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ASSESSMENT OF COMMON PLACEMENT AND MANNER ERRORS IN PATIENTS WITH ARTICULATION DISORDER

AVALIAÇÃO DE ERROS COMUNS DE POSICIONAMENTO E MANEIRA EM PACIENTES COM TRANSTORNO DE ARTICULAÇÃO

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Abstract
Background: Articulation disorders are common in children and refer to difficulties in producing speech sounds. These disorders often involve placement and manner errors that can impact speech intelligibility. Previous studies have explored these errors in various populations, but the prevalence and types of errors in children aged 3-12 years remain under examined, particularly in non-Western languages. Objective: The aim of this study was to assess the common placement and manner errors in children aged 3-12 years diagnosed with articulation disorders. Methods: A descriptive cross-sectional survey was conducted in government and private hospitals and rehabilitation centers. A total of 183 children

Resumo
Contexto: Os distúrbios de articulação são comuns em crianças e referem-se a dificuldades na produção de sons da fala. Esses distúrbios geralmente envolvem erros de posicionamento e maneira que podem afetar a inteligibilidade da fala. Estudos anteriores exploraram esses erros em várias populações, mas a prevalência e os tipos de erros em crianças de 3 a 12 anos ainda não foram suficientemente examinados, particularmente em idiomas não ocidentais. Objetivo: O objetivo deste estudo foi avaliar os erros comuns de posicionamento e maneira em crianças de 3 a 12 anos diagnosticadas com distúrbios de articulação. Métodos: Foi realizada uma pesquisa descritiva transversal em hospitais públicos e privados e centros de

were included through purposive sampling. Data was collected using an articulation screening tool, and statistical analysis was performed using SPSS version 25. Results: The most common placement error was alveolar (38.8%), followed by palatal (24.6%). Fricatives were the most frequent manner error (41.5%), and most errors occurred in the initial position of words (56.8%). Statistical analysis revealed significant associations between placement errors and age, and between manner errors and gender. Conclusion: The study identifies key articulation errors in children, with placement errors primarily involving alveolar and palatal sounds, and manner errors predominantly involving fricatives. These findings highlight the need for early intervention and targeted therapy to address these speech challenges.

Keywords: Articulation Disorder. Placement Error. Manner Error. Speech Sound Disorder. Children. Prevalence. Fricative Errors.

reabilitação. Um total de 183 crianças foram incluídas por meio de amostragem intencional. Os dados foram coletados usando uma ferramenta de triagem de articulação e a análise estatística foi realizada usando o SPSS versão 25. Resultados: O erro de posicionamento mais comum foi o alveolar (38,8%), seguido pelo palatal (24,6%). As fricativas foram o erro de maneira mais frequente (41,5%), e a maioria dos erros ocorreu na posição inicial das palavras (56,8%). A análise estatística revelou associações significativas entre erros de posicionamento e idade, e entre erros de maneira e gênero. Conclusão: O estudo identifica os principais erros de articulação em crianças, com erros de colocação envolvendo principalmente sons alveolares e palatinos, e erros de maneira envolvendo predominantemente fricativas. Esses achados destacam a necessidade de intervenção precoce e terapia direcionada para lidar com esses desafios da fala.

Palavras-chave: *Distúrbio de articulação. Erro de colocação. Erro de maneira. Distúrbio do som da fala. Crianças. Prevalência. Erros fricativos.*

1 INTRODUCTION

Articulation disorders are a significant subset of speech sound disorders, affecting the ability to produce speech sounds correctly. These disorders frequently occur in early childhood, often as a developmental variation, and can impair communication, leading to social, academic, and emotional challenges. Articulation refers to the precise movements of the speech organs, such as the tongue, lips, and teeth, required to produce specific speech sounds. These sounds can be classified into two broad categories based on their characteristics: placement errors and manner errors (Allen, 2022). Placement errors occur when the articulatory organs are positioned incorrectly during speech sound production, while manner errors arise from distortions in the airflow or vibration during sound articulation (Schneier, 2021).

In children with articulation disorders, these errors can significantly affect their speech intelligibility and overall language development. Articulation disorders are typically distinguished from other speech and language disorders because they do not involve structural abnormalities, hearing impairments, or motor deficits (Gósy & Horváth, 2015). As such, they represent a functional challenge in the speech production process, which can often be addressed with targeted therapeutic interventions. Previous studies have identified common errors such as substitutions, omissions, and distortions of speech sounds, but the prevalence and specific types of errors often vary depending on the population studied, the language spoken, and the methods used for assessment.

Several studies have highlighted the relationship between articulation errors and specific sound classes, with the most common placement errors being observed in alveolar and palatal sounds. Manner errors often involve fricatives, with fricative errors being reported as the most frequent manner issue in children with articulation disorders (Bybee & Easterday, 2019). Notably, these errors are commonly observed in early childhood, as children develop their speech sound systems. However, the trajectory of these disorders—how and when they resolve or persist remains a subject of interest, particularly in relation to the developmental stages of speech acquisition (Duffy, 2016).

Despite the considerable body of research on articulation disorders, there remains a gap in understanding the specific error patterns in different age groups and regions. Most studies focus on specific types of errors without addressing the broader spectrum of placement and manner errors across various developmental stages. Furthermore, few studies have comprehensively explored these errors in non-Western populations or in languages with different phonological structures. For example, while studies in English-speaking children have shown that fricative errors are frequent, similar research on children in Urdu-speaking populations is scarce (Cleland & Scobbie, 2021).

This study aims to fill this gap by investigating the most common placement and manner errors in children aged 3-12 years diagnosed with articulation disorders in Lahore, Pakistan. Given the importance of early diagnosis and intervention for children with speech disorders, the research seeks to provide a more detailed understanding of the error patterns in this population. Specifically, the study will assess the prevalence and distribution of errors across various sound placements (e.g., bilabial, alveolar, palatal) and manners (e.g., fricatives, stops, glides) to inform clinical practice and intervention strategies.

The research question guiding this study is: What is the most common placement and manner errors in children aged 3-12 years with articulation disorders, and how do these errors relate to their developmental stage? By answering this question, this study aims to contribute to the growing body of knowledge on speech sound disorders and provide insights into more targeted treatment approaches.

2 MATERIALS AND METHODS

This study employed a descriptive cross-sectional survey design to assess the prevalence of placement and manner errors in children with articulation disorders. The research was conducted in government and private medical hospitals as well as rehabilitation centers, ensuring a diverse and representative sample of children with speech impairments. Data were collected over a defined period from 25 July, 2023 to 25 January, 2024 allowing for consistent and controlled conditions during the study.

Participants in the study were selected through purposive sampling, a non-random technique that ensured the inclusion of children diagnosed with articulation disorders. A total of 183 children aged between 3 and 12 years participated in the study. This age range was chosen to capture a broad spectrum of developmental stages, as children's speech and articulation skills undergo significant changes during these years. Both male and female participants were included, with 54.1% (n=99) male and 45.9% (n=84) female. Children who met the inclusion criteria were those with confirmed articulation disorders, while those with structural abnormalities, hearing impairments, or congenital and acquired anomalies were excluded.

Informed consent was obtained from the parents or legal guardians of all participants. In addition to the signed consent forms, parents were provided with verbal instructions about the study's purpose and procedures. The children's medical and developmental histories were also recorded to ensure a comprehensive understanding of each participant's background.

The primary data collection tool was the Articulation Screening Tool, which assessed articulation errors through a list of 25 words in Urdu. This tool was selected for its established validity in assessing speech sound disorders in Urdu-speaking populations. The words in the list were chosen to represent a variety of sounds across different placements (bilabial, alveolar, palatal, etc.) and manners (stops, fricatives, glides, etc.). Each child was asked to pronounce the words during a one-on-one session with a trained speech-language pathologist. The clinician used a response sheet to record the articulation errors, noting the type (placement or manner) and position (initial, medial, and final) of each error.

To ensure reliability, all data were recorded by a single, trained clinician who filled out the Articulation Screening Performa for each participant. The clinician was blinded to the specific hypotheses of the study to minimize bias in data collection. Data collection was completed in a controlled environment within the medical or rehabilitation center, ensuring consistent conditions for each participant.

The data were subsequently analysed using SPSS version 25. Descriptive statistics were used to summarize the demographic characteristics of the participants, such as age and gender, as well as the frequency and types of articulation errors. For continuous variables, such as age, the mean, standard deviation, and range were calculated. Categorical variables, such as error types and positions, were analysed using frequency distributions and percentages. The study also calculated the confidence intervals for prevalence rates, ensuring that the estimates were statistically robust. Statistical significance for comparisons between groups (e.g., male vs. female, initial vs. final position) was assessed using appropriate tests, such as chi-square or Fisher's exact test.

Ethical considerations were an essential aspect of the study. The research adhered to the ethical guidelines set forth by [Institutional Review Board or Ethics Committee], ensuring that all procedures were conducted with respect for participant privacy and well-being. Confidentiality was maintained throughout the study, and all data were anonymized before analysis to protect the identities of the participants.

To ensure the reproducibility and integrity of the data, all study materials, including the Articulation Screening Tool, response sheets, and the Articulation Screening Performa, were made available for future research. Detailed records of the sampling process, data collection procedures, and statistical analysis were also documented, allowing for full transparency in the methodology.

3 RESULTS

A total of 183 participants, aged 3-12 years, were included in the study. The gender distribution of the sample was 54.1% male (n = 99) and 45.9% female (n = 84).

The following tables summarize the distribution of placement errors, manner errors, and the position of errors across the sample.

Table 1

Frequency of Placement Errors

Placement Error	Frequency (n)	Percentage (%)
Bilabial	5	2.7
Labiodental	27	14.8
Interdental	32	17.5
Alveolar	71	38.8
Palatal	45	24.6
Glottal	3	1.6

The **alveolar** error was the most common placement error, found in 38.8% (n = 71) of the participants, followed by **palatal** errors at 24.6% (n = 45). **Bilabial** and **glottal** errors were the least common, with 2.7% (n = 5) and 1.6% (n = 3), respectively.

Table 2

Frequency of Manner Errors

Manner Error	Frequency (n)	Percentage (%)
Stop/Plosive	41	22.4
Fricative	76	41.5
Affricate	45	24.6
Glide	21	11.5

The most frequent manner error was fricatives, observed in 41.5% (n = 76) of the participants, followed by affricates at 24.6% (n = 45). Glide errors were the least frequent, accounting for 11.5% (n = 21).

Table 3

Position of Articulation Errors

Error Position	Frequency (n)	Percentage (%)
Initial	104	56.8
Medial	43	23.5
Final	36	19.7

Most errors occurred in the **initial position** of words, with 56.8% (n = 104) of errors observed in this location. **Medial** errors were recorded at 23.5% (n = 43), and **final** position errors were the least common, at 19.7% (n = 36).

Figure 1

Age-Based Distribution of Placement and Manner Errors in Articulation Disorders

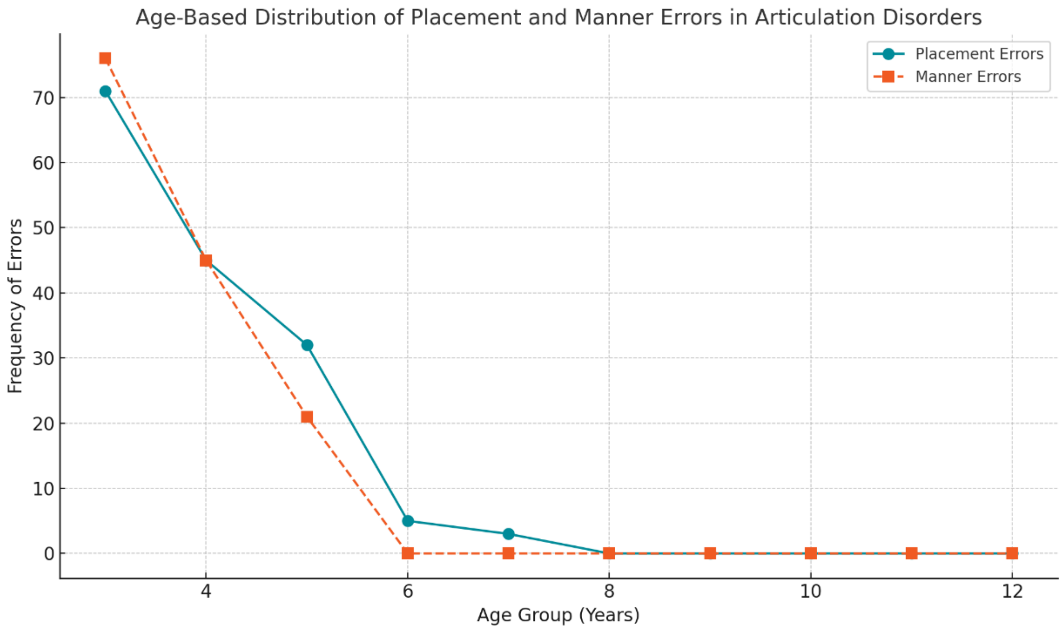

Figure 1 shows the integrated graph distribution of placement and manner errors across different age groups. The graph illustrates the frequency of these errors, highlighting the trend in placement and manner difficulties with age.

4 DISCUSSION

The present study aimed to investigate the prevalence and types of placement and manner errors in children aged 3-12 years diagnosed with articulation disorders. Our findings indicate that alveolar and palatal sounds are the most commonly misarticulated placement errors, while fricatives are the most frequent manner errors. These results align with previous research, which has highlighted the developmental nature of articulation disorders and the patterns of sound errors in children.

Placement errors, particularly in the alveolar and palatal categories, were the most prevalent, accounting for 38.8% and 24.6% of errors, respectively. This finding is consistent with the work of Wang et al. (2020), who identified alveolar errors as the most common placement errors in children with speech sound disorders. The prominence of alveolar errors may be attributed to the developmental sequence of speech sounds, as children often acquire bilabial and velar sounds earlier than alveolar and palatal sounds (Cleland & Scobbie, 2021). Alveolar errors, including sounds like /t/, /d/, /s/, and /z/, are often challenging for children, particularly those in the early stages of speech development. Moreover, palatal sounds, such as /ʃ/ and /ʒ/, are typically acquired later, which could explain why these errors are also frequent in the present study.

In terms of manner errors, the results revealed that fricative sounds were the most frequently misarticulated, observed in 41.5% of the participants. This is consistent with the findings of Boschetti et al. (2018), who also reported fricative errors as a common issue in children with functional articulation disorders. Fricative errors often occur due to difficulties in maintaining the necessary airflow and tongue positioning required for the accurate production of sounds like /f/, /v/, /s/, and /z/. These errors are particularly notable because fricatives are complex sounds that require precise articulation, and their difficulty may contribute to delayed speech intelligibility in young children (Brosseau-Lapré & Roepke, 2019). Interestingly, **affricates** were also commonly misarticulated, with 24.6% of the sample showing errors in sounds like /ʧ/ and /ʤ/, which further supports the idea that children struggle with more complex sounds as part of their developmental trajectory.

The results also showed that most errors occurred in the **initial position** of words, aligning with prior studies that suggest that early speech sound development is marked by greater difficulty in producing sounds at the beginning of words (Fox et al., 2002). This finding may reflect the developmental nature of speech sound acquisition, where children often master sounds in the initial position before successfully producing them in the medial and final positions (Cleland & Scobbie, 2021).

Our study also found significant associations between age and placement errors, with younger children showing more frequent placement errors. This trend aligns with previous research that has indicated a natural progression in speech sound acquisition as children age (Tung et al., 2013). It is worth noting that speech sound disorders are often transient, with many children outgrowing these errors as they develop (Flipsen Jr., 2015).

However, persistent errors in children aged 9-12 years may indicate the need for early intervention to address these ongoing difficulties.

Furthermore, the study revealed a significant gender difference in the frequency of fricative errors, with males exhibiting a higher incidence of these errors than females. This finding is consistent with several studies, including those by Wang et al. (2020), which have found that males are more likely to exhibit speech sound disorders, particularly fricative and other manner errors. Gender differences in speech sound development are well-documented, and some researchers suggest that males may experience a slower pace of speech sound acquisition compared to females (Wang et al., 2020).

This study contributes to the growing body of knowledge regarding speech sound disorders by highlighting specific placement and manner errors that are prevalent in a population of children aged 3-12 years. The findings emphasize the importance of early detection and intervention for children with articulation disorders, particularly those exhibiting difficulty with fricative and palatal sounds. Clinicians should be aware of the age-related patterns in these errors and use this information to tailor intervention strategies accordingly.

Additionally, the findings suggest that fricative errors should be a primary focus in therapeutic interventions for children with articulation disorders, especially in the early years. Given the complexity of fricative production, targeted therapies that address these errors could enhance speech intelligibility and promote better communication outcomes for children.

Study provides valuable insights into the prevalence and types of articulation errors in children with speech sound disorders. By examining placement and manner errors, as well as the relationship between these errors and age and gender, we have contributed to a deeper understanding of the challenges children face in speech sound acquisition. Future research should focus on longitudinal studies to track the progression of these errors over time and explore the efficacy of early intervention strategies in reducing articulation errors.

5 CONCLUSION

This study provides a comprehensive analysis of placement and manner errors in children aged 3-12 years with articulation disorders. The findings indicate that alveolar and palatal sounds are the most commonly misarticulated placement errors, while fricatives are the most frequent manner errors. Additionally, errors predominantly occur in the initial position of words, with younger children showing more frequent placement errors. The study also highlights significant gender differences, with males exhibiting more fricative errors than females. These findings underscore the importance of early diagnosis and intervention for children with articulation disorders. By identifying common error patterns and their relationship to age and gender, this study provides valuable insights that can guide clinicians in developing targeted speech therapy interventions. Further research, particularly longitudinal studies, is needed to explore the long-term outcomes of early intervention and to better understand the progression of these errors over time.

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Authors’ Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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