification or rejected. Their reviews and feedback were considered and modifications were done accordingly.

This pre-final version was presented in a group of 10 patients with type II diabetes mellitus to explore the clarity of the questionnaire. Sample size was set as 20 for the initial target number of respondents for validation of the18-item DHI and the participants were selected by the simple random sampling method. The participants were selected from the Ahmedabad city. The inclusion criteria for the respondents were males and females in the age group from 45-60 years with the ability to read and understand Gujarati language. The exclusion criteria were defined as, any systematic diseases or neurologic conditions other than musculoskeletal pathologies. Participants who were eligible for this study were informed about the purpose of the study and the methodology. Written informed consent was obtained and the

questionnaire was handed over to them to fill up. All the patients were asked whether they understood the items and whether they could interpret the questionnaire correctly.
The scores were calculated for each participant and recorded. The participants were ensured of the confidentiality of the study. This procedure was repeated after a week again with the same participants and scores were recorded (To know the test-retest reliability of the DHI). The completed questionnaires were evaluated to determine the presence of missing responses and language difficulties. There was no specific difficulty in the translated Duruoz Hand Index scale. Thus, this version was accepted for the use in a larger patient population. The findings were discussed among the translators, resulting in only minor changes to the final Gujarati version of the DHI. The final version of the DHI in Gujarati was then approved by the experts committee and validated using appropriate statistical analysis. Test- retest reliability and internal consistency were assessed using SPSS version 20.

RESULT

All 18 items listed in the DHI questionnaire were validated to measure functional aspects of the hand. Reliability judges the degree to which the results of the measurements are consistent even when done repeatedly. Test-retest reliability of the Gujarati DHI was determined by the means of Intra class Correlation Coefficients (ICC) at 95% confidence intervals and internal consistency, an indicator for the homogeneity of a questionnaire was assessed with Cronbach's alpha. The Gujarati version of the DHI had high internal consistency and test-retest reliability with Cronbach's α=0.890 and intraclass correlation coefficient=0.866.

Intraclass Correlation Coefficient			
	Intraclass Correlation	95% Confidence Interval	
		Lower Bound	Upper Bound
Single Measures	0.264	0.146	0.475
Average Measures	0.866	0.754	0.942

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
0.890	0.910	18

DISCUSSION

The study was conducted as there was a need for an instrument to measure hand function, especially concerning DHI in Gujarati population. Being a self-reported questionnaire, DHI provides us an important applicability in both clinical and educational settings. Therefore, it is important to employ a validated health related outcome measure. Adaptation was necessary to ensure it was both culturally and linguistically appropriate in Gujarati population.
In the validation process of Gujarati version of Duruoz hand index, discussions were done about translation and application of certain questions in questionnaire. Question number 6 is regarding cutting meat. Meat was not kept as an example; instead of it cheese/vegetables criterion was chosen. Adaptation was required to ensure it is both culturally and linguistically appropriate. The primary objective of this study was to create a reliable and valid Gujarati version of DHI by translation and adaptation. No difficulties were encountered in the translation phase of the study; the structure of the original DHI was not altered and all items were maintained. Only 1 item (Questions 6) was modified as per suggestions given by experts and considering the Gujarati population. None of the items were rejected. No change was made in sequence of item presentation. Also the items were numbered in Gujarati. The item number 6 of the original DHI "Cutting meat with a knife" was modified to "cutting cheese/vegetable/ meat with knife". Cutting was considered as an activity of daily living which was important to perform. Many people in Gujarat are pure vegetarians and they do not cut meat therefore the item's content were altered to vegetable, cheese and it included meat as well, so it was important to keep the question. During the study it was observed that there was an increasing in DHI scoring with increasing age. It would be more

appropriate to do a separate study for different age categories. Future studies should include large sample size including other conditions. Future research work can also investigate the association of DHI-Gujarati version with other functional measures.

CONCLUSION

The translation of the DHI into the Gujarati version was successful in preserving the semantic and the measurement properties of the original DHI scale and was shown to be valid and reliable scale to be used in Gujarati population.

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