Original Article

Comparison of Traditional Articulation Therapy and Picture Articulation Test in Children with Articulation Disorders

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ABSTRACT

Background: Articulation disorders in children can impede communication and social interaction. Traditional Articulation Therapy (TAT) and the Picture Articulation Test (PAT) are two contrasting approaches employed to address these disorders. While TAT is a conventional method focusing on sensory-perceptual training and sound stabilization, PAT uses visual aids to assess and encourage correct speech sound production.

Objective: The study aimed to evaluate and compare the efficacy of TAT and PAT in treating substitution errors in children with articulation disorders.

Methods: Employing a randomized sampling technique, the study included 10 children with functional articulation disorders, aged 8 to 18 years, from both genders. Exclusion criteria included organic articulation disorders. Participants were divided into two groups at REX Medical Center, Lahore, and treated over a six-month period, with two sessions per week lasting 30-40 minutes. Pre- and post-intervention assessments were conducted using the Articulation Assessment Test and the Articulation Severity Rating Scale. Data analysis was performed using SPSS 24, with paired and independent sample t-tests.

Results: TAT showed a significant reduction in substitution error scores from pre- to post-intervention across all error types (initial, middle, and final), with significant p-values indicating improvement ($p \leq 0.05$). PAT did not demonstrate a significant reduction in error scores, with p-values exceeding the threshold of significance.

Conclusion: TAT was found to be more effective than PAT in decreasing substitution errors in children with articulation disorders. The findings advocate for the application of TAT in clinical settings, while recognizing the potential for integrating traditional methods with newer technologies to optimize treatment outcomes.

Keywords: Articulation Disorders, Traditional Articulation Therapy, Picture Articulation Test, Speech Therapy, Paediatric Speech Sound Disorders

INTRODUCTION

Articulation, a vital component of communication, involves the transformation of thoughts, ideas, and feelings into speech sounds, forming words, phrases, and sentences (1, 2). Articulation disorders, characterized by persistent speech errors beyond the typical developmental age for certain sounds, are marked by limited sound production abilities (3-5). These disorders manifest in various ways, including slurred or vague verbal communication and the substitution of sounds. Treatment typically involves speech therapy, encompassing exercises to strengthen speech muscles, pronunciation practice, and speech drills aimed at enhancing clarity of expression (6-8).

In the realm of speech therapy, traditional articulation therapy and the Picture Articulation Test (PAT) are notable methods used in addressing articulation disorders in children (9, 10). Traditional articulation therapy involves a comprehensive approach, including sensory perceptual training for sound discrimination, voice training for sound acquisition, stabilization exercises to integrate sounds into syllables, words, phrases, and sentences, and maintenance of these acquired sounds (11-13). Conversely, the PAT, designed

specifically for assessing children's articulation abilities, utilizes 72 color photographs and 9 images across 8 sheets (14-16). This tool is instrumental in the pre-evaluation stage of speech therapy, employing photographs to test defined consonants at initial, middle, and final positions. Speech-language pathologists manually evaluate the children's utterances, classifying them into categories like correct, distorted, omitted, substituted, or added sounds (17, 18).

Literature review reveals various approaches and practices in the field of speech therapy. A study examining international and Middle Eastern clinical practices found similarities in the use of auditory discrimination, traditional articulation therapy, phonological awareness, minimal pairs, and language intervention strategies for children with speech sound disorders (19, 20). A 2021 study involving interviews with 11 Speech & Language Pathologists highlighted four primary therapies: minimal pairs approach, traditional articulatory approaches, auditory discrimination, and Cued Articulation. This study emphasized the need to tailor these therapies to the individual child and their family preferences (19). Furthermore, a study at the Hamza Foundation Academy for Deaf in Lahore, Pakistan, compared linguistic-based therapy with traditional articulation therapy in children with mild to severe hearing loss (10). This study indicated a slight preference for linguistic-based therapy over traditional articulation therapy.

The primary objective of this study is to systematically compare and evaluate the effectiveness of Traditional Articulation Therapy and the Picture Articulation Test (PAT) in treating children with articulation disorders (21, 22). Given the diverse methodologies and approaches in speech therapy, this research aims to provide insight into the efficacy of these two prevalent methods. By analyzing their impact on improving articulation skills in children, the study seeks to offer evidence-based guidance for speech-language pathologists in selecting the most effective treatment strategy tailored to individual needs. This comparison is essential to enhance therapeutic outcomes and optimize speech therapy practices for children facing articulation challenges.

MATERIAL AND METHODS

In this interventional study, a randomized sampling technique was employed, utilizing a coin toss method to select children with articulation disorders (23). A total of 10 children were included in the sample. Conducted over a six-month period, the study focused on children aged between 8 to 18 years, encompassing both genders. The inclusion criterion was specifically children with functional articulation disorders, while those with organic articulation disorders were excluded (24, 25).

Data collection took place at REX Medical Center in Lahore. Following the acquisition of consent, children diagnosed with articulation disorders were divided into two groups. Each child underwent an initial assessment using the Articulation Assessment Test and the Articulation Severity Rating Scale to measure the severity of their articulation errors (17, 24).

The study then applied two different therapeutic approaches. Traditional articulation therapy was administered to one group, while the other group received picture articulation therapy. Both therapies were conducted over a period of three months, with the children attending two sessions per week, each lasting between 30 to 40 minutes. Upon completion of the therapies, a post-intervention assessment was conducted to evaluate the effectiveness of both interventions.

For the analysis of the data, SPSS version 24 statistical software was utilized. To determine the significance of the changes observed between the pre- and post-intervention scores in Traditional Articulation Therapy (TAT) and Picture Articulation Therapy (PAT), a paired sample t-test was conducted. Additionally, an independent sample t-test was employed to assess the interaction effect between TAT and PAT. The threshold for statistical significance in both tests was set at a p-value of ≤0.05. This methodological approach aimed to provide a robust and standardized framework for assessing the efficacy of these two articulation therapy techniques in children with articulation disorders.

RESULTS

The bar graph presents a comparison of error scores between Traditional Articulation Therapy (TAT) and Picture Articulation Therapy (PAT) across six types of articulation errors. The errors are categorized as Preinitial, Premiddle, Prefinal, Postinitial, Postmiddle, and Postfinal. For Preinitial errors, TAT shows a higher error score (5.56%) compared to PAT (3.33%). In Premiddle errors, both therapies have an identical error score of 6.67%. The Prefinal errors depict a slight advantage for PAT (5.56%) over TAT (6.11%). Notably, PAT outperforms TAT in the Postinitial, Postmiddle, and Postfinal errors with scores of 1.11%, 3.33%, and 2.22% respectively, as opposed to TAT's consistent error score of 6.67% across these categories. The graph indicates that PAT is generally associated with lower error scores in post-articulation positions, suggesting it may be more effective in reducing errors in these areas compared to TAT.
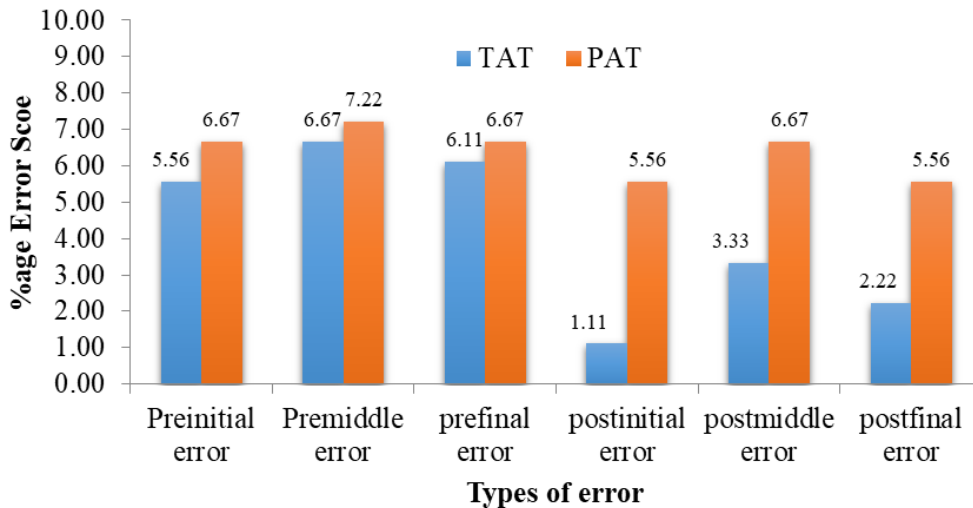
Figure 1 Mean percentage substitution error score obtained in TAT and PAT

In Table 1, the results from a paired sample t-test demonstrate significant improvements in substitution error scores following Traditional Articulation Therapy (TAT). For initial sounds, the mean pre-initial score was 5.56 with a standard deviation (SD) of 1.95, which significantly decreased to a mean post-initial score of 1.11 (SD = 1.52), yielding a t-value of 6.53 (df = 4, p = 0.003). Middle sounds showed a reduction from a pre-middle mean score of 6.67 (SD = 2.49) to a post-middle mean score of 3.33 (SD = 1.24), with a t-value of 3.21 (df = 4, p = 0.03). Final sounds exhibited a decrease from a pre-final mean of 6.11 (SD = 1.24) to a post-final mean of 2.22 (SD = 1.21), with a t-value of 5.72 (df = 4, p = 0.05). The total scores for TAT indicated a substantial decrease from a pre-total mean of 25 (SD = 7.08) to a post-total mean of 6.67 (SD = 3.17), with a t-value of 8.82 (df = 4, p = 0.01), suggesting a statistically significant improvement in articulation post-therapy.

Table 1: Significant testing of substitution error score obtained in TAT.

Paired sample t-test result of mean comparison scores of initials in TAT									
Initial scores	Pre-Initial			Post-Initial			95% confidence interval		t	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	5.56	1.95	5	1.11	1.52	5	2.56	6.33	6.53	4	0.003
Paired sample t-test result of mean comparison scores of middles in TAT									
Middle scores	Pre-Middle			Post-Middle			95% confidence interval		t	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	6.67	2.49	5	3.33	1.24	5	0.45	6.23	3.21	4	0.03
Paired sample t-test result of mean comparison scores of final in TAT									
Final scores	Pre-Final			Post-Final			95% confidence interval		t	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	6.11	1.24	5	2.22	1.21	5	2.00	5.78	5.72	4	0.05
Paired sample t-test result of TAT									
Total scores	Pre-Total			Post-Total			95% confidence interval		t	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	25	7.08	5	6.67	3.17	5	12.56	24.11	8.82	4	0.01
Level of significance: p≤0.001***& p≤0.05**									

Table 2 displays the results for Picture Articulation Therapy (PAT) using a paired sample t-test. The mean pre-initial score was 6.67 (SD = 1.52) with a non-significant reduction to a mean post-initial score of 5.56 (SD = 0.01), indicated by a t-value of 1.63 (df = 4, p = 0.18). Similarly, the mean pre-middle score of 7.22 (SD = 1.52) showed a non-significant decrease to a post-middle score of 6.67 (SD = 1.52), with a t-value of 1.00 (df = 4, p = 0.37). The mean pre-final score of 6.67 (SD = 1.52) also had a non-significant change to a post-final score of 5.56 (SD = 0.01), with a t-value of 1.63 (df = 4, p = 0.18). The total scores' comparison for PAT yielded a slight but non-significant decrease from a pre-total mean of 20.60 (SD = 4.09) to a post-total mean of 17.80 (SD = 1.09), resulting in a t-value of 1.60 (df = 4, p = 0.19), indicating that changes in articulation scores were not statistically significant post-therapy.

Table 2: Significant testing of substitution error score obtained in PAT

Paired sample t-test result of mean comparison scores of initials in PAT										
Initial scores	Pre-Initial			Post-Initial			95% confidence interval		T	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	6.67	1.52	5	5.56	0.01	5	-0.78	-3.00	1.63	4	0.18
Paired sample t-test result of mean comparison scores of middle in PAT										
Middle scores	Pre-Middle			Post-Middle			95% confidence interval		T	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	7.22	1.52	5	6.67	1.52	5	-0.99	2.09	1.00	4	0.37
Paired sample t-test result of mean comparison scores of final in PAT										
Final scores	Pre-Final			Post-Final			95% confidence interval		T	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	6.67	1.52	5	5.56	0.01	5	-0.78	3.00	1.63	4	0.18
Paired sample t-test result of PAT										
Total scores	Pre-Total			Post-Total			95% confidence interval		T	df	Sig. two tailed
	`Mean	SD	N	Mean	SD	N					
	20.60	4.09	5	17.80	1.09	5	-2.04	7.64	1.60	4	0.19
Level of significance: p≤0.001***& p≤0.05**										

Table 3: Significant testing of comparative score of both therapies used.

Post test score	TAT-therapy			PAT-therapy			95% confidence interval		t	df	Sig. two tailed
	Mean	SD	N	Mean	SD	N					
	6.8	2.95	5	17.8	1.10	5	-14.83	-7.18	-7.98	4	0.01
Level of significance: p≤0.001***& p≤0.05**										

Table 3 presents an independent sample t-test comparing the post-test scores of TAT and PAT. The mean post-test score for TAT was 6.8 (SD = 2.95) and for PAT was 17.8 (SD = 1.10). The 95% confidence interval for the difference between the means ranged from-14.83 to-7.18. The t-test yielded a t-value of-7.98 (df = 4), with a highly significant p-value of 0.01, indicating a statistically significant difference between the two therapies, with TAT showing a lower mean error score compared to PAT post-treatment.

DISCUSSION

The results of this study align with the existing research, which supports the effectiveness of conventional treatment methods in treating articulation disorders. Consistent with previous research, the current study indicates that traditional therapeutic interventions, when consistently implemented for a duration of three months, lead to notable enhancements in the articulation skills of children with functional speech-sound disorders. Uniform enhancements were noted in all areas, as children exhibited heightened precision in phoneme production, corroborating the findings of a prior investigation that affirmed the advantage of conventional therapy in this specific population.

Additional research provides further validation by comparing the results of computerised and conventional therapies in individuals with chronic, stable dysarthria. The creation of a computer programme, supported by a European Union initiative, confirms the claim that speech enhancements can be accomplished through both technologically sophisticated and conventional therapeutic methods.

Furthermore, the incorporation of conventional treatments alongside cutting-edge programmes like Boost Articulation Therapy (BArT) for individuals with dysarthria has demonstrated encouraging outcomes (26). By employing automated error detection techniques, preliminary implementations of BArT have demonstrated its effectiveness and positive reception as a valuable addition to traditional therapy. It improves the consistency and intensity of articulation training, thereby strengthening the impact of conventional approaches (5).

Furthermore, it is important to mention that although certain studies support the current findings by demonstrating the effectiveness of traditional methods, there are also differing viewpoints that argue in favour of a more customised approach. Due to the varying degrees of severity in articulation disorders and individual medical conditions, multiple studies suggest the use of customised therapeutic approaches. Among these options, the Linguistic Based Approach, phonological articulation therapy,

ultrasound visual biofeedback (U-VBF), and BArT have been proposed as modern alternatives that could potentially yield improved results in specific situations (27).

The current study highlights the efficacy of Traditional Articulation Therapy (TAT) (28) compared to the Picture Articulation Test (PAT) in treating substitution errors in children with articulation disorders (28). The data demonstrates that the implementation of TAT intervention resulted in substantial decreases in error scores across the initial, middle, and final positions. This establishes TAT as a more effective strategy for reducing substitution errors compared to PAT. These findings support the ongoing use and further exploration of conventional techniques in speech therapy, while also recognising the potential advantages of incorporating innovative, research-backed approaches customised to meet the specific needs of each patient (18-21).

CONCLUSION

In conclusion, the study's results indicate that Traditional Articulation Therapy (TAT) is more effective than the Picture Articulation Test (PAT) in reducing substitution errors among children with articulation disorders. The implications of these findings suggest that while newer, technology-based interventions have their place, TAT remains a robust option, particularly for the pediatric population facing substitution errors in speech. These outcomes not only reinforce the value of traditional speech therapy techniques but also highlight the importance of personalized treatment plans. Future research should explore the integration of traditional therapies with cutting-edge tools to enhance the efficacy and appeal of articulation therapy, ensuring that interventions are aligned with the evolving landscape of speech-language pathology and the diverse needs of individuals with articulation disorders.

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