RESEARCH ARTICLE

Adaptation of Apraxia Battery for Assessing the Patient with Apraxia

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Abstract

Background: Speech and Language Therapy is an established profession in many countries of the world but still very new in Bangladesh. There is no culturally appropriate adult assessment tool for assessing patient with Apraxia in Bangladesh and has no alternative tool in own language to assess and diagnose patient with apraxia.

Objectives: The aim of the study was cultural adaptation of Apraxia Battery for assessing the patient with Apraxia.

Methodology: A total of nineteen people diagnosed with apraxia of speech, within the age from 37 to 80 years, participated in this study. The investigator used quantitative (item analysis, validity determination and reliability determination) and qualitative (observation and focus group discussion) method for the adaptation procedure. After observation and focus group discussion the investigator received concern from the panel of expert for conducting the pilot study. After find out the pilot study result the investigator conducted test and retest. The result was discussed changing forward translation, changing pilot study and test retest findings. The pilot study was examined in a sample of eight apraxia patients. The interval between five days the test and retest reliability was examined in a sample of eleven apraxia patients. Using the Cronbach’s alpha, examined the internal consistency and intra-class correlation for test retest reliability.

Results: After modification of ABA-2 tool, the pilot study showed that the ABA-2 tool was in culturally appropriate in Bangladesh for apraxia patient. The test reliability for Diadochokineti Rate, Increasing word length (Part A), Increasing word length (Part B), Limb Apraxia, Oral Apraxia, Latency Time for polysyllabic word, Utterance Time for polysyllabic word and Repeated Trials sub-tests appear to be satisfactory as researchers claim that Cronbach’s alpha coefficients ranging between .8143 and 0.9006 indicate good to excellent reliability. And the retest reliability for these subtests Cronbach’s alpha coefficients ranging between 0.7898 and 0.9095 indicate acceptable to excellent reliability. The intra-class consistency for all subtest of the test and retest was excellent (Cronbach’s alpha =0.9478 to 0.9917).

Conclusion: This study suggests that valid assessment of apraxia patient using the ABA-2 assessment tool. The modified ABA-2 assessment tool is feasible for assessing the patient with apraxia in content of Bangladesh. The test retest result also showed that the ABA-2 assessment tool was reliable in culturally. ABA-2 is reliable and valid instrument for evaluating the patients with apraxia. This assessment tools also help Speech and Language Therapists to assess and diagnose the patient with apraxia.
1 | INTRODUCTION

Background:

Bangladesh is a developing country of South Asia, located on the northern shore of the Bay of Bengal, covering 147,570 square km (1). According to WHO and World Bank, about 10% people have a disability and among this percentage about 10.2 million people are adult in developing countries (2) [2]. Speech and Language Therapy is an established profession in many countries of the world but still very new in Bangladesh. There is no culturally appropriate adult assessment tool for assessing patient with Apraxia in Bangladesh. Apraxic patient is unable to perform skilled sequential purposeful movement (3). Due to the lack of appropriate diagnosis the patient with apraxia cannot get appropriate treatment. So, the investigator adapted the Apraxia Battery for Adult-2 (ABA-2) assessment tool and modified it in Bangla language because the assessment tool made in English language and was adapted on patient with apraxia. The Apraxia Battery for Adults-2 (ABA-2) is a standardized assessment tool for apraxia patients. In order to use it in this country, an adaptation based on cultural and social point of view is necessary. This assessment tools also help Speech and Language Therapists to assess and diagnose the patient with apraxia. After modification it would be an effective tool to diagnosis and plan appropriate treatment for the patient with apraxia. There are different causes of disabilities in the world, among them stroke is a major cause of disability. After stroke apraxia can be happen and physical, sensory and cognitive abilities may be affected by stroke. Apraxic patient have difficulty to carrying out the daily living activities (4). Speech and Language Therapist can work people with apraxia of speech to develop speech abilities and general communication skills. For proper diagnosis of people with apraxia, appropriate assessment form is needed. Apraxia Battery for Adult -2 was considered to validate the existence of apraxia in the adult patient and to approximate the severity of the disorder (5). After diagnosing the patient with apraxia Speech and Language Therapist planned a therapy goal. For producing the correct sounds and corrects sequence of sounds into words patient needed to retain the muscles of speech (6). In that case the Speech and Language Therapists trained them, how to communicate with others by using the appropriate technique. These techniques are planned to permit the individual to repeat sounds again and again and practice mouth movement for sounds (7). In this study our aimed to cultural adaptation of Apraxia Battery for assessing the patient with Apraxia.

2 | METHODS:

Study Instrument:

The ABA-2 assesses the presence and severity of apraxia of speech through subtests examining diadochokinetic rate, sequencing of phonemes in words of increasing length, limb and oral apraxia, utterance time for polysyllabic words, consistency of repetition of polysyllabic words and characteristics of apraxia (5). Diadochokinetic rate, the examinee repeats one, two and three syllable combinations as quickly as possible within a given time limit (ibid). Increasing word length, the examinee repeats similar words that increase in number of syllable (e.g. “ “, “Nbxf~Z”, “NbKiY”) and these subtest measures the ability to sequence the correct number of syllable in the proper order (ibid). Limb apraxia and oral apraxia, consists of two parts. In part A, Limb Apraxia, the examiner gives the examinee 10 oral directions requiring the use of the arms and hands (e.g. “make a fist”) (ibid). In part B, Oral Apraxia, the examiner gives the examinee 10 oral directions for volitional manipulation of the oral structures (e.g. “stick out your tongue”) (ibid). This subtest measures the ability to produce a movement based on an oral direction (ibid). Latency and utterance time for polysyllabic words, the examinee is asked to name 10 objects presented in picture form and this subtest measures

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the amount of time it takes to begin initiation of a word and the amount of time it takes to produce the word once initiation begins (ibid). Repeated trials test, the examinee is asked to repeat 10 polysyllabic words (e.g. “telephone”, “motorcycle”) three times each and this subtests measures change in production of words over successive trials (ibid). Inventory of articulation characteristics of apraxia, the examinee engages in three types of speech behaviour: spontaneous speech, reading and automatic speech and this subtest measures the presence of apraxic speech behaviours in each of these types of speech (ibid). The raw scores in the ABA-2 are used to determine the level of impairment for each of speech (ibid). The profile/examiner record form provides the examiner with a range of raw scores for each corresponding severity level [5]. Four severity levels are used within the ABA-2, none (no apraxia), mild, moderate and severe [5]. These severity levels are plotted to provide the clinician with a profile of the participant’s deficits and allows the clinician to determine an overall severity profile for each participant (ibid).

**Study Design**
Both qualitative (observation & focus group discussion) and quantitative (item analysis, validity & reliability) design was used in this study.

**Population**
The sample population was all appointed patient in neuro adult department with Apraxia in Savar and Mirpur CRP.

**Participants**
A total of nineteen people diagnosed with apraxia of speech, within the age from 37 to 80 years, participated in this study. In this group, fourteen of the participants were male and five were female. The participants were selected from the Speech and Language Therapy Departments of CRP (Savar and Mirpur). The presence of apraxia had been established before participation in the study by the participating treating SLT. Participant gave informed consent before inclusion in the study, following verbal explanation by the SLT and the provision of written information and consent form.

**Sampling Procedure**

The pilot study was examined in a sample of eight apraxia patients and the test and retest reliability was examined in a sample of eleven apraxia patients. The samples were selected by using convenience sampling procedure where participants were selected by the inclusion and exclusion criteria. Inclusion were those who diagnosed with apraxia and exclusion were those who are not diagnosed with apraxia and not willing to participate in the study voluntarily.

### 3 | RESULT:

**TABLE 1:** Demographic Information of the Participants

| Participant | Age (Year) | Gender | Diagnosis          |
|-------------|------------|--------|--------------------|
| 1           | 50         | Male   | CVA, Apraxia       |
| 2           | 40         | Male   | CVA, Apraxia       |
| 3           | 55         | Male   | CVA, Apraxia       |
| 4           | 47         | Male   | CVA, Apraxia       |
| 5           | 65         | Female | CVA, Apraxia       |
| 6           | 78         | Female | CVA, Apraxia       |
| 7           | 50         | Male   | CVA, Apraxia       |
| 8           | 70         | Male   | CVA, Apraxia       |
| 9           | 80         | Male   | CVA, Apraxia       |
| 10          | 37         | Male   | CVA, Apraxia       |
| 11          | 40         | Male   | CVA, Apraxia       |
| 12          | 49         | Female | CVA, Apraxia       |
| 13          | 58         | Male   | CVA, Apraxia       |
| 14          | 75         | Male   | CVA, Apraxia       |
| 15          | 63         | Male   | CVA, Apraxia       |
| 16          | 41         | Female | CVA, Apraxia       |
| 17          | 57         | Male   | CVA, Apraxia       |
| 18          | 68         | Female | CVA, Apraxia       |
| 19          | 39         | Male   | CVA, Apraxia       |

Table 1 shows that demographic information of participants. Age range of the participants was (37 years to 80 years) years. Among all the participants fourteen were male and five participants were female all the participants were diagnosed as apraxia by Speech & Language Therapist.

**Feasibility**
There were no missing answers in ABA-2 whole assessment form. Participants responded to all
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of the tasks accordingly. For some particular words/sentences/pictures participants needed elicitation from the administrator to make the respondents understand the task. For example, Newspaper (Main Word), Le‡ii KvMR (Translated Word), KeyZi (Modified Word).

Findings of the Observation and Focus Group Discussion

Subtest 1: Diadochokinetic rate

In this subtest was observed that all of the translated syllables fulfill the criteria of ABA-2 assessment tools. Patient s responses were easy. So that not needed to modify this task. Translated syllable are given below:

TABLE 2: Subtest 1 Diadochokinetic Rate

| Main Syllable of ABA-2 tool | Translated Syllable | Culturally Modified Syllable |
|-----------------------------|--------------------|-----------------------------|
| /pa/                        | /pa/               | NM                          |
| /ta/                        | /ta/               | NM                          |
| /ka/                        | /ka/               | NM                          |
| /pata/                      | /pata/             | NM                          |
| /taka/                      | /taka/             | NM                          |
| /pataka/                    | /pataka/           | NM                          |

The original contents of the diadochokinetic rate task of the ABA-2 tool and translation of the syllables based on cultural context are shown in table 2. For example: /pa/ - /cv/ Here, NM= No Modification

Subtest 2: Increasing Word Length

Increasing word length task has two parts (A and B). This task observed that the most of the translated words did not fulfill the criteria of ABA-2 tools. After translation some of the words and sentences length sometimes decreased and sometimes increased. For example, Zip- Kvco †Qovi kã; Zipper- Kvco †Qovi gZ kã; Zippering- Kvco †Qovi gZ kã n‡"Q, Response- mvov; Responsible- ‚vqx; Responsibility- ‘vwqZi. In this case, the modifications would have been according to Bangladeshi cultural contexts. Some words not needed to modify because some words after translation it was culturally appropriate for example, Attract-AvKIY©xq; Attractive- AvKIY©xq; Attractively- AvKIY©xq. All main words in the tool, translated words and modified words are given below:

TABLE 3: subtest 2 Increasing word Length (Part A)

The original contents of the increasing word length task of the ABA-2 tool and translation of the words and the modified words based on cultural context. Table 3 show that the main word increasing word length task part A of the ABA-2 tool and translated word and modified word. For example: Thick-Thicken-Thickening (Main Word), Nb-Nbxf-Z-NbKiY (Translated Word); Nb- NbZi- NbKiY (Modified Word). Here, NM= No Modification.
The original contents of the increasing word length task of the ABA-2 tool and translation of the words and the modified words based on cultural context. Table 4 show that the main word increasing word length part A of the ABA-2 tool and translated word and modified word. For example: Instruct – Instructively (Main Word), wkLv‡bv - wk¶vg~jK - wk¶vg~jK fv‡ e (Translated Word); wkLv- wkLv‡bv - wk¶vg~jK (Modified Word). Here, NM=No Modification.

Subtest 3: Limb Apraxia and Oral Apraxia

The task of limb apraxia and oral apraxia, it was observed that the entire translated sentences fulfill the criteria of ABA-2 assessment tool. In this subtest the included items from the ABA-2 that were simply translated so not needed to modify for cultural relevance. All main sentences in the tool, translated sentences and modified sentences are given below:

**TABLE 5: Limb Apraxia**

| Main Sentences of ABA-2 | Translated Sentences | Culturally Modified Sentences |
|-------------------------|----------------------|-----------------------------|
| Make a fist | | |
| Wave good-bye | | |
| Snap your fingers | | |
| Throw a ball | | |
| Hide your eyes | | |
| Make a hitchhiking sign | | |
| Make a pointing | | |
| Salute | | |
| Play the piano | | |
| Scratch | | |

**TABLE 6: Oral Apraxia**

| Main Sentences of ABA-2 | Translated Sentences | Culturally Modified Sentences |
|-------------------------|----------------------|-----------------------------|
| Stick out your tongue | | |
| Whistle | | |
| Puff out your cheeks | | |
| Kiss a baby | | |
| Clear your throat | | |
| Bite your lower lip | | |
| Show me your teeth | | |
| Take a deep breath and hold it | | |
| Lick your lips | | |
| Open your mouth | | |

The original contents of the Limb apraxia and oral apraxia task of the ABA-2 tool and translation of the sentences based on cultural context are shown in table 5 and table 6. For example: Make a fist (Main Sentence), nvZ gywV Ki“b (Translated Sentence), No modification (Modified Sentence). Here, NM=No Modification.
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Subtest 4 & Subtest 5: Latency Time and Utterance Time for Polysyllabic Words & Repeated Trials

In these tasks the translated some words were not suitable for ABA-2 tools. Because some polysyllabic words were translated into Bangla that time those words became bisyllabic words. So that modification is needed. All main word in the tool, translated word and modified word are given below:

**TABLE 7:** Latency Time and Utterance Time for Polysyllabic Words & Repeated Trials

| Subtest 4 & 5 | Latency Time | Utterance Time |
|--------------|--------------|----------------|
| Main Word    | Translated Word | Culturally Modified Word |
| Telephone (Example) | তলায়মন্ত্র (উদাহরণ) | NM |
| Flashlight | ফ্লাশলাইট | NM |
| Umbrella | ম্যাউষ্ট | NM |
| Newspaper | গ্রন্থাগার | NM |
| Banana | বানান | NM |
| Elephant | জিন্নাহ | NM |
| Potato | পটেটো | NM |
| Butterfly | বিংশ কিশোর | NM |
| Motorcycle | মোটরসাইকেল | NM |
| Computer | কম্পিউটার | NM |
| Refrigerator | রিফ্রিজারেটর | NM |

The subtest 4 and subtest 5 of the ABA-2 tool and translation of the words and the modified words based on cultural context. Table 7 shows that the main word subtest four and five of the ABA-2 tool and translated word and modified word. For example, Potato (Main Word); Avjy (Translated Word); cZvKv (Modified Word). Her, NM= No Modification.

Subtest 6: Inventory of articulation characteristics of apraxia

In this subtest the picture of spontaneous speech task was not culturally appropriate so that it was necessary to change picture in context of Bangladesh (Annexure 2, plate 11). For reading task, the translated passage was not culturally suitable. It was also necessary to change the passage according to clients’ familiarity with the sentence structures. Similarly, in this case, the modifications would have been according to Bangladeshi cultural contexts. Main passage, translated passage and modified passage are given below:

**TABLE 8:** Subtest 6 (Inventory of articulation characteristics of apraxia)

| Original passage | Translated passage | Culturally Modified passage |
|------------------|--------------------|-----------------------------|
| My Grandfather (Main Passage) | Avgvi 'v*v (Translated Passage); evsjv‡k (Modified Passage) | N |

The original contents of the Inventory of articulation characteristics of apraxia task of the ABA-2 tool and translation of the passage based on cultural context are shown in table 8. Table 8 shows that the main passage of the ABA-2 tool and translated passage and modified passage. For example: My Grandfather (Main Passage); Avgvi 'v*v (Translated Passage); evsjv‡k (Modified Passage). Her, NM= No Modification.

Changing between the test and retest findings in each section

In this table find out the test & re-test scores and leveling the participants for each section except Latency time for polysyllabic word and inventory of articulation characteristic of apraxia section which is a checklist of characteristics of speech. The findings of the test and retest results were changed or no changed each section by using impairment level. Four impairment level (none, mild, moderate and severe) are using and the test and retest was examined using eleven participants diagnosed with apraxia.
Table 9 shows that the result of test and retest, change or not change. Here, Pt= Patient, T= Test, RT= Retest, DDK = Diadochokinetic Rate, IWL= Increasing Word Length, LT for PW= Latency Time for Polysyllabic Word, UT for PW= Utterance Time for Polysyllabic Word, T Trial= Repeated Trial, IACA= Inventory of Articulation Characteristic of Apraxia, * = Changing level, N= None, Mi=Mild, Mo= Moderate, S=Severe.

**Internal Consistency**

The adaptation of ABA-2 assessment tool showed internal consistency as measured by the Cronbach’s alpha for the major sub-tests are as follows: Diadochokinetic Rate, Increasing word length (Part A), Increasing word length (Part B), Limb Apraxia, Oral Apraxia, Latency Time for polysyllabic word, Utterance Time polysyllabic word and Repeated Trials. The internal consistency for the immediate Inventory of Articulation Characteristics of Apraxia subtest could not be calculated because this subtest has three types of speech behaviour: spontaneous speech, reading and automatic speech. This subtest measures the presence of apraxia speech behaviours in each of these types of speech. This subtest is used for treatment purpose only.

**Table 10: Internal consistency between two tasks**

| Task                              | Correlation (Test result) | Consistency | Correlation (Re-test result) | Consistency |
|-----------------------------------|---------------------------|-------------|------------------------------|-------------|
| Diadochokinetic Rate & Repeated Trials | 0.8637 | Good | 0.8741 | Good |
| Increasing word length (Part A) & Increasing word length (Part B) | 0.8143 | Good | 0.8005 | Good |
| Limb Apraxia & Oral Apraxia | 0.8400 | Good | 0.7898 | Acceptable |
| Latency Time for polysyllabic word & Utterance Time polysyllabic word | 0.9006 | Excellent | 0.9095 | Excellent |
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Table 10 shows that the internal consistency between two task in different test (test and retest). By using Cronbach’s alpha in this table showed the correlation between two tasks such as:

Test result: Diadochokinetic Rate & Repeated Trials (0.8637: Good), Increasing word length (Part A) & Increasing word length (Part B) (0.8143: Good), Limb Apraxia & Oral Apraxia (0.8400: Good), Latency Time for polysyllabic word & Utterance Time polysyllabic word (0.9006: Excellent).

Re-test: Diadochokinetic Rate & Repeated Trials (0.8741: Good), Increasing word length (Part A) & Increasing word length (Part B) (0.8005: Good), Limb Apraxia & Oral Apraxia (0.7898: Acceptable), Latency Time for polysyllabic word & Utterance Time polysyllabic word (0.9095: Excellent).

Test- retests reliability coefficients

The test retest reliability of the ABA-2 tool was evaluated by testing 11 patients and all patients were diagnosed at apraxia after stroke. The interval between testing ranged five days. Nine tasks intra-class correlation are given below:

**TABLE 10: Test- retests reliability coefficients**

| Task                                      | Intra-class correlation | Consistency  |
|-------------------------------------------|-------------------------|--------------|
| Diadochokinetic Rate                      | 0.9842                  | Excellent    |
| Increasing word length Part A             | 0.9704                  | Excellent    |
| Increasing word length Part B             | 0.9498                  | Excellent    |
| Limb Apraxia                              | 0.9507                  | Excellent    |
| Oral Apraxia                              | 0.9714                  | Excellent    |
| Latency Time for polysyllabic word        | 0.9585                  | Excellent    |
| Utterance Time polysyllabic word          | 0.9917                  | Excellent    |
| Repeated Trials                           | 0.9862                  | Excellent    |
| Inventory of Articulation Characteristics of Apraxia | 0.9478                  | Excellent    |

Table 11 shows the test retest reliability coefficients examined using intra class correlation. The test retest reliability coefficients for 11 of the 9 tasks show adequate constancy of scores over time. Excellent intra-class correlation was found between the two administrations all of the tasks.

4 DISCUSSION:

Feasibility

This study established the feasibility of the ABA-2 whole form in the Speech and Language Therapy Clinical settings. In general the tool was well under-stood and responded by the participants. No missing response was formed. After addressing all these issue in the piloting of patients the tool picked up variation in response of all.

Findings of Observation and Focus Group Discussion

After forward translation the investigator observed the 5 apraxia patents. A total of five people diag-nosed with apraxia of speech, participated in this study. In that time the clinician assessed the patient and investigator observed and scored. The observa-tion findings was that: There are six subtests and 9 tasks on the ABA-2; however the observation was conducted with nine tasks (Diadochokinetic Rate, Increasing Word Length Part A, Increasing Word Length Part B, Limb Apraxia, Oral Apraxia, Latency time and Utterance time for Polysyllabic Words, Re-peated Trials, Inventory of Articulation Characteris-tics of Apraxia). Subtest number one (Diadochoki-netic Rate) (Table 2), subtest number three (Limb Apraxia and Oral Apraxia) (Table 5 & 6), included items from the ABA-2 that were simply translated (no modification for cultural relevance).According to rule the subtest number two (Increasing Word Length), the length of word should be increased from shorter to longer length. But when the investigator translated the increasing word length items in Bangla that time, sometimes the words length was increas-ing and sometimes the words length was decreasing (Table 3 & Table 4).
The picture which was used in subtest four (Latency time and Utterance time for Polysyllabic Words) was not culturally appropriate in Bangladeshi context so it was needed to change (Table 7 & See Annexure 2, picture book). In subtest number five (Repeated Trials), some polysyllabic words were translated into Bangla that time those words became bisyllabic words (Table 7). In subtest number six (Inventory of Articulation Characteristics of Apraxia e.g. Spontaneous Speech, Reading, Automatic Speech) including passage (reading) needed change because when the passage was translated into Bangla that time it was not culturally appropriate, for this reason the investigator made another passage which is culturally appropriate in Bangladesh (Annexure 2, plate 12 ). The picture which was used in subtest six for Spontaneous Speech was not culturally appropriate in Bangladeshi context so it was needed to change (Annexure 2, plate 11). In this subtest the automatic speech was needed reduce the number of counting. The investigator used 1-20 numbers counting for automatic speech. The investigator also discussed with 10 normal people about the selected words, sentences and pictures and all people were reported that the positive opinion and their understandability were feasible.

Changing Pilot Study

By observation findings, focus group discussion and taken concern from panel of expert then the investigator modified the words, sentences and pictures in context of Bangladesh. And then pilot study was conducted. A pilot study was conducted in Savar Speech and Language Therapy Department, by the investigator before going to collect the actual data. This was arranged to check the suitability of the materials (words, sentences and pictures) in the context of Bangladesh. The number of participant of the pilot study were 8 among them 5 were male and three were female. All 8 participants were fulfilling the inclusion criteria of the study. All the patients were diagnosed as apraxia after stroke. During pilot study the clinicians assessed the patient and the investigator was scoring the patients response. The investigator also observed the patients behaviour when assessed the clinician. The pilot study findings was that: There are six subtests and 9 tasks on the ABA-2; however the pilot study was conducted with modified words, sentences and pictures with nine tasks (Diadochokinetic Rate, Increasing Word Length Part A, Increasing Word Length Part B, Limb Apraxia, Oral Apraxia, Latency time and Utterance time for Polysyllabic Words, Repeated Trials, Inventory of Articulation Characteristics of Apraxia). After changing and modification the words, sentences and pictures from the pilot study results showed that no modification was needed in all the tasks. Because the modified words, sentences, and pictures were culturally appropriate and participants understood all the tasks. After stroke all participants were unable to read so the clinician could not test the passage which was the part of subtest number six of “Reading” (Inventory of Articulation Characteristics of Apraxia).

Changing between the Test and Retest Findings in Each Section

Test – retest reliability which was administering the same test to the same participants at two points was used to measure of stability over time. Eleven patients were observed with the Bangla version of ABA-2 twice and were given a time interval of 5 days and ranging in age from 37 to 80 years, participated in this study for testing of ABA-2 whole section. In this group, nine of the participants were male and two were female. Test-retest study was conducted in Savar and Mirpur Speech and Language Therapy Department, by the investigator before going to collect the actual data. During testing retesting the clinicians assessed the patient and the investigator was scoring the patients response. The testing retesting time the investigator was used a stopwatch to time various tasks. In this study, standard deviation for the raw scores and the severity levels as determined by the each of the investigator outlined. Both tests were administrated by the examiner (intern). A 4 impairment level cutoff scale was developed from “none”, “mild”, “moderate” and “severe”. Test – retest observation findings that some of the patients have little changed in limb apraxia and oral apraxia section. The changing has some reason, when the test was conducted that the patient was unfamiliar to ABA-2 assessment tool and after five days later again when the assessment was conducted then the patient was known to the task so the patients response was changed.
Table 9 showed the test retest changed and star (*) symbol was indicated the change of the level.

**Discussion of Internal Consistency between Two Tasks**

The present study was undertaken with the aim of cultural adaptation of Apraxia Battery for assessing the patient with Apraxia. The internal correlation between two tasks of the ABA-2 tool was evaluated by testing 11 patients and all patients were diagnosed at apraxia after stroke. The reliability for Diadochokinetic Rate, Increasing word length (Part A), Increasing word length (Part B), Limb Apraxia, Oral Apraxia, Latency Time for polysyllabic word, Utterance Time for polysyllabic word and Repeated Trials sub-tests appear to be satisfactory as researchers claim that Cronbach’s alpha coefficients. The internal consistency for the immediate Inventory of Articulation Characteristics of Apraxia sub-test could not be calculated because this subtest has three types of speech behaviour: spontaneous speech, reading and automatic speech. This subtest measures the presence of apraxia speech behaviours in each of these types of speech. This subtest is used for treatment purpose only. The test and re-test result were separately find out by using Cronbach’s alpha coefficients. Using the Cronbach’s alpha, the internal consistency of all tasks indicates satisfactory result.

For testing result indicate correlation between two tasks: Diadochokinetic Rate with Repeated Trials (0.8637), Increasing word length (Part A) with Increasing word length (Part B) (0.8143), Limb Apraxia with Oral Apraxia (0.8400) showed that “Good” consistency. Latency Time for polysyllabic word with Utterance Time polysyllabic word (0.9006) showed that “Excellent” consistency.

For re-testing result indicate correlation between two tasks: Diadochokinetic Rate with Repeated Trials (0.8741), Increasing word length (Part A) with Increasing word length (Part B) (0.8005) showed that “Good” consistency. Limb Apraxia with Oral Apraxia (0.7898) showed that “Acceptable” consistency. Latency Time for polysyllabic word with Utterance Time polysyllabic word (0.9095) showed that “Excellent” consistency.

The each test and re-test task result were showed that the reliable result so each tasks were very useful for apraxia patient in context of Bangladesh.

**Discussion of Test- retests Reliability Coefficients**

The test-retest reliability of the ABA-2 tool was evaluated by testing 11 patients and all patients were diagnosed at apraxia after stroke. The interval between testing ranged five days. Using the Cronbach’s alpha, the intra-class consistency of all sub-tests combined was very high with a coefficient of 0.9478 (Excellent). Table 11 shows the test-retest reliability coefficients examined using intra class correlation. The test-retest reliability coefficients 9 tasks show adequate stability of scores over time. The reliability for Diadochokinetic Rate, Increasing word length (Part A), Increasing word length (Part B), Limb Apraxia, Oral Apraxia, Latency Time for polysyllabic word, Latency time for polysyllabic word, Utterance Time for polysyllabic word and Repeated Trials and Inventory of Articulation Characteristics of Apraxia sub-tests appear to be satisfactory as researchers claim that Cronbach’s alpha coefficients. The intra-class correlation coefficient for similarities subtest was indicate very high Cronbach’s alpha with a coefficient ranging between 0.9478 to 0.9917 showed that “Excellent” coefficient (Table 11).

**5 | CONCLUSION**

Speech and Language Therapy is an established profession in many countries of the world but still very new in Bangladesh. There is no culturally appropriate adult assessment tool for assessing patient with Apraxia in Bangladesh. For that reason the investigator adapted the ABA-2 tool in context of Bangladesh. The Apraxia Battery for Adults-2 (ABA-2) is a standardized assessment tool of apraxia disease. Despite a small size, the results from the present study indicate that assessment of apraxia via the ABA-2 assessment tool appears the valid. ABA-2 is reliable and valid instrument for evaluating the patients with apraxia.

The results of the study justify the utilization of this tool in clinical settings for screening patients.
for apraxia. The test retest result also showed that the ABA-2 assessment tool was reliable in culturally. This assessment tools also help Speech and Language Therapists to assess and diagnose the patient with apraxia.

**Ethical considerations**

For conducting this study project, investigator took permission from study supervisor, course coordinator of Speech and Language Therapy at Bangladesh Health Professions Institute (BHPI) and incharge of adult department (Annexure 4-7). Written inform consent was given to all participant’s caregiver prior to the completion of the pre-test. The investigator received a written consent form from every participant’s caregiver including signature (Annexure 8). Participant’s caregiver was also informed verbally about the study purpose and their role in the study. The name and address was kept confidential. The name and address of the participants was kept confidential. The data notes were only shared with selected person. The investigator ensured the participant that this study project was not harmful to them. They could withdraw their participation at any time from the study.

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**Conflict of Interest**

No conflict of interest

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