RESEARCH ARTICLE

COMPARISON OF VISUAL ACTION THERAPY AND AUDITORY COMPREHENSION THERAPY FOR LANGUAGE FUNCTIONS IN PATIENTS WITH WERNECK'S APHASIA

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ABSTRACT

Objective: to compare the effectiveness of visual action therapy (VAT) and auditory compression training (ACT) for language functions in patients with Wernicke Aphasia. **Methodology:** A Pilot Randomized Clinical trial was conducted. Patients with age range of 30-60 years with neurological impairments and aphasia were included in the study. The participants n=12 were recruited through purposive sampling technique and randomly divided in to two groups through lottery method. One group received visual action therapy while other group received auditory comprehensive training. Each participant in both groups received three sessions per week in their homes for a time period of 10 weeks. The data were collected through Western Aphasic Battery (WAB). **Results:** The Mean of age of study participant in VAT and ACT as 51.83±7.83 and 60.3±2.05 respectively. In this study significant improvement has been observed after 10 weeks of intervention in visual action therapy group ($p<0.05$). **Conclusion:** It is concluded from the results that VAT significantly improved the western aphasic battery scoring and comprehension skills in patient with Wernicke's aphasia.

Key words: Auditory comprehension therapy, visual action therapy, Wernicke aphasia

INTRODUCTION

Aphasia is a language impairment that affects the production or understanding of a speech and the ability to read or write. It occurs due to the brain damage, usually in stroke, especially in older adults. Additionally, the brain damage that leads to aphasia can also be caused by head trauma, brain tumors or infections.[1] According to the American Speech-Language-Hearing Association (ASHA), 1 million people in the United States and 250,000 people in the UK have been reported with aphasia. And 80,000 new cases reported annually.[2] According to a study, 15% of people under the age of 65 presented with a complaint of aphasia.[3] Aphasia is more common problem as compared to cerebral palsy, Parkinson's disease or muscular dystrophy.[4, 5]

According to the literature, the patients' who have an intact cognitive abilities have different pathology from those who are non-linguistic.[6, 7] The people with aphasia have speech and language problems in four communication modalities, i.e. auditory understanding, oral expression, reading, writing and functional communication.[8] The patients' with Wernicke aphasia have difficulty in building a syntactic structure because of the lack of understanding or using these structures in proper sentence form.[9-11] The previous evidence showed that, the global aphasic person have a serious language concerns that restricts the non-verbal means of expression such as gesture and attraction. And these patients, therefore, have poor communication skills.[12]

The patient with Wernicke's aphasia maintains a rich conceptual system, and some of the cognitive functions that are required for natural language. Aphasic patients who had a little or no communication ability, were taught natural language through visual communication system (VCS).[13] Another study showed that, the Alternative and Augmentative Communication (AAC) is a way of communication technique, when communicating skills are not working.[14]

According to literature, eight aphasic patients who didn't respond to traditional treatment were treated with the visual action therapy (VAT). The patients were hospitalized to produce symptoms of non-restless problem. The Porch Index of Capacity Ability (PICA) showed significant improvement in the VAT points.[15] Visual Action Therapy (VAT) is mainly a non-verbal technique that trains an individual suffered from any neurological disease so can convey message from representative gestures, which is without speech.[3]

The aim of present study helps to increase the patient's comprehension skills, a good daily living activities. This study helps them in spending good quality of life and makes them able to communicate effectively. Previously, some studies has been conducted on Visual Action Therapy (VAT and Auditory Comprehension Therapy (ACT along

with any other therapy and with different types of aphasia on Wernicke's aphasic patients. But, the RCT of both VAT and ACT were not conducted so far in Pakistan, for the management of patients with Wernicke's aphasia. The objective of study is to determine the effectiveness of visual action therapy versus auditory comprehension therapy in patients with Wernicke's aphasia.

METHODOLOGY

A Pilot Randomized Clinical, Trail was conducted in with the approval from a competent authority for duration of 3 months. The age range for both male and female was 30-60 years, patients with neurological impairment and Wernicke's Aphasia after stroke were included in the study, while, patients with any other co-morbidities were excluded from the study. The participants n=12 were recruited through purposive sampling technique and randomly divided into two groups through lottery method as shown in Figure 1. One group receives visual action therapy (VAT), while other group receives auditory comprehension training (ACT) as shown in Table 1 and 2 respectively. Each participant of the both groups received three sessions per week in their homes for a time period of 10 weeks. The duration of each session was 30 minutes.

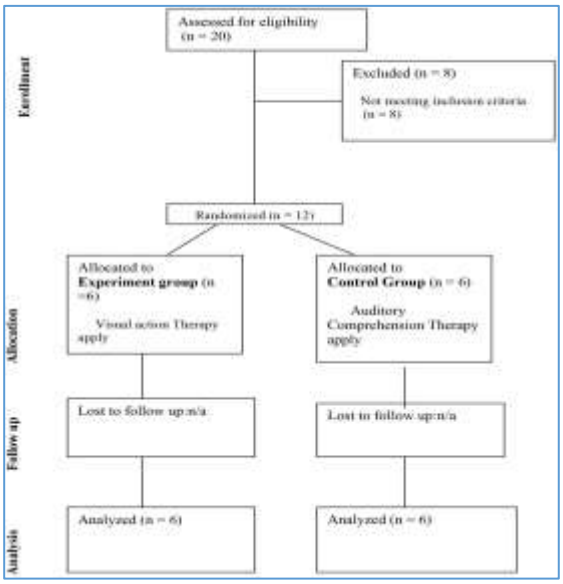

Figure 1: CONSORT Diagram

Table 1: Visual Action Therapy (VAT) Protocol

Session No.	Duration	Tasks VAT
Screening session	• 35 -45mint	• Introduction • Consent taking • Administration of quick assessment
1st session -	• 30mint	LARGE PICTURE MATCHING • Object to picture matching(8 items) • Picture to object matching
2nd session	• 30mint	• Object to picture pointing • Picture to object pointing (8 items of large pictures)
3rd session	• 30mint	• Object to picture matching • Picture to object matching (8 items of small pictures)
4th session	• 30mint	• Object to picture pointing • Picture to object pointing (8 items of small pictures
5th session	• 30mint	• Step 3. Object Use Training. • Step4. Action picture taking.
6th session	• 30mint	• Step5. Following action picture command. • Step6. Pantomimed gesture demonstration
8th session	• 30mint	• Step7. Pantomimed gesture recognition. • Step8. Pantomimed gesture training.
9th session	• 30mint	• Step9.Pantomime gesture production. • Step10. Representational gesture for absent object training
10th session	• 30mint	• Step11. Representational gesture for absent object
11th session	• 30mint	• Step6. Pantomimed gesture demonstration With Action card
12th session	• 30mint	• Step7. Pantomimed gesture recognition. • Step8. Pantomimed gesture training. With Action card
13th session	• 30mint	• Step9.Pantomime gesture production. With Action card • Step10. Representational gesture for absent object
14th session	• 30mint	• Step11. Representational gesture for absent object
15th session	• 30mint	• Step6. Pantomimed gesture demonstration
16	16th session	• 30mint	• Small cards • Step7. Pantomimed gesture recognition. • Step8. Pantomimed gesture training. Small cards
17	17th session	• 30mint	• Step9.Pantomime gesture production. • Step10. Representational gesture for absent object Small cards
18	18th session	• 30mint	• Step11. Representational gesture for absent object Small cards
19	19th session	• 30mint	• Step6. Pantomimed gesture demonstration Small cards
20	20th session	• 30mint	• Step7. Pantomimed gesture recognition. • Step8. Pantomimed gesture training. Small cards
21	21th session	• 30mint	• Step9.Pantomime gesture production. • Step10. Representational gesture for absent object Small cards
22	22th session	• 30mint	• Step11. Representational gesture for absent object Small cards
23	23th session	• 30mint	• Step6. Pantomimed gesture demonstration With action cards
24	24th session	• 30mint	• Step7. Pantomimed gesture recognition. • Step8. Pantomimed gesture training. With action cards
25	25th session	• 30mint	• Step9.Pantomime gesture production. • Step10. Representational gesture for absent object With action cards
26	26th session	• 30mint	• Step11. Representational gesture for absent object With action cards
27	27th session	• 30mint	• Step6. Pantomimed gesture demonstration through small card
28	28th session	• 30mint	• Step7. Pantomimed gesture recognition. • Step8. Pantomimed gesture training. through small card
29	29th session	• 30mint	• Step9.Pantomime gesture production. • Step10. Representational gesture for absent object through small card
30	30th session	• 30mint	• Step11. Representational gesture for absent object through small card

Table 2: Auditory Comprehension Training (ACT)

Session no	Duration	TASKS OF ACT
1st Session	35-45 mint	Screening session • Informed consent • Administration of quick aphasia assessment
2nd Session	30 mint	Continuation of screening session • Administration of western aphasia battery
3rd Session	30 mint	Auditory awareness (patient will detect sound)
4thSession	30 mint	Sound localization (patient will locate the sound source) Auditory Attention(here patient will attend to important auditory information including attending in the midst of competing background noise)
5th Session	30 mint	Sound localization (patient will locate the sound source) Auditory Attention(here patient will attend to important auditory information including attending in the midst of competing background noise)
6th Session	30 mint	Auditory Discrimination of environmental sounds(patient will detect differences between sounds in the environment)
7th Session	30 mint	Auditory Discrimination of environmental sounds(patient will detect differences between sounds in the environment)
8th Session	30 mint	Auditory discrimination of suprasegmentals (here the patient will detect differences in non-phoneme aspects of speech including rate,intensity,prosody,duration and pitch)
9th Session	30 mint	Auditory discrimination of suprasegmentals (here the patient will detect differences in non-phoneme aspects of speech including rate,intensity,prosody,duration and pitch
10th Session	30 mint	Auditory discrimination of suprasegmentals (here the patient will detect differences in non-phoneme aspects of speech including rate,intensity,prosody,duration and pitch
11th Session	30 mint	Auditory discrimination of segmentals(patient will detect differences between specific speech sounds)
12th Session	30 mint	Auditory discrimination of segmentals(patient will detect differences between specific speech sounds)
13th Session	30 mint	Auditory discrimination of segmentals(patient will detect differences between specific speech sounds)
14th Session	30 mint	Auditory indentification auditory association (here the patient will attach meaning to sounds and speech)
15th Session	30 mint	Auditory indentification auditory association (here the patient will attach meaning to sounds and speech)
16th Session	30 mint	Auditory feedback(here the patient will change the speech production based on the information you get from hearing yourself speak)
17th Session	30 mint	Auditory feedback(here the patient will change the speech production based on the information you get from hearing yourself speak)
18th Session	30 mint	Phonological awareness (patient will be able to identify,blend,segment and manipulate oral language structure)
19th Session	30 mint	Phonological awareness (patient will be able to identify,blend,segment and manipulate oral language structure)
20th Session	30 mint	Auditory comprehension (here the patient will understand longer messages , including engaging in conversation, following directions and understanding stories.
21th Session	30 mint	Auditory comprehension (here the patient will understand longer messages , including engaging in conversation, following directions and understanding stories.
22th Session	30 mint	Auditory closure (here the patient will make sense of auditory messages when a piece of auditory information is missing;fill in the blanks)
23th Session	30 mint	Auditory closure (here the patient will make sense of auditory messages when a piece of auditory information is missing;fill in the blanks)
24th Session	30 mint	Auditory memory (patient will retain auditory information both immediately and after a delay)
25th Session	30 mint	Linguistic auditory processing (here the patient will interpret ,retain, organize and manipulate spoken language for higher level learning and communication)
26th Session	30 mint	Auditory memory (patient will retain auditory information both immediately and after a delay)
27th Session	30 mint	Auditory memory (patient will retain auditory information both immediately and after a delay)
28th Session	30 mint	Linguistic auditory processing (here the patient will interpret ,retain,organize and manipulate spoken language for higher level learning and communication)
29th Session	30 mint	Linguistic auditory processing (here the patient will interpret ,retain,organize and manipulate spoken language for higher level learning and communication)
30th Session	30 mint	Linguistic auditory processing (here the patient will interpret ,retain,organize and manipulate spoken language for higher level learning and communication)

The data was collected through Western Aphasic Battery (WAB). It is actually an instrument which is used for the assessment of language function for an adult who suffers from some neurological condition or disease, i.e. stroke, head injury, any trauma or dementia. It has proven validity and reliability.[16]

The demographic data were collected such as age, gender, and occupation and presented as percentage, frequency distribution, mean±SD. The normality testing was done and parametric test was used for analysis. For between group comparisons independent sample t-test was used while for within group comparison paired sample t-test was applied. Data was analyzed by using SPSS version 21 and, therefore, the level of significance was set at a $p<0.05$.

RESULTS

The mean age of the study participant of VAT and ACT group was 51.83±7.83 and 60.3±2.05 respectively. In VAT group, the male participants were 5(55.6%), while female was 1(33.3%). However, in ACT group, the males were 4(44.4%) and females were 2(66.7%).

Within-group analysis showed that VAT group significantly improved WAB scoring ($p<0.05$) after 10 weeks of intervention, except information content and responsive speech as shown in Table 3.

Furthermore, between the group analysis showed significant improvement in VAT group in terms of spontaneous speech, word fluency, and naming words ($p<0.05$) as compare to ACT group as shown in Table 4.

Table 3: Western Aphasia Battery with-in group analysis

Domains		VAT Group Mean±SD	*p-value*	ACT Group Mean±SD	*p-value*
Spontaneous Speech	Pre Post	1.50±1.64 5.00±.894	*0.000****	1.50±1.97 3.00±1.67	*0.007***
Picture Description	Pre Post	.166±.408 1.00±.000	*0.004***	.166±.408 .666±.516	*0.076*
Information Content	Pre Post	3.00±3.22 3.83±1.47	*0 .402*	.666±.516 1.33±1.75	*0.025**
Scoring Fluency	Pre Post	2.00±2.19 4.66±1.50	*0.000****	1.33±2.16 2.83±1.94	*0.007***
Auditory Verbal	Pre Post	10.83±8.56 27.16±9.13	*0.000****	8.50±9.37 18.33±7.68	*0.001***
Auditory Word	Pre Post	19.50 ±.170 39.16± .918	*0.000****	15.16±17.50 29.33±11.94	*0.032**
Sequential	Pre Post	16.83±19.29 38.83±18.87	*0.000****	14.16±20.92 27.66±18.07	*0.001***
Repetition	Pre Post	17.33 ±.259 47.00 ±18.63	*0.000****	14.16±21.54 33.50±17.42	*0.001***
Word Fluency	Pre Post	16.50±19.65 40.66±12.17	*0.002***	11.33±17.65 .833±.752	*0.191*
Responsive Speech	Pre Post	.500±.547 .833±.408	*0.363*	.333±.516 .500±.547	*0 .363*
Sentence	Pre Post	.833±.983 1.66±.516	*0.042**	.500±.836 1.16±.752	*0.025**

Level of significance= p<0.05, p<0.01**, p<0.001****

Table 4: Western Aphasia Battery between group analyses

Domains		Mean±SD	*p-value*
Spontaneous speech	Exp. Con.	5.00±.894 3.00±1.67	*0.027**
Picture description	Exp. Con.	.894±.000 1.67±.516	*0.145*
Scoring fluency	Exp. Con.	4.66±1.50 2.83±1.94	*0.097*
Information content	Exp. Con.	3.83±1.47 2.00±2.00	*0.101*
Sequential	Exp. Con.	38.83±18.87 27.66±18.07	*0.320*
Auditory verbal	Exp. Con.	27.16±9.13 18.33±7.68	*0.100*
Auditory word	Exp. Con.	39.16±14.91 29.33±11.94	*0.236*
Repetition	Exp. Con.	47.00±18.63 33.50±17.42	*0.224*
Naming word	Exp. Con.	40.66±12.17 24.50±13.91	*0.041**
Word fluency	Exp. Con.	1.66±.516 .833±.752	*0.049**
Responsive	Exp. Con.	.833±.408 .500±.547	*0.260*
Sentence	Exp. Con.	1.66±.516 1.66±.752	*0.209*

Level of significance= p<0.05, p<0.01**, p<0.001****

DISCUSSION

The aim of the study was to find out the effectiveness of visual action therapy and auditory comprehension therapy on Western Aphasic Battery (WAB) among the patients of Wernicke's Aphasia after stroke.

The with-in analysis showed significant improvement in visual action therapy (VAT) group, which enhanced the domains of fluency, auditory verbal, and repetitions. Therefore, visual action therapy (VAT), a non-verbal approach, was used to train patients for communication through gestures. The pre and post analysis showed improvement on subtests which measure pantomimic and sound-related perception abilities.[17]

Furthermore, the picture description on western aphasic battery (WAB) was also significantly improved after visual action therapy (VAT). A previous study conducted on Wernicke aphasic patient. And results showed significant improvement after visual action therapy. Additionally, VAT is effective for the improvement of communication skills through pictures in the patients of Wernicke's aphasia.[18]

While, within group comparison also showed significant improvement in auditory comprehension treatment (ACT) in terms of spontaneous speech, fluency, auditory verbal and word, sequential, sentence formation and repetitions. A study conducted by Knollman-Porter K et al. showed effectiveness of ACT in the patients with aphasia.[19]

However, in the present study between groups comparison showed improvement in the sequential commands, word formation, and auditory word in visual action therapy (VAT) group. A previous study supported the currents findings, that the visual action therapy was used for the Wernicke aphasic patients. And significant improvement had been observed in the formation of words, sentences and composition levels of the patients.[20, 21]

Moreover, in the current study between groups comparison showed significant improvement in naming word, fluency and spontaneous speech which was also in coherence with the previous study. The current findings of the study corresponded with the previous studies. In which conventional treatment was used for aphasic patients but no significant response was observed.[17] The visual action therapy was used for the Wernicke aphasic patients. And significant improvement had been observed in the formation of words, sentences and composition levels of the patients.[20, 21]

CONCLUSION

It was concluded that the visual action therapy (VAT) is more effective for Wernicke aphasic patients than auditory comprehension treatment (ACT). These findings provided us a direction that VAT and this type of treatment approaches must be used for management of Wernicke's aphasia. Further study should be conducted on large sample size so that generalization can be done with long-term follow-up must conducted to see level of improvement

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