Development of Naming, reading, and imitation skills management programme for Patients with Broca's Aphasia

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ABSTARCT:

Background: Aphasia is a neurological language disorder caused by injury to those regions of the brain that are accountable for language input and integration (frontal/temporal lobe). Broca's aphasia also known as non fluent or expressive aphasia, results in failure of the ability to produce language, either spoken or written. The management programme of naming, reading, and imitation skills through mobile app of patients with severe Broca Aphasia. The programme is developed for the treatment of severe Broca's Aphasia patients, targeting the personal vocabulary and focusing on the patient's conversational needs. Moreover the programme increases the independency which was not seen in some traditional techniques. This study is the pathway for maintaining and improving the functional life of patients.

Objectives: The main objective was to develop the naming, reading, and imitation skills management through mobile app of patients with severe Broca Aphasia.

Methodology:

A pilot study with eight patients is carried out. The purposive non probability sampling technique was used to recruit the patients with severe Broca aphasia and these patients who received therapy through mobile app programme. It contains four domains: naming, reading, and imitation. The programme was developed in Urdu language. This study was conducted in YUSRA general hospital, Pakistan Railway Hospital, Rawalpindi. The inclusion criteria were patients above the age of 40, and three months of stroke with chronic Broca's Aphasias diagnosis, while patients with severe cognitive impairment were excluded from the study. The pre and post score of patients was recorded for the measurement of change. Treatment protocol includes 30-45 mints sessions, 4 days per week for total 8weeks. Data for each patient was analyzed based on their pre and post intervention scores.

Results: The scores were computed in terms of mean and standard deviation. The pre and post scores of each patient compares separately through which remarkably improvement in their naming, reading, and imitation skills. The results also illustrate a significant difference between the pre and post scores on each domain and show the vital improvement in all skills of patients with severe Broca aphasia.

Conclusion: It is concluded from the results that the development of Naming, reading, and imitation skills management programme skills of patients with severe Broca aphasia.

Key words: Aphasia, Broca Aphasia, management programme

INTRODUCTION

Aphasia is a language disorder occurring mainly as a result of stroke, it is an impairment of language, an acquired communication disorder that weakens people's ability to comprehend language, but is not shown to affect intellect. It is a neurological disorder caused by injury to those regions of the brain that are accountable for language input and integration (frontal/temporal lobe). Aphasia refers to loss of language following an insult to the anatomical basis of language areas in the brain. Aphasia refers to the disturbance of any or all of the skills, associations and habits of spoken and written language produced by injury to certain brain areas that are specialized for these functions. Causes of brain attack vary from cerebral vascular accidents (stroke), tumor, penetrating wounds, and other diseases. Stroke is the most widespread cause of aphasia. Aphasia may influence all means of expressive and receptive communication along with speaking, reading, writing, understanding and gesturing.[1] Aphasia persists as disability in 21-38% of stroke survivors. Internationally community incidence is 43/100,000/year, and prevalence is 3000 per million. [(2)] Aphasia is a language impairment which is due to damage of brain areas related to production of speech and understanding of language. The prevalence of aphasia indicates that about 100,000 people have aphasia per year in the United States.[3] About 82.37% of stroke patients suffer from speech disorder[4]. In Pakistan estimated annual incidence is 250/100,000, translating to 350,000 new cases every year. [5] Aphasia has heavily influenced the life quality of patients and is one of the most important indicators to evaluate the patients' social outcomes. [6]

There are different speech therapies most of them are for verbal expressive skills as stimulation-response method and the Melodic Intonation Therapy (MIT).[7] Other are like linguistic-oriented learning approaches, Still, other techniques such as Promoting Aphasics'

Communicative Effectiveness (PACE) and the Response Elaboration Training (RET) Designed for broca aphasia patients to improve the length of verbal responses.[8] The constraint-induced aphasia therapy, CIAT is use to improve verbal abilities. [9]

Some studies find out effectiveness of computer programs for management [10]. A study based on computer therapy conducted on aphasic patients after five months of computer treatment, showed that a significant improvement on naming skills of the patients was achieved. [11]

Computer-based aphasia therapy is appealing and the patient with severe Broca Aphasia managed with computer-based training patients showed positive effects through computer based therapy on sentences making, reading writing.[12]

The naming, reading, and imitation skills management programme through mobile app is for stroke survivors without access to intensive speech therapy services confirms that they can continue to recover on their own by using the tool. The different domains of app are developed for the treatment of severe Broca's Aphasia patients, targeting the personal vocabulary and focusing on the patient's conversational needs. Unfortunately, many people face barriers to accessing speech therapy due to time required to create change in the brain.

METHODS & MATERIALS:

This article is part of a major study which aims to develop mobile app to enhance of naming, reading, and imitation skills for patients with severe Broca's thus improving their quality of life. The purposive sampling was used to recruit the patients from various hospitals in Rawalpindi and Islamabad. The patients that are forty years old or more with post stroke with severe Broca aphasia (within three months) recruited in study. Presence of cognitive impairment of any kind led to exclusion from the study. The procedure began with an informed consent and information disclosure. The programme was designed with specific consideration to patients' level of education, affordability, familiarity and comfortability with gadgets. Interactive programme was created in Urdu language for each participant and installed on their smart phones. The programme contains naming, reading, writing, and imitation skills (Table 1). It also contains different daily functional statements, words, phrases and sentences according to the need of domain; Treatment stimuli consisted of images of objects along with auditory sounds of person and actions, cues. The voice output can operate by pressing the selected picture with his index finger. Participants received 1-8 weeks of therapy using software programme specifically included four domains within the app comprising of 30-45 minutes sessions (4 days per week for total 8weeks). The measurement will be taken at 0 week (baseline) after 8 weeks. Data was analyzed on basis of pre and post intervention score. (Table 2)

Table 1: Disciplines Naming, Reading, and Imitation Skills Management Program

Sr #	Domain name	Description	Levels
1	**Naming,**	The pictures of daily functional things are presented in the order and ask the client to name each item. In word fluency portion pts repeat the phrase and sentences of relevant picture. Then the action pictures show and the client have to describe the picture. There are cues: sound from which word start, then spelling form and then written form of picture name along auditory feedback	Level 1:Includes picture and just name them Level II: response in phrases and sentences Level III: narration of pictures
2	**Reading**	This domain contains simple Reading of functional items list, Symbol recognition, Number Matching , Word Identification, sentence completion Oral reading, Paragraph reading. Each has four option the patient click the statement which match the representative item from above. If wrong response then the option color fades out.	Level 1: Characteristic of item match to picture Level II: response in Functional quality manners of item Level III: Patients have to answer the questions after reading paragraph
3	**Imitation**	Ask the patient to repeat the words listed below contain different categories then record the responses. Hints related to that word are presented in form of written and auditory form.	Level I: Easy Level II: medium Level III: Difficult

Table 2: Patient Treatment Protocol:

Week	Domains	Time duration	Goals
1-3	**Naming skill**	Session: 08 Duration: 30 mints each	Can produce name of daily functional things and describe the pictures in phrases and sentences.
4-6	**Reading skill**	Session: 12 Duration of session: 30	The patients able to read of functional items list , Symbol recognition, Number Matching , Word Identification, sentence completion Oral reading, Paragraph reading.
7-8	**Imitation Skill**	Session: 08 Duration: 30 mints each	Patient can repeat the words from different categories. Listen to the question and respond in sequence.

RESULTS:

The programme was designed and implemented on eight stroke patients who were eligible and willing to participate. Descriptive statistics of score calculated in terms of mean and standard deviation. The paired sample t-test was used to compare pre and post score, which was statistically significant (p-value 0.05). (Table 3)

Demographic variations among samples

According to demographic variations 50.0% people lie in the age range 40-50 while 50.0% of people are 51-60 years old. The mean age of sample is 49 years. And 87% of participants are right handed while 12% are left handed

Table 3: Pre and post data of aphasia's treatment domain

Patients	Repetition Total Score: 78		Naming Total Score: 188		Reading Total Score: 98	
	Pre	Post	Pre	Post	Pre	Post
Patient 1	10	42	34	96	30	62
Patient 2	8	56	40	102	20	68
Patient 3	12	60	30	88	18	36
Patient 4	10	62	22	98	28	60
Patient 5	22	70	38	86	40	86
Patient 6	22	58	58	98	28	60
Patient 7	20	66	78	154	40	88
Patient 8	26	70	98	168	50	80

The pretest and post test score of each patient for treatment data of repetition, naming, reading. The scores show that all patients show remarkable improvement in these skills. (Table 3)

Table 4: Domains of Naming, Reading, Writing And Imitation Skills Management Program

Domains	Total patients	Pretest Mean ± SD	Posttest Mean ± SD	*P*
Repetition	08	13.00± 4.40	60.5±9.11	.000
Naming	08	49.75± 26.28	1.11±31.16	.000
Reading	08	31.75± 10.81	70.00±12.78	.000

The mean and standard deviation for repetition sub domain of VESMP software. The data was implicit on pre and post test scores. The pretest comprehension was 13.00± 4.40 and post test was 60.5±9.11. Their p-value was 0.00 which is highly significant, indicating that participants had no trouble repeating spoken words through app program. The result of naming skill is highly significant. This shows patient easily name the functional items list from the application. The mean and standard deviation for pretest reading was 31.75± 10.81 and post test scores was70.00±12.78. Their p-value was with 0.00 significant, indicating that participants can you positive result while reading the presented material. (Table 4)

DISCUSSION:

The study on development of naming, reading, writing and imitation skills management programme app for patients with severe Broca Aphasia. Moreover the programme increases the patient's independencies through using on their smart mobiles which were not observed in other traditional techniques. The results of different studies revealed that home based practice on the iPad through these participants were able to self-teach and was maintained the improvement.[13]

The present study reveals that pre score of patients on naming, post test core was 1.11±31.16 which shows that patient naming skill enhance through the software. The study on computer assistive programme is to compose naming words and sentences. The programme is based on specially designed with multiple equipments used by patients with severe aphasia so that patients learnt an alternative mean of communication through this symbol system[14].

Present study showed significant result on the repetition domain. The results clearly depict that through implication of software patients show drastic change in their speech production. The study on computerized reading treatment study that contains 29 tasks along with 8 levels, patients have to maintain performance. Results revealed the positive effect of this computer-provided intervention[15]. A randomized Computer-based aphasia therapy is conducted on patient with severe Broca Aphasia that was provided with a laptop installed program which shows instant recovery with in sessions on confrontation naming tasks[16].

The result of reading skills from present study illustrates that their p-value was 0.00 which is significant. One of related research showed that computer treatment for sentence construction, word finding, and reading had a positive effect found that computer training has an additional\ effect: patients who received computer training in addition to their regular therapist-delivered therapy showed greater gains in linguistic functioning than patients who only received regular

therapist-delivered therapy. This indicated that computer technology can be used to increase treatment intensity[17].

This is pilot project more data should require to generalize and validate the study. Other type of aphasia should also target for management. This app should contain all seven domains for management of aphasia.

CONCLUSION:

After the conduction and analysis of this study, it is concluded that the reading, naming, repetition and automated speech skills are improved in patients with severe Broca aphasia using management programme app. This management app is for post stroke chronic Broca Aphasia patients only. This app can only install on android mobiles. The app is only in Urdu language and target only four domains for management of Broca aphasia.

REFERENCES

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