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Original Research Article

Transadaptation and validation of dysphagia handicap index in Bangla

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ABSTRACT

Background: The aim of this study was to transadapt and validate the Bangla version of DHI (DHI-B). The objective of the study was to translate and culturally adapt the Dysphagia Handicap Index (DHI) in Bangla language.
Methods: Thirty individuals (mean age-42.23, SD±12.52) with dysphagia and an equal number of healthy individuals (mean age-28.23, SD±10.68) participated to fill up the questionnaire of DHI-B. Establishment of validity was done by comparing DHI-B scores of healthy controls and patients with dysphagia. Test–retest reproducibility, content validity and concurrent validity were established and internal consistency were used for reliability testing.
Results: The overall Cronbach's α for DHI-B was 0.84, indicating good internal consistency. Pearson's correlation on test–retest reliability of DHI-B was found to be 0.9. Correlation that achieved between subscales of DHI-B and total DHI-B was analysed using Pearson's correlation which was found very high. Compared to the dysphagic group, the control group showed significantly lower scores for all scales.
Conclusion: From this study it was concluded that DHI-B showed good internal consistency, test-retest reliability, and concurrent validity. Therefore, it could be claimed that for assessment of dysphagia related handicap in Bangla, DHI-B is a reliable and valid tool**.**

Keywords: Swallowing**,** Dysphagia, Quality of life, Handicap

INTRODUCTION

It is evident that QOL plays a major role to measure impact of any health issue.[1] As dysphagia leads to both the social consequences and the emotional implications which worsens QOL in dysphagic patient, it is essential to evaluate all these consequences and efficacy of speech therapy on these aspects. QOL considered as unification of multifaceted elements (physical, mental and social parameters). In presence of dysphagia, these factors may be affected. Dysphagia handicap index (DHI), that evaluate the quality of life related with dysphagia was developed in english and was intended to be used in English speaking countries. The use of the DHI in clinical routines is increasing and has led to translation of the DHI into diverse languages, including Persian, Arabic, Hebrew and Japanese.[2-5] Although there were several test materials available in English, such test materials when used by native speakers of other languages would not yield exact results. In a linguistically divergent country like India, it is thus essential to translate tests such as the DHI in regional languages for obtaining reliable outcome. In South Asia, Bangla is an Indo-Aryan language which is the fifth most- spoken native language and the sixth most spoken language by total number of speakers in the world. To understand the intrinsic aspect of QOL related to dysphagia severity, native language render important role to engross appropriate information without any ambiguities. The objectives of this study were to translate and culturally adapt the Dysphagia DHI in Bangla

language, to measure the linguistic validation of translated DHI in Bangla (DHI-Bangla), to obtain content, concurrent and discriminant validity in participants with dysphagia and normal population and to obtain measures of reliability and validity of this translation in a group of individuals presenting with dysphagia complaints and with age matched controls.

METHODS

Research design, descriptive tool development sampling, purposive sampling.

Study place

Ali Yavar Jung National Institute of Speech and Hearing Disabilities (Divyangjan), Regional centre, Kolkata, Department of speech. [B.T Road, Bonhooghly, Kolkata-700090].

Study duration

The duration of the study was of 7 months from March 2022 to September 2022.

Sample size

In order to meet the objectives of tool development purposive sampling was employed. Sample size calculation was done based on pilot study on 10 subjects with and without dysphagia by using G power software.

Study population

A total of 60 subjects (mean 35.23, SD±11.6) within the age range of 18-60 years were taken in this study. The total subjects were divided into two groups, group A (30 Bangla speaking healthy subjects with no feeling of dysphagia) control group (mean age-28.23, SD±10.68), group B (Bangla speaking subjects with feeling of dysphagia) with 30 subjects (mean age-42.23, SD±12.52).

Inclusion criteria

Following subject selection criteria were mentioned for normal population (Group A) and in dysphagic population (Group B).

Inclusion criteria (Group A): All participants were native speakers of Bangla. They had educational level not less than graduation. All participants had mostly equal proficiency in Bangla and English.

Inclusion criteria (Group B): For consciousness measurement subjects in group B were evaluated with mini mental status examination (MMSE, Folstein and McHugh, 1975). Subjects were included who scored (mean=29.93, SD±0.359) above 25 suggestive of normal. Most of the data from group B subjects were taken during their hospitalization. The dysphagic population were examined by otorhinolaryngologist or neurologist and speech language pathologist.

Exclusion criteria

Exclusion criteria (Group A): Subjects with history of dysphagia, history of neurologic disease, head and neck malignancy, chemoradiotherapy (CRT) or surgery to the oropharyngeal apparatus, or cerebrovascular accident at the time of the study were excluded. Participants with any psychological problem were excluded.

Exclusion criteria (Group B): Subjects having previous history of cognitive impairment Poor auditory verbal comprehension, Aphasia were excluded from group B with reference to AQ-scores (mean 94.93, SD±0.24) Patients who could not express fully in one session were given more than 1 session maximum of 3 sessions to collect the responses in DHI-B

Study tools

Dysphagia handicap index (DHI; Silbergleit et al, 2012).[7] Mann Assessment of Swallowing Ability (MASA; Mann et al, 2002). Penetration aspiration scale (PAS; Rosenbek, et al, 1996).[9]

Study procedure

Stage 1: Approval of the study

Consent taking from Research authority Ethical and technical clearance were done by ethical committee of research institute. Approval and consent taking from the author of DHI and all participants were subjected to provide written consent.

Stage 2: Trans-adaptation of dysphagia handicap index (DHI) in Bangla

By using ITC guideline, 2013 the trans-adaptation of DHI in Bangla was done. With the help of a linguist having experience of translation and trans-adaptation process the linguistic validation of DHI in Bangla was done. Suitable modifications were made by scrutinizing the available literature in Bangla from books, web-based sources, journals and existing tools in India. The specification is included in following steps. In the first step original version of Dysphagia Handicap Index (English) was provided to five native Speech Language Pathologists (SLPs). They had adequate knowledge and proficiency in both Bangla and English language for conceptually equivalent translation. They separately translated the English version into Bangla. Lastly one common version of the scale was assembled as final tool by a very experienced speech language pathologist working in Dysphagia set up.

Another five native SLPs (not participated in the forward translation process) with adequate proficiency in Bangla and English language and having no previous knowledge of the DHI questionnaire, were asked to back translate the Bangla version of Dysphagia Handicap Index into English to measure homogeneity of the Bangla Dysphagia Handicap Index. Another experienced SLP was asked to form a final back-translated English tool. Three experienced SLPs having excellent proficiency in English were instructed to rate the two English version of DHI (original and back translated). The newly formed (back translated) English DHI correlated with original DHI (English) by Cronbach's α test which revealed a value of 0.84, thus confirming Bangla DHI to be validated. Preparation of final tool was completed by arranging accordingly the translated Bangla version of Dysphagia Handicap Index.

Stage 3: Validation

Content validity estimates anyways a test is representative of all aspects of the contents of the tool under study. Content validity was assessed in following steps. Inter-judge agreement, both the tools, one English version of DHI (original) and other one back translated English DHI was given to 3 SLPs for rating of appropriateness. They gave scores in 3-point visual analog scale (1=not appropriate, 2=appropriate, 3=most appropriate). The values of inter-judge agreement were measured by Cronbach's α coefficient.

Further the DHI-B and DHI-E given to normal group for item wise correlation analysis by using appropriate statistics. Correlation between Bangla and English version of the Dysphagia Handicap Index

Both the DHI-B and DHI-E were conducted with the dysphagic group participants. By correlating the emotional, physical and functional parameters of each scale, including the total scores content validity was achieved. Concurrent validity was obtained by correlating the scores of Bangla DHI of participants with other Swallowing assessment protocols. In this study, the developed DHI in Bangla was correlated with MASA and PAS. Discriminant validity was achieved by comparing the performance of patients with dysphagia and normal population in DHI-B. Test-retest reliability was measured to evaluate the reproducibility of the DHI-B. After two weeks, the participants who were studied were asked for same activity. The participants were asked to fill up the DHI-B questionnaire like before. The retest was done without informing the participants their score of the previous test. There was no intervening treatment between test and retest conditions.

Statistical analysis

The obtained data was analysed using SPSS version 16.0 software. Shapiro-wilk test was done to measure normal distribution of the data. At significant level <0.05 data were analysed. All the data were following normal distribution.

Hence parametric tests were carried out. The tests used were Cronbach's α test to analyses internal consistency reliability. Pearson's correction test was done to correlate between Bangla and English DHI as well as correlation between Bangla DHI and PAS and test-retest reliability. Independent t-test was done to differentiate the score of Bangla DHI between normal and dysphagic participants. Paired t-test was done to check the validity.

RESULTS

The first objective of the study was to translate and culturally adapt the Dysphagia Handicap Index (DHI) in Bangla language. The procedure of translation and trans adaptation has been discussed in the method section. No item was changed to account for cultural variation.

Table 1: Item analysis between DHI-B and DHI-E of all 25 questions in normal group.

Questions	DHI-B and DHI-E in normal (Cronbach's α)
Q.1	0.89
Q.2	0.85
Q.3	0.86
Q.4	0.89
Q.5	0.86
Q.6	0.84
Q.7	0.85
Q.8	0.89
Q.9	0.87
Q.10	0.89
Q.11	0.89
Q.12	0.85
Q.13	0.89
Q.14	0.86

Continued.

Questions	DHI-B and DHI-E in normal (Cronbach's α)
Q.15	0.89
Q.16	0.85
Q.17	0.89
Q.18	0.84
Q.19	0.85
Q.20	0.83
Q.21	0.89
Q.22	0.86
Q.23	0.89
Q.24	0.84
Q.25	0.89

Table 2: Independent t-test result of total score of DHI-B between group A and group B.

Parameters	Group	Mean	SD	t value	P value	Level of significance
DHI-B	Group A	4.81	4.4	11.397	0.00	0.05
	Group B	52.21	10.41			

Table 3 : Independent t-test result of physical , functional and emotional score of DHI-B between Group A and group B.

Parameters	Group	Mean	S.D.	t value	P value	Level significance
DHI-B Physical score	A	1.46	0.89	15.504	0.00	0.05
	B	18.1	4.45			
Functional score	A	2.33	1.18	15.27	0.00	0.05
	B	20.06	4.51			
Emotional score	A	1	1.01	15.504	0.00	0.05
	B	14.06	3.70			

Table 4: Pearson's correlation (r) between total score, functional, physical and emotional scores of DHI-B and DHI-E in dysphagic population (group B).

Parameters	Mean	S.D.	Pearsons's correlation (r)	P value
DHI -B	52.22	10.41	0.99	0.31
DHI-E	52.36	11.42		
DHI-B(F)	20.06	4.51	0.989	0.15
DHI-E(F)	20.09	4.35		
DHI-B(P)	18.1	4.45	0.99	0.41
DHI-E(P)	18.09	4.41		
DHI-B(E)	14.06	3.70	0.99	0.07
DHI-E(E)	15.09	3.75		

Table 5: Paired t-test between DHI-B and DHI-E on the basis of total score, functional score, physical score, emotional score in dysphagic population (Group B).

Parameter	Mean difference	S.D.	t value	P value	Standard error mean	Df
DHI-B(T)	0.344	0.689	2.04	0.745	0.189	30.251
DHI-E(T)						
DHI-B(F)	0.367	4.108	10.380	0.373	0.199	20.651
DHI-E(F)						
DHI-B(P)	0.01	4.40	5.380	0.52	0.199	10.651
DHI-E(P)						
DHI-B(E)	0.201	3.63	10.380	0.068	0.199	15.651
DHI-E(E)						

Table 6: Pearson's correlation between total score of DHI-B and MASA in normal (Group A) population, in dysphagic population (Group B), DHI-B and PAS in group A and B.

Parameter	Mean	S.D.	Pearsons's correlation (r)	P value
DHI-B (G-A)	4.81	4.41	0.79	0.01
MASA (G-A)	197.1	4.02		
DHI-B (G-B)	52.21	10.41	0.89	0.07
MASA (G-B)	152.7	14.3		
DHI-B(G-A)	4.821	4.41	0.89	0.15
PAS(G-A)	1.06	0.25		
DHI-B(G-B)	52.21	10.41	0.91	0.09
PAS(G-B)	5.06	1.31		

Table 7: Pearson's correlation between total score of DHI-B in test-retest condition in normal population.

Parameter	Mean	S.D.	Pearson's correlation (r)	P value
Test	4.81	4.41	0.93	0.41
Retest	4.83	4.46		

Table 8: Pearson's correlation between total score of DHI-B in test-retest condition in dysphagic population (Group B).

Parameter	Mean	S.D.	Pearsons's correlation (r)	P value
Test	52.21	11.93	0.91	0.36
Retest	53.36	11.63		

The second objective of present study was to measure the linguistic validation of translated DHI in Bangla (DHI-Bangla). DHI-E was forwardly and backwardly translated with the help of native Bengali SLPs, recruited at its different stages. Preparation of final DHI-B was achieved after observing significant values in appropriate measurement (Cronbach's α=0.84). Final tool was completed by arranging accordingly the translated DHI-B. Content validity was obtained by giving both the tools [DHI-E (original) and back translated English DHI] to 3 SLPs for rating appropriateness They gave scores in 3 points visual analog scale (1=not appropriate, 2=appropriate, 3=most appropriate).

The first step towards this was to measure the values of inter-judge agreement by Cronbach α coefficient, which was found 0.84. This is suggestive of high agreement between the judges in all 25 items, also all the values of item analysis measured by Cronbach's α coefficient between DHI-B and DHI-E of all 25 items were above 0.8 was suggestive of high agreement in all Suggestive correlation between each item in DHI-B and DHI-E. The third objective was to obtain content, concurrent and discriminant validity in participants with dysphagia and normal population. To achieve this objective the following hypotheses were tested. Null Hypothesis 1 was there is no significant difference between non dysphagic healthy population and dysphagic population in DHI-B scores. For testing this null hypothesis, the total Bangla dysphagia handicap index (DHI-B) on two groups, namely group A (Control group) and group B (Participants with dysphagia) were studied. The functional, Physical and Emotional subtests were also studied. The obtained scores were analysed using independent t-test to measure the discriminant validity between normal and dysphagic participants. The results obtained are as follows. Independent t-test result of total score of DHI-B between group A and group B (Table 2) revealed that there was a significant difference between two groups, p value was 0.00, less than 0.05 (p value was 0.00<0.05). Here null hypothesis was rejected.

Independent t test result of physical score of DHI-B between group A and group B (Table 3) reflected that there was a significant difference between two groups (p value was 0.00<0.05). Here null hypothesis was rejected. Independent t-test result of functional score of DHI-B between Group A and group B reflected that there was a significant difference between two groups (p value was 0.00<0.05) (Table 3). Here null hypothesis was rejected. Independent t-test result of emotional (parameter of DHI-B) score of DHI-B between Group A and group B (Table 3) reflected that there was a significant difference between two groups (p value was 0.00<0.05). From the above findings it could be stated that significant differences seen in the scores between group A and group B. So, the null hypothesis (There is no significant difference between non dysphagic healthy population and Dysphagic population in DHI-B scores) was rejected. Null Hypothesis 2 was there is no significant difference between Bangla and English version of DHI in dysphagic populations. This hypothesis was tested by analyzing Pearson's correlation between total score of DHI-B and DHI-E in dysphagic population (Group B). This indicated

(Table 4) significantly high correlation between DHI-B and DHI-E in dysphagic population. The value of Pearson's correlation, r=0.99 at p=0.31>0.05.

Paired t-test between DHI-B and DHI-E in dysphagic population (Table 5) on the basis of the total score revealed that the p value was 0.745, which was more than 0.05 (p=0.745>0.05). So, the null hypothesis was accepted. No significant difference between DHI-E and DHI-B in dysphagic population on the basis of total score. Pearson's correlation between functional score DHI-B and DHI-E in dysphagic population (Group B) revealed (Table 4) that Pearson's correlation score was r=0.989 at p value 0.15. So, significant correlation was achieved between functional score of DHI-B and DHI-E in dysphagic population. Paired t-test between functional score of DHI-B and DHI-E in dysphagic population (Group B) showed (Table 5) that p value was 0.373 which was more than 0.05(p=0.373>0.05). So null hypotheses were accepted and it was concluded that there was no significant difference between functional score of DHI-B and DHI-E in Dysphagic population.

Pearson's correlation between physical score of DHI-B and DHI-E in dysphagic population (Table 4) revealed that significant correlation was achieved. A correlation value of r=0.99 at p=0.41 was estimated between physical score of the DHI-B and DHI-E in dysphagic population.

Paired t-test between physical score of DHI-B and DHI-E in dysphagic population (Table 5) enumerated that the p value was 0.52(p=0.52>0.05) which was more than 0.05. Thus, null hypotheses were accepted and it explored that there was no significant difference between physical score of DHI-B and DHI-E in Dysphagic population. Pearson's correlation between emotional score of DHI-B and DHI-E in dysphagic population (Table 4) revealed significant correlation (r=0.99 at p=0.07) between emotional score of the Bangla and English version of the DHI in dysphagic population.

Paired t test between the emotional score of DHI-B and DHI-E in dysphagic population (Group B) revealed that the p value was 0.068 (p=0.068>0.05) which was more than 0.05 so null hypotheses was accepted and it was concluded that there was no significant difference between functional score of DHI-B and DHI-E in dysphagic population (Table 5). Null hypothesis 3 was, there is no correlation between DHI-B and PAS (Obtained from FEES) and DHI-B and MASA. Concurrent validity is the measure of how well a new test compares to a well-established test. Pearson's correlation between total score of DHI-B and MASA in normal population (Group A) revealed correlation (r=0.79) had been achieved (Table 6), also Pearson's correlation between total score of DHI-B and MASA in dysphagic population (Group B) showed correlation had been accomplished (r=0.89) between DHI-B and MASA scores in dysphagic population.

Pearson's correlation between total score of DHI-B and PAS in normal population (Group A) revealed correlation had been achieved between DHI-B and PAS scores in normal population where r=0.89 at p value 0.15(p>0.05) (Table 6). Pearson's correlation between total score of DHI-B and PAS in dysphagic population (Group B) revealed significant correlation (r=0.91) had been achieved (Table 6).

From the above findings it was concluded that, there was significant correlation between DHI-B and PAS and DHI-B and MASA. So, Null hypothesis 3 (There is no correlation between DHI- B and PAS and DHI-B and MASA) was rejected. Validity measures was further strengthened by assessing internal consistency of DHI-B for all the participants by using test-retest reliability measures. Table number 7 revealed significant correlation was achieved between total score of DHI-B in test-retest condition in normal population as it reflected a significant correlation value (r=0.93 at p=0.41>0.05).

Pearson's correlation between total score of DHI-B in test-retest condition in Dysphagic population (Group-B) showed correlation ((r=0.91, at p=0.36>0.05) had been accomplished (Table 8). Above mentioned results were critically and elaborately explained in discussion part by relating interactive impacts on different variables DHI-B established as robust tool as DHI-E.

DISCUSSION

This study was aimed to trans adapt and validate DHI into Bangla to meet the cultural and linguistic demands. For establishing validation, some validation procedures were assessed. Results were established based on DHI-E. DHI-B was established with reference to DHI-E and almost same results were achieved. The aim of this study was to translate the DHI-E to Bangla systematically using valid methods. The results of the study revealed that the DHI-B is a reliable tool with good internal consistency and test–retest reliability. The findings of this study were similar to the original DHI in English, including the other translated versions of the DHI.[2-7] The DHI-B was also obtained to be a valid tool, being able to discriminate between individuals with dysphagia and healthy controls. Further the results were discussed critically as follows. Validity had explained or studied in different ways as per different literatures available. Content validity was established, Content validity was measured using inter-judge agreement, item analysis (Table 1), correlation between DHI-B and DHI-E (Table 4). In this study, the value of inter-judge agreement was measured by Cronbach's α coefficient, which was found overall 0.84, suggestive of high agreement between the judges in all 25 items.

Table 1 revealed all the values of item analysis measured by Cronbach's α coefficient between DHI-B and DHI-E of all 25 items were above 0.8, suggestive of high agreement in all of the 25 items also, indicates high

correlation between each item in DHI-B and DHI-E. In similar study where DHI was translated into Indian regional language Kannada the authors found the overall Cronbach's α for DHI-K was 0.81.[10] The Functional, Physical and Emotional subtests were also compared based on the responses of participants with dysphagia on both DHI-B and DHI-E. Significant correlation in all aspects (functional, physical, emotional) between DHI-B and DHI-E in dysphagic population was obtained.

Significant correlation also achieved (r=0.91 at p=0.09)) between total DHI-B and PAS scores in dysphagic population (Table 6), also the MASA scores correlated with total DHI-B in both the normal population and dysphagic population (Table 6). The findings revealed that, there was significant correlation between DHI- B and PAS and DHI-B and MASA. In a similar study where DHI was validated in Hebrew language, they found a moderate correlation between the DHI and PAS scores.[4] To obtain the discriminant validity significant difference ($p<0.05$) was obtained between the total scores of DHI-B across normal participants and participants with dysphagia.

The fourth objective was to obtain measures of reliability, reproducibility, and responsiveness of this translation in a group of individuals presenting with dysphagia and with age matched controls. In table 7, in case of normal population Pearson's correlation value was 0.93 which was high correlation between test and retest condition and Pearson's correlation was 0.91 (Table 8) in case of individuals with dysphagia in test-retest condition. The result of the present study was found to be in consonance with study in Kannada version of DHI, where authors observed that the test–retest reliability for the total score and subscales as Physical (r=0.99), Functional (r=0.94), Emotional (r=0.91), Total (r=0.91).

In Japanese version of dysphagia handicap index, the internal consistency (Cronbach's α) of the DHI-J total score and the physical, functional, and emotional aspect scores were high. in Physical (r=0.83), Functional (r=0.89), Emotional (r=0.90), Total (r=0.95).[5]

In Overall the DHI-B is a valid and reliable tool to understand dysphagia related quality of life and its severity in Bangla context. This DHI-B could be studied in connection with patients with progressive neurodegenerative disorders and Oro-pharyngeal burn. DHI-B could be re-established with reference to parents as responder in subjects with paediatric dysphagia. DHI-B could be used to measure outcome of any successful dysphagia therapy programme**.**

CONCLUSION

As a self-assessment tool DHI-B preserved its validity and reliability for patients with dysphagia. In patients with dysphagia, who crucially differentiating from healthy subjects, DHI-B showed results comparable to those of the original version of DHI. DHI-B had been shown to be an easy and less time-consuming tool, for clinicians to understand the manner in which patients perceive their dysphagia problem. The present study concluded that the DHI-B is the most thoroughly evaluated and psychometrically robust measure for the self-assessment of swallowing difficulty. It not only gave an idea of the swallowing disorders, but also may help the clinician to understand the degree of functional, physical, and emotional impairment and act accordingly, and not entirely going by the objective findings. Again, this tool will help to yield exact result of difficulty in swallowing problem amongst native speakers of Bangla.

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