

ARTICULATION DISORDERS AND THEIR RELATION TO OROFACIAL STRUCTURES IN CHILDREN

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ABSTRACT

BACKGROUND: Speech sound disorders comprise of hassles in articulation and phonetics. Legible and meaningful sounds are produced by pronouncing syllables that have varied tonalities. A normal speech is a result of the physiological motions of the tongue's contact to the teeth, pressure exerted on the lips and the passage of airway that adds to the acoustics. In children with articulatory defects, the primary etiology can be the premature loss or absence of dental components. **AIM:** This study aimed to determine the relation between dental components and articulatory defects in children. **MATERIALS AND METHODS:** 60 children between the age of 6-11 years were divided into three age groups. Each group went through the Goldman Frisloe Test of Articulation. A speech therapy analyzed the articulating defects (substitution errors, omission errors, distortion errors, addition errors and normal words) whereas a pediatric dentist analyzed the dental components (missing anterior teeth, ankyloglossia, supernumerary teeth, restricted mouth opening). **RESULTS:** Statistical analysis with ANOVA revealed that children in the age range of 6-7 years had a significantly higher rate of substitution errors. Intergroup comparison with Cramer's V test revealed no significant correlation. **CONCLUSION:** Within the limitations of the study, no relationship can be drawn between articulation disorders and dental components.

Keywords: Speech Disorder, Articulation Disorders, Pediatric Dentistry, Orofacial Myotherapy, Supernumerary Teeth, Ankyloglossia

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INTRODUCTION

Speech may be defined as a complex psycho-physiological process for putting thoughts into words and organizing these words into a sequence with grammatical context. Speech sound disorders (SSD) include problems with articulation (making sounds) and phonological processes (sound patterns). An articulatory error is the atypical production of speech sounds that may interfere with intelligibility.

Children with articulatory defects have difficulty in saying certain vowels and consonants. These defects are divided into functional and organic disorders. Organic disorders include physical factors like cleft palate, hearing impairment and neurological dysfunction. Functional disorders are caused without any pathological conditions. These may lead to speech sounds to be omitted, substituted, distorted or added.

The teeth in conjunction with the lips and tongue, play an important role in the articulation of consonants by airflow obstruction and modification. Therefore, tooth position may play a role in articulatory speech disorders, which although not the most severe, represent 50% to 60 % of all speech disorders.¹

The present study was conducted to determine if any relationship existed between the articulatory errors and dental components in children visiting the dental operatory.

MATERIALS AND METHODS

An institutional ethics committee approval was obtained before the start of the procedure. The study was conducted in the Department of Pediatric and Preventive Dentistry of College of Dental Sciences and Research Centre, Ahmedabad, India.

The parents of the children were explained the purpose and protocol of the study in detail and those who volunteered to take part were given a consent form to sign. Children in the age group of 6-11 years visiting the outpatient department were selected for the study. A sample size of 60 children was decided upon following based on a beta-power analysis. All participants were divided equally into three age groups (6-7; 8-9; 10-11).

The selected children were given a pictorial hand-out which consisted of 30 pictures. The hand-out was prepared with the help of a qualified speech therapist using the Goldman Fristoe Test of Articulation (GFTA). All the pictures were supposed to be identified and said



out aloud and the same was recorded using a digital voice recorder. The data obtained was analysed by a speech therapist for the type of articulation error. The data given by the speech therapist was further passed blind to an independent statistician. The statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., version 19.0 for Windows).

RESULTS

The results of the study were formulated using the ANOVA test for the dependent variables and CRAMER’S V test for the independent variables. The five dependent variables were substitution error, omission error, distortion error, addition error and normal words. The independent variable was the dental component.

It was found that substitution error was highest in children in the age group of 6-7 years as compared to children in the older age groups. The statistical results showed that the normal words spoken by the child were significant in children in the age group of 6-7 and 8-9 year old.

Omission, distortion and addition errors however were statistically non-significant in either of the groups. The Cramer’s V test used to derive results for the dental components showed no statistical significance in the inter-group comparison.

Statistically significant results were seen with substitution type of error in 6-7 year old children. No statistically significant relationship was found between the dental component and the presence of articulatory error.

AGE GROUP	SAMPLE	MINIMUM	MAXIMUM	MEAN	SKEWNESS RATIO	PERCENTILE		
						P25	P50 (MEDIAN)	P75
6-7	20	0	10	4.65	0.43	2.25	4.5	6.75
8-9	20	0	5	1.85	1.43	1	2	2
10-11	20	0	10	2.65	2.43	0.25	2	4

Table 1 Showing Substitution Errors in Children



AGE GROUP (years)	FREQUENCY (%) OF PATIENTS' DENTAL COMPONENT STATUS		TOTAL
	YES	NO	
6-7	6 (30)	14 (70)	20 (100)
8 – 9	10 (50)	10 (50)	20 (100)
10-11	13 (65)	7 (35)	20 (100)
Total	29 (48.33)	31 (51.67)	60 (100)

Table 2 Showing Relationship to the Dental Component

Age Group (years)	Missing anterior Teeth	Ankyloglossia	Supernumerary Teeth	Restricted Mouth opening	Total
6-7	9	3	1	0	13
8-9	7	2	0	1	10
10-11	7	1	0	0	8

Table 3: Dental Component

DISCUSSION

The reported prevalence of language delay in children two to seven years of age ranges from 2.3% to 19%.² Severe speech and language disorders in young children can negatively affect later educational achievement, even after intensive intervention.³ Several studies have shown that children with speech and language problems at two and a half to five years of age have increased difficulty reading in the elementary school years.⁴⁻⁶

Children in whom speech and language impairments persist past five and a half years of age have an increased incidence of attention and social difficulties.⁷ Children with specific speech and language impairments at seven and a half to 13 years of age have been shown to



have impaired writing skills, with marked deficits in spelling and punctuation compared with children without speech and language impairments.⁸

This particular age group (6-11 years) was selected because it has been reported that most sound errors in preschoolers with SSDs resolve by 6 years of age; with the exception of errors involving rhotics and sibilants.⁹

Out of the six components necessary for development of normal speech (respiration, phonation, resonance, articulation, neurologic integration, and audition), articulation is the component most affected by the presence or absence of teeth.¹⁰ The ‘s’ and ‘z’ sounds in particular may be defective since their articulation necessitates developing a narrow air stream against the incisal edges of the anterior teeth. Studies have shown that loss of anterior teeth does affect articulation, especially of the s sound, but that many children manage to compensate and articulate the sounds correctly even when anterior teeth are missing.¹¹

In the present study, no statistically significant relationship was found between the dental component and presence of articulatory error. This result is in accordance with Riekman GA et al, who found that the premature loss of the four primary maxillary incisor teeth did not have any long-term effect on the speech development of most children whose speech was tested at ages 5.4-11.5 years.¹¹ They also stated that minor articulatory errors may occur if primary anterior extractions are performed in children younger than 3 years of age.

Gable et al also found that early loss of teeth had no long term effect on speech of children between three to five years of age.¹² Waggoner F William et al stated that loss of anterior teeth below 3 years of age does lead to articulatory errors in the speech. Hence prosthetic appliances must be given to these children who are yet to develop speech skills.¹³

In the present study, the dental component also included ankyloglossia. It has been previously observed that ankyloglossia does not prevent or delay the onset of speech. However, it does affect articulation.¹⁴ In such cases, children under the age of 12 years can significantly improve their tongue mobility and speech following a frenuloplasty procedure.¹⁵

CONCLUSION

While the present sample size is too small to draw specific conclusions, it is still intriguing that substitution type of articulatory error was found to be significant in young



children in the age group of 6-8 years. According to the results of this study, dental intervention is not advisable in children with articulatory errors as they are self-correcting.

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