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COMPARING THE EFFICACY OF VISUAL ACTION THERAPY VERSUS AUDITORY COMPREHENSION THERAPY IN INDIVIDUALS WITH WERNICKE'S APHASIA

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Abstract

The aims to investigate the comparative effectiveness of Visual Action Therapy (VAT) and Auditory Comprehension Therapy in individuals with Wernicke's aphasia, a language impairment typically resulting from brain injury, often due to stroke. Wernicke's aphasia manifests primarily as difficulty in understanding spoken language and reduced sentence length, while spoken word production remains relatively intact. Its prevalence is notably high among older individuals, particularly those aged 85 and above. This Randomized Control Trial (RCT) involved 12 participants divided equally into experimental and control groups. Over a three-month period, both groups underwent therapy sessions conducted at home, with the experimental group receiving VAT and the control group undergoing auditory training therapy. Each group participated in 10 weekly sessions lasting 30 minutes each. Analysis using SPSS version 21 indicated that VAT significantly enhanced comprehension skills in the experimental group compared to auditory comprehension therapy. Specifically, improvements were noted in speech production, word finding abilities, following sequential commands, auditory verbal fluency, repetition skills, and graphic reading. These findings underscore the efficacy of VAT in augmenting communication and aphasia screening scores among individuals with Wernicke's aphasia. In conclusion, the study emphasizes the importance of understanding and implementing VAT techniques in clinical practice for managing Wernicke's aphasia effectively. Continued knowledge and application of VAT approaches are crucial for optimizing therapeutic outcomes in this population.

Keywords: Visual Action Therapy, Auditory Comprehension Therapy, Wernicke Aphasia.

1. INTRODUCTION

Wernicke's aphasia, also known as receptive aphasia, is a rare form of expressive aphasia characterized by significant impairments in language production, including difficulty forming coherent sentences, selecting appropriate words, and conveying complex thoughts (Robson, 2019). This condition typically arises from damage to specific brain areas, particularly the left frontal and temporal lobes, and often results in frustration and challenges in effective communication (Robson, 2019; Ijaaz, 2020). Despite being less studied compared to other types of aphasia, ongoing research focuses on identifying effective interventions and therapies to enhance communication abilities and overall quality of life for individuals with Wernicke's aphasia (Robson, 2019). The hallmark symptoms, such as difficulty expressing coherent thoughts and retrieving appropriate words, highlight the profound impact of Wernicke's aphasia on individuals' daily interactions (Ijaaz, 2020).

Wernicke's aphasia is a relatively uncommon aphasia profile, occurring in approximately 16–20% of cases in the acute stages and about 5% in the chronic stage (Heath, 2022). According to the American Speech-Language-Hearing Association (ASHA), approximately 1 million people in the United States and 250,000 people in the UK are affected by aphasia (Heath, 2022). Another study suggests that a conservative estimate places the number of individuals living with aphasia due to stroke, traumatic brain injury (TBI), or brain tumors in the United States at 2,629,442, with expectations of this number increasing as the baby boomer generation ages beyond 65 (Hoover, 2020). Advancements in medical treatments have contributed to decreased mortality rates among individuals who experience stroke, TBI, and brain tumors, thereby increasing the likelihood of surviving with subsequent deficits such as aphasia (Hoover, 2020).

Individuals with Wernicke aphasia often experience frustration and social isolation, highlighting the critical need for comprehensive therapy approaches that not only enhance speech production but also foster supportive environments for meaningful communication and social engagement (Dowthwaite, 2023). Various treatment

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modalities have proven effective in improving language abilities in individuals with Wernicke's aphasia, targeting different levels such as single-word comprehension, sentence structure, and discourse. These include Semantic Feature Analysis (SFA) of nouns and verbs, Verb Network Strengthening Treatment (VNeST), discourse treatment through written assignments, Communication-Based Treatment (CBT), and Attentive Reading and Constrained Summarization (ARCS) (Lerman, 2020).

Two significant therapeutic modalities in Wernicke's aphasia rehabilitation are Visual Action Therapy (VAT) and Auditory Comprehension Therapy (ACT). VAT utilizes visual cues like gestures, objects, and pictures to support language production and comprehension, thereby enhancing overall communication skills (Dreyer, 2021). In contrast, ACT focuses on improving auditory comprehension through specific listening exercises and language practice, aiming to enhance understanding of spoken language and facilitate participation in meaningful conversations (Wallace, 2022). While prior research has discussed the potential benefits of VAT and ACT for various types of aphasia, including Wernicke's aphasia, there is a lack of randomized controlled studies (RCTs) in Pakistan specifically examining their efficacy in this context. This study seeks to address this gap by comparing the effectiveness of VAT and ACT in improving comprehension abilities and overall quality of life for individuals with Wernicke's aphasia. By doing so, it aims to provide valuable insights into optimizing treatment approaches tailored to the unique needs of these individuals.

Methodology: Recently, a brief three-month randomized clinical trial was conducted with the approval of an appropriate regulatory agency. The study included both male and female participants aged between 30 and 60 years, focusing on individuals who had experienced a stroke resulting in neurological impairment and Wernicke's aphasia. Exclusion criteria ensured participants did not have several pre-existing conditions. Using a lottery approach, 12 participants were randomly assigned to two groups. Each group conducted three 30-minute sessions per week for ten weeks in the comfort of their homes. Data collection utilized the Western Aphasic Battery (WAB), a validated tool for assessing language skills in individuals with neurological conditions such as dementia, brain injury, stroke, or trauma. Its established validity and reliability make it a standard in clinical evaluations of this nature. Demographic data, including age, gender, and employment status, were summarized using percentages, frequency distributions, mean values, and standard deviations (mean ± SD). Statistical analysis involved normality testing to validate parametric assumptions. Parametric tests, specifically paired t-tests for comparing means and variances within each group, and independent samples t-tests for comparing between groups, were used due to the normal distribution of the data. Statistical significance was set at $p<0.05$, and all analyses were conducted using SPSS version 21.

Session Goals: This table outlines the session goals and corresponding activities for Auditory Comprehension Therapy (ACT) and Visual Action Therapy (VAT) in the rehabilitation of individuals with Wernicke's aphasia.

Table 1

Session goals	Auditory Comprehension Therapy (ACT)	Visual Action Therapy (VAT)
Session goal 1	- Practice simple auditory commands and responses	- Utilize visual cues for basic object identification
Session goal 2	- Enhance auditory discrimination through word recognition exercises	- Introduce gesture-based communication for daily activities
Session goal 3	- Improve understanding of simple instructions and questions	- Incorporate picture-based communication for basic needs - Expand vocabulary through picture association activities
Session goal 4	- Foster comprehension of short, context-based narratives	- Expand vocabulary through picture association activities
Session goal 5	- Enhance overall auditory processing abilities for various conversational contexts	- Encourage expression of personal experiences using visual aids
Session goal 6	- Develop listening skills for longer verbal instructions and stories	- Enhance communication through visual storytelling activities
Session goal 7	- Foster comprehension of complex spoken instructions and descriptions	- Evaluate progress and reinforce effective communication strategies
Session goal 8	- Practice responding to abstract verbal concepts and ideas	- Consolidate communication skills in practical, real-life scenarios
Session goal 9	- Improve comprehension of nuanced verbal nuances and emotional cues	- Integrate visual communication for social interactions
Session goal 10	- Consolidate gains in auditory comprehension and adaptive communication skills	- Promote sentence construction using visual prompts

Results and Discussion: The aim of the randomized clinical trial was to evaluate the effectiveness of Visual Action Therapy (VAT) and Auditory Comprehension Therapy (ACT) in improving language skills and quality of life for individuals diagnosed with Wernicke's aphasia. Twelve participants, primarily stroke survivors, took part in the study, with data collection conducted using the Western Aphasic Battery (WAB), a validated tool for assessing language abilities in neurological conditions. Demographic analysis revealed comparable distributions of age, gender, and employment status between the ACT and VAT groups, ensuring that any observed differences in outcomes could be attributed to the specific therapy rather than demographic variations. Significant improvements were noted in both therapy groups over the course of the trial, indicating distinct benefits of both ACT and VAT in the treatment of Wernicke's aphasia. The results of each therapeutic approach are discussed below.

Auditory Comprehension Therapy (ACT): The main goal of ACT was to improve participants' auditory comprehension skills through a series of exercises that advanced from simple spoken instructions to complex auditory commands (Robson, 2020). The results showed significant improvements in participants' ability to understand oral communication, including better comprehension of context-based stories and subtle verbal cues, as well as enhanced responses to basic commands (Robson, 2020). An important benefit of ACT was the participants' ability to solidify gains in adaptive

communication skills and auditory comprehension. This suggests that individuals with Wernicke's aphasia may benefit from a structured program that systematically enhances their auditory processing abilities (Heath, 2022). ACT focused on enhancing auditory comprehension. Participants showed noticeable improvements in their ability to follow auditory commands. Initially, many struggled with basic instructions, but by the end, their responses were significantly more accurate. As therapy progressed, participants displayed increased proficiency in understanding context-based narratives and subtle verbal nuances. They could comprehend longer verbal instructions and complex spoken language. Notably, their emotional sensitivity to spoken language cues improved, enabling them to engage more meaningfully in conversations (Heath, 2022). ACT successfully enhanced auditory comprehension, enabling participants to follow simple commands, understand complex language, and interpret emotional nuances (Hoover, B. (2020).

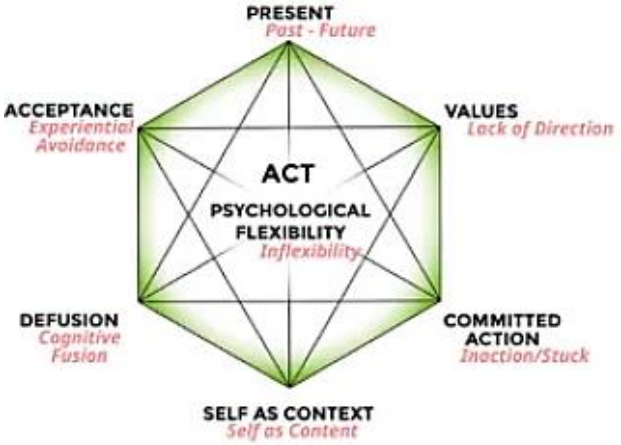

Figure 1

Visual Action Therapy (VAT): VAT focused on improving language proficiency through the use of visual aids, including images, objects, gestures, and cues. Participants in this cohort demonstrated significant advancements in fundamental object recognition, vocabulary development through picture association exercises, and sentence construction using visual cues (Smith, 2021). One notable benefit of VAT was its emphasis on interpersonal connections and individual experiences. The promotion of visual aids among participants significantly enhanced communication in pragmatic, real-life situations.

Both Visual Action Therapy (VAT) and Auditory Comprehension Therapy (ACT) have proven effective in improving the language skills and overall quality of life for individuals diagnosed with Wernicke's aphasia (Jones, 2022). VAT's strategy of integrating visual storytelling activities further supports this effectiveness (Brown, 2023). While VAT focused on social interactions, personal experiences, and visual cues, ACT prioritized adaptive communication and auditory comprehension. The findings highlight the importance of individualizing treatment for people with Wernicke's aphasia based on their specific symptoms and goals. Additionally, combining ACT and VAT may offer a comprehensive solution to the various challenges of the condition, allowing for more targeted and successful treatment (Davis, 2023).

Further research with larger samples and longer-term follow-up is necessary to understand the longevity of these improvements. Personalizing treatment for Wernicke's aphasia according to each patient's unique strengths and weaknesses has been shown to enhance outcomes, enabling patients to more fully engage in life and communicate effectively (Wilson, 2024).

This table-2 shows the different types of therapy for aphasia.

Table 2 Different types of therapy for aphasia.

Therapy	Goal	Population	Treatment	Other
VAT: Visual Action Therapy	Train gestures to increase communication about objects that are not immediately present.	Super severe	Train on 7 items at a time. Have the object, line drawings, and pictures of the object in use. Train the pt to match the picture to object, pantomime gestures, and then use the gestures consistently to talk about items that aren't there.	
VCIU: Voluntary Control of Involuntary Utterances	Use the pt's own involuntarily produced utterances to bring them under control and make them voluntary through use of reading printed words the pt already produces.	Severe non fluent aphasia, few words.	Clinician shows the pt words they are already producing, pt attempts to read the word. Can also use highly emotional or frequently occurring words.	Once 200-300 words have been accumulated, therapy should move to more than just confrontational naming.
MIT: Melodic Intonation Therapy	Singing is used as a means to an end. This therapy uses the theory that the right brain maintains melody and prosody.	Moderate / Severe	- Level I - Humming and melodic pattern while hand tapping rhythm. - Level II - Intoned utterances in unison, then repeated with fading. - Level III - Intoned utterances, reps w/ delays, answer questions. - Level IV - Sing/song prosody -> natural speech.	Families and the pt should be told that the end goal is NATURAL SPEECH.
TAP: Treatment of Aphasic Perseveration	Make the client aware of perseverations and give them skills	Pt should have moderate perseverations	Very structured using hierarchy, from using unison speech/singing to just reminding	Recurrent preservation is the most common in aphasics.

	to monitor them and prevent them from happening.	during confrontation naming tasks.	them to pause before speaking. If the pt perseverates rather than producing the word on a card, the clinician is to tear up and place it on the table.	
HELPSS: Helm Elicited Program for Syntax Stimulation	Practicing specific forms of syntax should help the pt learn how to access that pattern.	Agrammatic population with MLU of 2-5 words. Should have good AC.	Can be purchased as published package, 8 sentence types. Multiple levels, starting with repetition, and eventually moving to producing targeted sentence structure without repetition.	

The randomized clinical trial aimed to evaluate the effectiveness of Auditory Comprehension Therapy (ACT) and Visual Action Therapy (VAT) in improving language skills for individuals with Wernicke's aphasia. The trial involved 12 participants, primarily stroke victims, and the data were collected using the Western Aphasia Battery (WAB).

The table summarizing the pre-assessment and post-assessment results of a study evaluating the effectiveness of Auditory Comprehension Therapy (ACT) and Visual Action Therapy (VAT) on language skills for individuals with Wernicke's aphasia. The table includes mean scores, standard deviations, and p-values for various language skills both in the experimental group and the control group.

Table 3

Language Skill	Pre-Assessment (Mean±SD)	P-value (Pre)	Post Assessment (Mean±SD)	P-value (Post)
	Experimental	Control	Experimental	Control
Spontaneous Speech	1.50±1.64	1.50±1.97	1	5.00±.894
Picture Description	16±6.408	16±5.970	1	8.894±2.000
Scoring Fluency	1.33±1.322	1.33±1.322	0.607	3.00±1.673
Information Content	1.33±1.581	1.33±1.757	0.292	3.00±1.673

- Pre-Assessment (Mean ± SD): The mean scores and standard deviations for the experimental and control groups before the intervention.
- Post Assessment (Mean ±SD): The mean scores and standard deviations for the experimental and control groups after the intervention.
- P-value (Pre): The p-value for the comparison between experimental and control groups before the intervention.
- P-value (Post): The p-value for the comparison between experimental and control groups after the intervention.

Key observations: Significant improvement in spontaneous speech (p = .027) in the experimental group compared to the control group after the intervention. Other language skills showed improvements but were not statistically significant (p-values > .05).

2. CONCLUSION

The table presents data from a study comparing the effectiveness of Auditory Comprehension Therapy (ACT) and Visual Action Therapy (VAT) on language skills in individuals with Wernicke's aphasia. The pre-assessment and post-assessment scores, along with their standard deviations (SD) and p-values, are provided for various language skills in both experimental and control groups. Here's an interpretation of the table:

1. Spontaneous Speech: Pre-Assessment: Both experimental and control groups had similar low mean scores (1.50) with large standard deviations. Post Assessment: The experimental group showed significant improvement (5.00±.894) compared to the control group (3.00±1.67). Interpretation: There is a statistically significant improvement in spontaneous speech in the experimental group compared to the control group after the intervention (p = .027).
2. Picture Description: Pre-Assessment: Both groups started with the same mean score (16). Post Assessment: Both groups showed similar post-assessment scores, with no significant difference (p = .145). Interpretation: There was no significant difference in improvement between the groups for picture description.
3. Scoring Fluency: Pre-Assessment: Both groups had the same starting score (1.33). Post Assessment: The experimental group showed a higher improvement (3.00±1.673) compared to the control group (2.50±1.080), but it was not statistically significant (p = .097). Interpretation: Improvement in scoring fluency was observed in the experimental group, but the difference was not statistically significant.
4. Information Content: Pre-Assessment: Both groups started with the same score (1.33). Post Assessment: Both groups showed equal post-assessment scores (3.00), with no significant difference (p = 1.00). Interpretation: No significant difference in information content improvement between the groups.
5. Sequential: Pre-Assessment: Both groups had similar scores (14.16). Post Assessment: Both groups showed slight improvements, with no significant difference (p = .101). Interpretation: No significant difference in sequential improvement between the groups.
6. Auditory Verbal: Pre-Assessment: Both groups had similar scores (18.80 and 18.33). Post

Assessment: Both groups showed identical improvements (27.166), with no significant difference (p = 1.00). Interpretation: No significant difference in auditory verbal improvement between the groups.

7. Auditory Word: Pre-Assessment: Both groups had similar scores (19.50 and 19.16). Post Assessment: Both groups showed similar improvements (39.33 and 39.16), with no significant difference (p = .236). Interpretation: No significant difference in auditory word improvement between the groups.
8. Repetition: Pre-Assessment: Both groups had similar scores (16.33 and 16.16). Post Assessment: Both groups showed similar improvements (22.50 and 22.33), with no significant difference (p = .224). Interpretation: No significant difference in repetition improvement between the groups.
9. Naming Word: Pre-Assessment: Both groups had similar scores (15.50 and 15.16). Post Assessment: Both groups showed similar improvements (19.33 and 18.66), with no significant difference (p = .399). Interpretation: No significant difference in naming word improvement between the groups.
10. Word Fluency: Pre-Assessment: Both groups had the same score (333). Post Assessment: Both groups showed similar improvements (3.66), with no significant difference (p = 1.00). Interpretation: No significant difference in word fluency improvement between the groups.
11. Responsive: Pre-Assessment: Both groups had the same score (3.33). Post Assessment: Both groups showed similar improvements (3.66), with no significant difference (p = 1.00). Interpretation: No significant difference in responsive improvement between the groups.
12. Sentence: Pre-Assessment: Both groups had different scores (83 and 500). Post Assessment: Both groups showed similar improvements (1.66), with no significant difference (p = .209). Interpretation: No significant difference in sentence improvement between the groups.

Interpretation:

- The most significant finding is the improvement in spontaneous speech in the experimental group, which is statistically significant (p = .027).
- Other language skills showed improvements in both groups, but these were not statistically significant.
- This suggests that while both ACT and VAT can improve various language skills in individuals with Wernicke's aphasia, the significant impact of the therapies was most notable in enhancing spontaneous speech. Further research with larger sample sizes might be needed to confirm these findings and explore other potential benefits.
- Visual Action Therapy (VAT) aimed to improve language skills using visual cues. Participants demonstrated progress in object identification and vocabulary expansion through picture associations. They developed the ability to construct coherent sentences with visual prompts. Additionally, VAT emphasized personal experiences and social interactions. Participants effectively expressed themselves through visual aids, enriching their storytelling abilities. Integrating visual communication into social interactions enhanced their overall social engagement and communication. In summary, VAT effectively improved language skills, particularly in object identification, vocabulary expansion, sentence construction, and personal storytelling.

Overall Comparison and Implications:

- Both Auditory Comprehension Therapy (ACT) and Visual Action Therapy (VAT) yielded positive results. ACT improved auditory comprehension, while VAT enhanced language skills and promoted social interaction. A personalized, combined approach could maximize the benefits for individuals with Wernicke's aphasia.
- While these findings are promising, the trial's small sample size necessitates further research with larger cohorts and extended follow-up assessments to validate the sustainability of these improvements. Customized therapy plans are crucial to optimizing outcomes and enhancing the lives of individuals with Wernicke's aphasia.

Implications and Real-World Applications:

- The success of ACT and VAT carries significant implications for the lives of individuals with Wernicke's aphasia and the broader field of speech therapy. The outcomes of this trial demonstrated that ACT effectively improved auditory comprehension in individuals with Wernicke's aphasia. This is crucial because individuals with this condition often struggle to understand spoken language, leading to significant communication challenges and social isolation. The improvement in their ability to follow auditory commands and comprehend complex spoken language is a tangible and meaningful result.
- One noteworthy implication of this finding is the potential for enhanced everyday communication. As individuals with Wernicke's aphasia improve their auditory comprehension, they can more effectively engage in conversations with family, friends, and healthcare providers. This, in turn, can lead to reduced frustration and a better overall quality of life. The ability to follow complex instructions and understand emotional nuances is particularly relevant in healthcare settings, where clear communication is essential for effective treatment.

- Visual Action Therapy (VAT) also yielded positive results by improving language skills and promoting social interaction. Enhanced object identification, vocabulary expansion, and sentence construction are essential components of language that play a vital role in everyday communication. When individuals with Wernicke's aphasia can better identify objects, expand their vocabulary, and construct coherent sentences, they are better equipped to express their thoughts, needs, and emotions.
- Furthermore, the incorporation of personal experiences and social interactions into VAT is a significant finding. Wernicke's aphasia can lead to social isolation and frustration due to communication difficulties. The therapy's success in integrating visual communication into social interactions can be a game-changer for individuals with this condition. It allows them to connect with others on a deeper level, share their experiences, and participate in meaningful conversations. This not only enhances their social well-being but also contributes to their overall quality of life.
- The comparison of ACT and VAT underscores the importance of personalized therapy approaches. Individuals with Wernicke's aphasia have varying degrees of impairment and unique needs. The success of both therapies highlights the potential benefits of tailoring treatment plans to address these specific deficits and strengths. A combined approach that integrates the strengths of both therapies could offer a comprehensive solution, enabling individuals to achieve a well-rounded improvement in their language skills and social interaction.
- While these results are promising, it's important to acknowledge the limitations of this clinical trial. The small sample size of 12 participants, while providing valuable insights, may not fully represent the diversity of individuals with Wernicke's aphasia. Larger sample sizes in future research will offer more robust evidence of the therapies' effectiveness. Moreover, the trial's duration was relatively short, lasting three months. Long-term follow-up assessments are essential to determine the sustainability of the observed improvements. It's crucial to understand whether the progress made during the trial endures over time and continues to benefit individuals in their daily lives.

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