



## COMORBIDITIES IN CHILDREN WITH FUNCTIONAL ARTICULATION DISORDER

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### ABSTRACT

**Background:** Articulation is crucial for effective communication, and articulation disorders can significantly impact verbal communication and language development. Despite its importance, there is limited research on the comorbidities associated with articulation disorders.

**Objective:** This study aimed to investigate comorbidities in children with functional articulation disorder.

**Methodology:** A descriptive cross-sectional study was conducted at the Department of Developmental Pediatrics, Children's Hospital, and the Institute of Child Health in Lahore, Pakistan. Sixty-five children aged 4 to 11 years diagnosed with articulation disorder participated in the study. Data was collected using a questionnaire filled out by parents or guardians at the hospital.

**Results:** The study revealed that 61.5% of the children had comorbidities, with stuttering (16.9%), enuresis disorder (10.8%), ADHD disorder (46.2%), language impairment (29.2%), tic disorder (4.6%), and ADHD disorder (46.2%) being the most prevalent. These findings underscore the significance of understanding and addressing comorbidities in children with articulation disorders.

**Discussion:** The study's findings are consistent with previous research indicating high rates of comorbidities in children with articulation disorders. The coexistence of articulation disorders with other conditions such as ADHD and language impairment highlights the complexity of diagnosing and treating these disorders. Early identification and intervention for comorbidities are essential for optimizing outcomes and providing holistic support to affected children.

**Conclusion:** This study provides valuable insights into the prevalence of comorbidities in children with functional articulation

disorder. The findings underscore the importance of comprehensive assessment and intervention to address the complex needs of these children.

**Keywords:** Articulation disorder, comorbidities, children, speech sound disorders, ADHD, language impairment.

**Introduction:** Articulation is a fundamental aspect of human communication, facilitating the conveyance of thoughts, emotions, and information through speech (Feldman & Messick, 2009). The formation of clear and distinct sounds in speech is the act of articulation. Articulators are the organs or physiological mechanisms that generate speech sound. It involves the precise coordination of various articulators within the oral cavity, including the lips, tongue, teeth, and palate, to produce speech sounds that form words and sentences. Articulation disorders, characterized by difficulties in producing speech sounds accurately, can significantly impede verbal communication, leading to social, academic, and professional challenges (Feldman & Messick, 2009).

Understanding the incidence, prevalence, diagnostic criteria, causes, risk factors, types of errors, diagnosis, treatment, prognosis, and comorbidities associated with articulation disorders is crucial for effective intervention and support for affected individuals (Feldman & Messick, 2009; American Speech-Language-Hearing Association [ASHA], 2016a; ASHA, 2016b).

The prevalence of speech sound disorders, including articulation disorders, varies widely, with estimates ranging from 2.3% to 24.6% among school-aged children (American Psychiatric Association [APA], 2013; Tomblin et al., 1997). Articulation disorder also persists post traumatic injuries such as TBI, Stroke and post neurological conditions. These disorders can persist into adulthood, affecting 1% to 2% of older children and adults (Feldman & Messick, 2009). Reports suggest a higher prevalence in boys compared to girls, with prevalence rates differing among racial and ethnic groups (APA, 2013).

Additionally, speech sound disorders often co-occur with language impairments, with estimates indicating comorbidity rates ranging from 11% to 40% (APA, 2013; Tomblin et al., 1997). This highlights the complex nature of articulation disorders and the need for comprehensive assessment and intervention (Feldman & Messick, 2009).

The DSM-5 outlines diagnostic criteria for articulation disorders, emphasizing persistent difficulty in speech sound production that interferes with intelligibility or verbal communication (APA, 2013). Symptoms typically manifest early in life and are not attributable to other medical or neurological conditions (APA, 2013).

Various factors contribute to the development of articulation disorders, including hearing loss, physical malformations of the oral cavity, neuromuscular disorders, developmental delays, and genetic predispositions (Feldman & Messick, 2009; APA, 2013). Early identification of risk factors such as gender, pre- and perinatal complications, family history, and persistent otitis media is crucial for intervention and support (Feldman & Messick, 2009; APA, 2013).

Articulation errors encompass substitutions, omissions, distortions, and additions of speech sounds, reflecting underlying difficulties in coordinating the movements of articulators during speech production (Feldman & Messick, 2009). Substitution occurs when a sound is replaced by another sound, omission occurs when a sound is omitted in a word and distortion is characterized by production of glottal sound in place of any sound. These errors can significantly impact verbal communication and language development (Feldman & Messick, 2009).

Speech-language pathologists (SLPs) play a critical role in diagnosing and treating articulation disorders (Feldman & Messick, 2009). They assess the individuals speech patterns, identify any errors or difficulties and develop personalized therapy plans to improve

articulation skills through exercises, technique and sometimes assistive devices. They also collaborate with other professionals and provide support to individuals and their families to enhance communication abilities and overall quality of life. Evaluation involves assessing the appearance, function, and mobility of articulators, as well as administering formal articulation assessments to identify error sounds (Feldman & Messick, 2009). Treatment strategies focus on systematic approaches, auditory discrimination tasks, visual modeling, oral motor practice, sensory activities, self-monitoring, airflow control, and various cues to facilitate proper articulator placement (Feldman & Messick, 2009; ASHA, 2016b).

The prognosis for articulation disorders depends on several factors, including the severity of the disorder, the underlying causes, the individual's age, and their response to therapy (Feldman & Messick, 2009). In many cases, with early intervention and appropriate speech therapy, individuals can significantly improve their articulation skills and communication abilities. However, some cases may require ongoing therapy and support. It's essential for individuals with articulation disorders to work closely with speech and language pathologists to address their specific needs and goals (Feldman & Messick, 2009).

Articulation disorders often coexist with other conditions such as language impairments, stuttering, enuresis, tic disorders, and ADHD (Feldman & Messick, 2009). Understanding these comorbidities is essential for comprehensive assessment and intervention, ensuring holistic support for affected individuals (Feldman & Messick, 2009).

Given the potential impact of comorbidities on the management and outcomes of articulation disorders, this study aims to investigate the prevalence of co-occurring conditions, including ADHD, tic disorders, enuresis, stuttering, and language impairment, in individuals with functional articulation disorders (Feldman & Messick, 2009). By elucidating the relationships between articulation disorders and comorbidities, this research seeks to inform clinical practice and enhance interventions tailored to the complex needs of affected individuals (Feldman & Messick, 2009).

**Method:** A descriptive cross-sectional This study aimed to investigate comorbidities in children with functional articulation disorder through an observational study. Using a consecutive sampling technique, a sample size of 65 participants was determined, including children aged 4 to 11 years diagnosed with articulation disorder. Exclusion criteria comprised participants who had received treatment related to articulation or were diagnosed with conditions other than articulation disorder. Data collection took place from August 2020 to July 2021 at the Department of Developmental Pediatrics at Children's Hospital and the Institute of Child Health Lahore. A questionnaire with 39 questions was designed after consultation with the supervisor to gather data. Parents or guardians filled out the questionnaire at the hospital. Prior to the main survey, the questionnaire underwent review by research experts to ensure alignment with study objectives. A pilot study involving 48 randomly selected participants was conducted to assess questionnaire validity. Pre-testing with 20 questionnaires was also carried out to finalize variable inclusion. Reliability of the questionnaire was determined using Cronbach's Alpha. Descriptive analysis was employed to summarize the data. The study's scope extends to medical professionals, occupational therapists, special education centers, and potential use by the Government of Pakistan to enhance healthcare facilities and services.

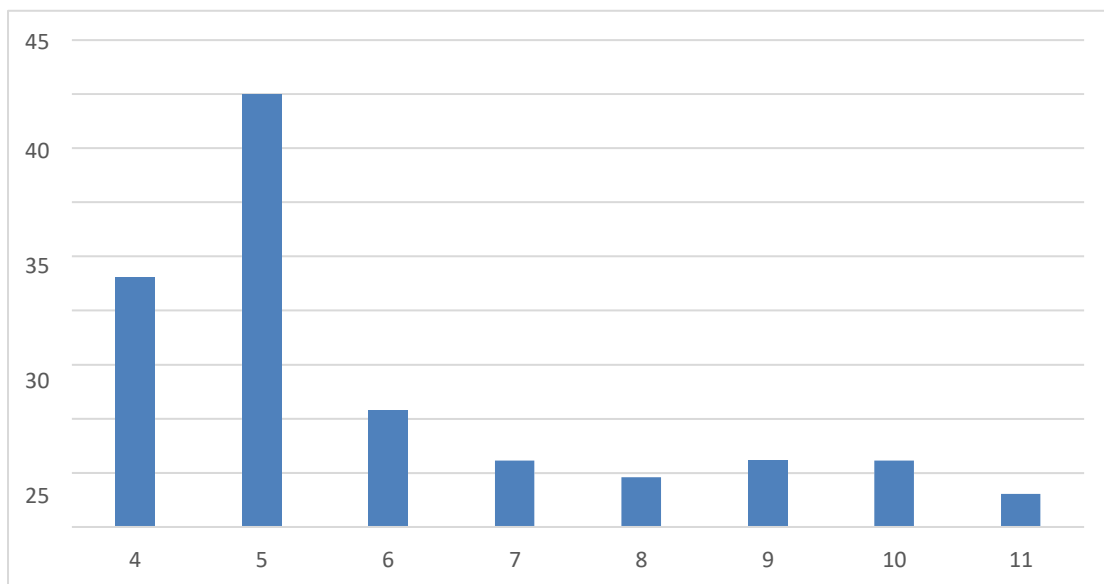
**Results:** This observational study based on 1 year duration and carried out at department of Development Paediatrics Children Hospital and Institute of child Health Lahore. This research was done to find out the Comorbidities in children with functional articulation disorder. 65 children diagnosed with articulation disorder participated in this study.

*Table 4.1 Frequency Distribution of respondent's age*

Ages	Frequency	Percent
4	15	23.1
5	26	40.0
6	7	10.76
7	4	6.153
8	3	4.61
9	4	6.15
10	4	6.15
11	2	3.07

Table 4.1 shows the Frequency Distribution of respondent's age it shows that out of 65 children 23.5% are of 4yr, 40.0% are of 5yr, 10.76% are of 6yr, 6.15% are of 7yr, 4.61% are of 8yr, 6.15% are of 9yr, 6.15% are of 10yr, 3.07% are of 11yr.

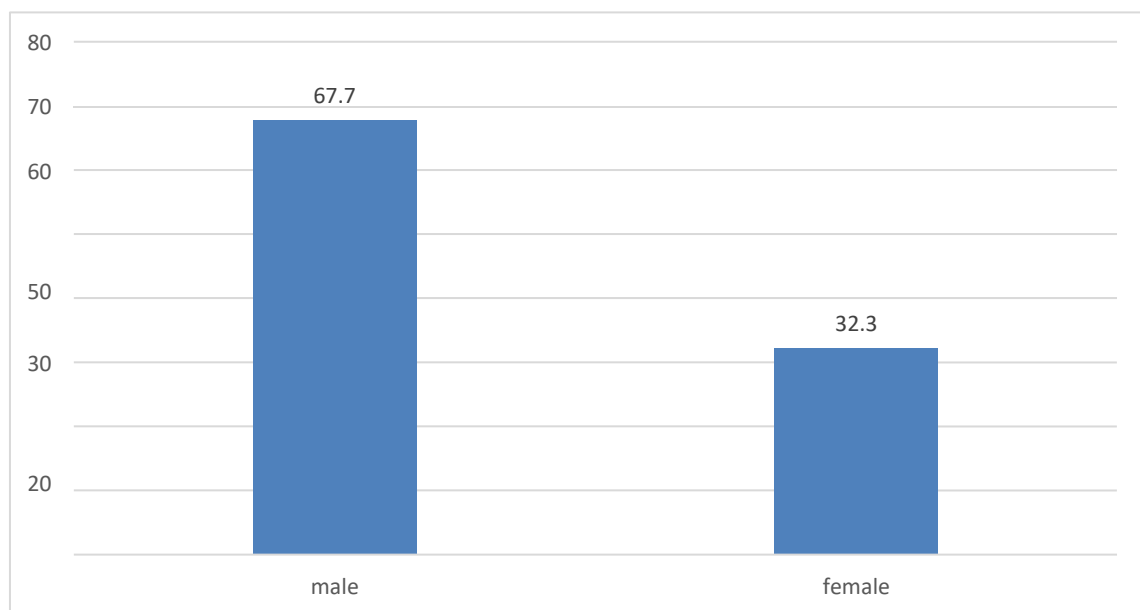
*Fig4.1 percentage distribution of respondent's age*



*Table4.2frequencydistributionofgender*

Gender	Frequenc y	Percent
Male	44	67.6
Female	21	32.30
Total	65	100

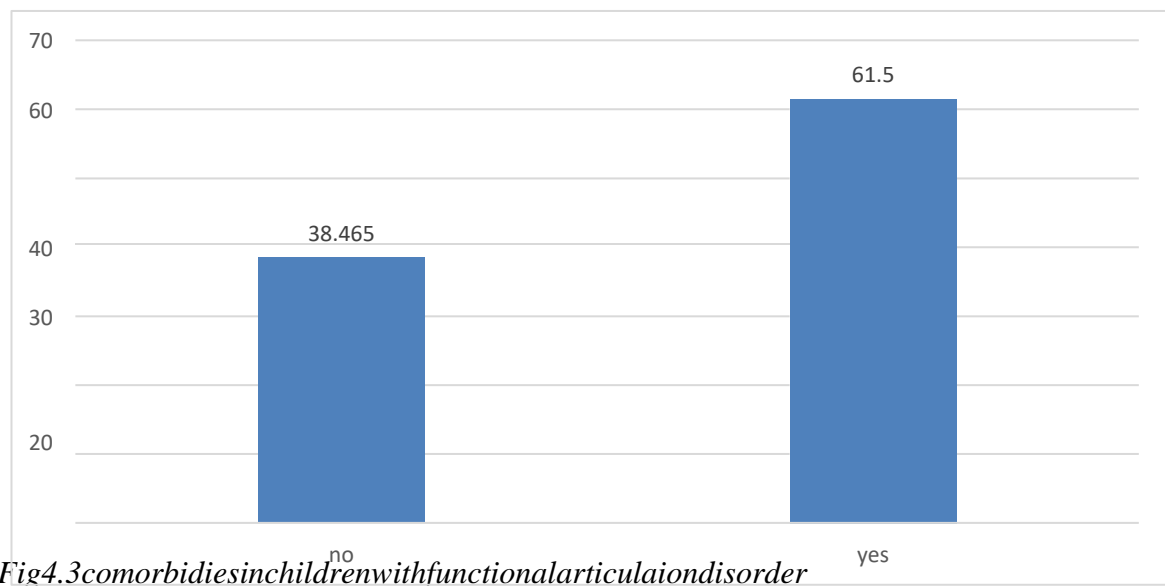
Table4.2 shows frequency distribution of gender it shows speech sound disorder are more prevalent in boys than in girls.

*Fig4.2percentagedistributionofgender*

*Table 4.3 Frequency distribution of comorbidities in children with functional articulation disorder*

Responses	Frequency	Percentage
No	25	38.46
Yes	40	61.5
total	65	100

Table 4.3 shows Frequency distribution of comorbidities in children with functional articulation disorder. Results show that out of 65 patients 40 (61.5%) patients have comorbidities and 25 (38.4%) patients have no comorbidity.

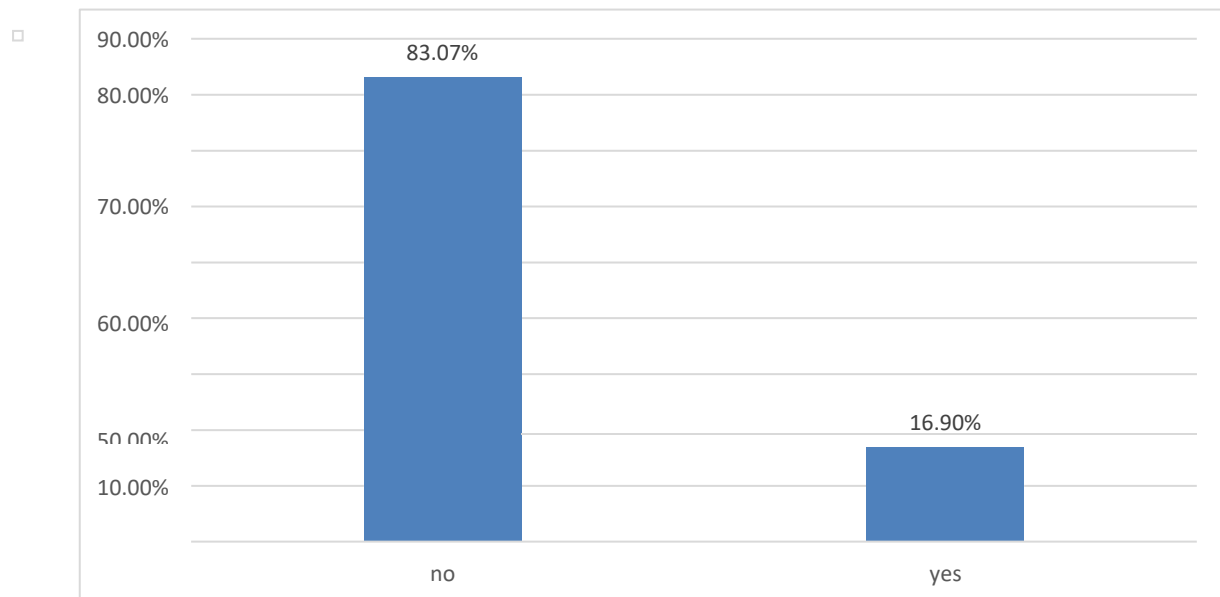


*Fig 4.3 comorbidities in children with functional articulation disorder*

*Table 4.4 Frequency distribution of stuttering in children with functional articulation disorder*

Responses	Frequency	Percentage
No	54	83.0
Yes	11	16.9
Total	65	100

Table 4.4 shows Frequency distribution of stuttering in children with functional articulation disorder. Results show that 11 (16.9%) patients show the stuttering and 54 (83.1%) show no stuttering.

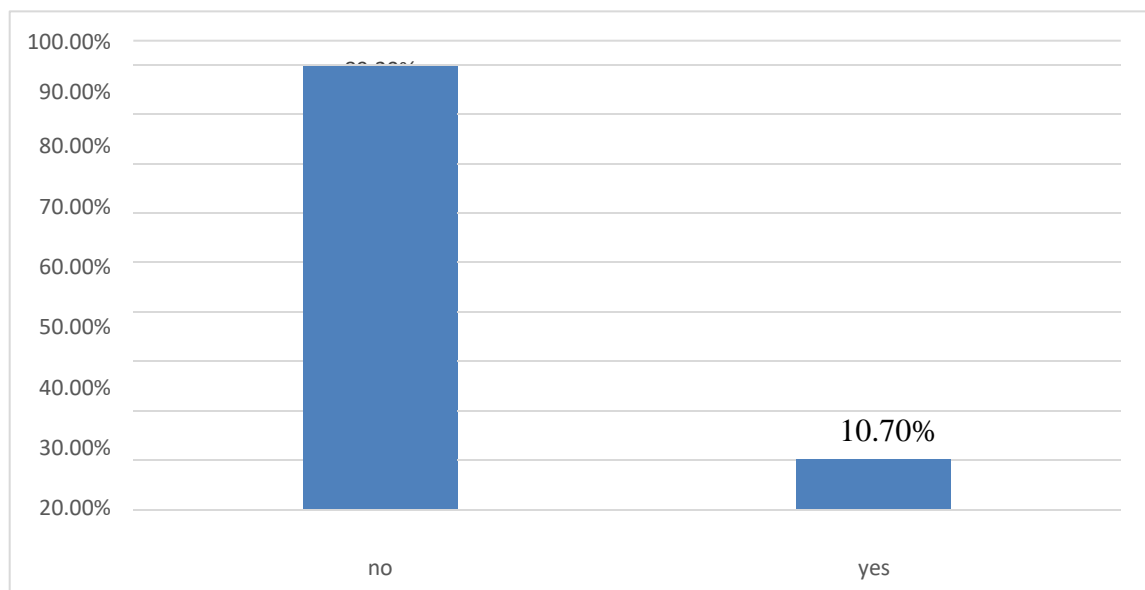


*Fig 4.4 coocurance of stuttering disorder in children with functional articulation disorder*

*Table 4.5 Frequency distribution of enuresis disorder in children with functional articulation disorder*

Responses	Frequency	Percent
No	58	89.2
Yes	7	10.7
Total	65	100

Table 4.5 show Frequency distribution of enuresis disorder in children with functional articulation disorder. Result shows that 7(10.8%) patients have enuresis disorder and 58(89.2%) have not enuresis disorder



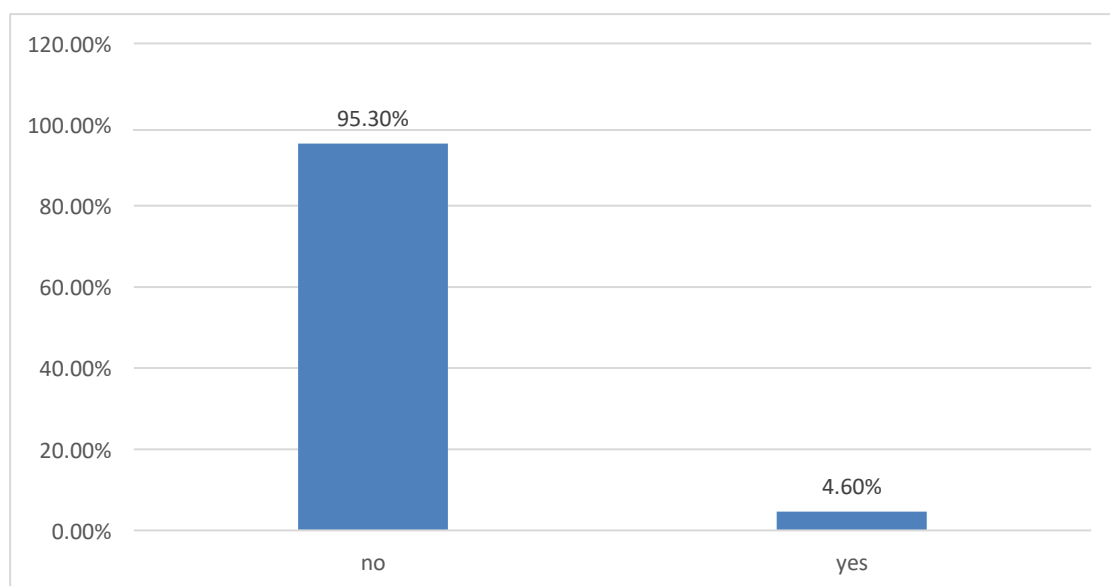
*Fig 4.5 coocurance of Enuresis disorder in children with functional articulation disorder*



*Table 4.6 Frequency distribution of Tic disorder in children with functional articulation disorder.*

Responses		Frequency	Percent
No		62	95.3
Yes	3		4.6
Total		65	100

Table 4.6 shows the frequency distribution of Tic disorder in children with functional articulation disorder. Results show that 3 (4.6%) patients have Tic disorder and 62 (95.4%) have not Tic disorder.

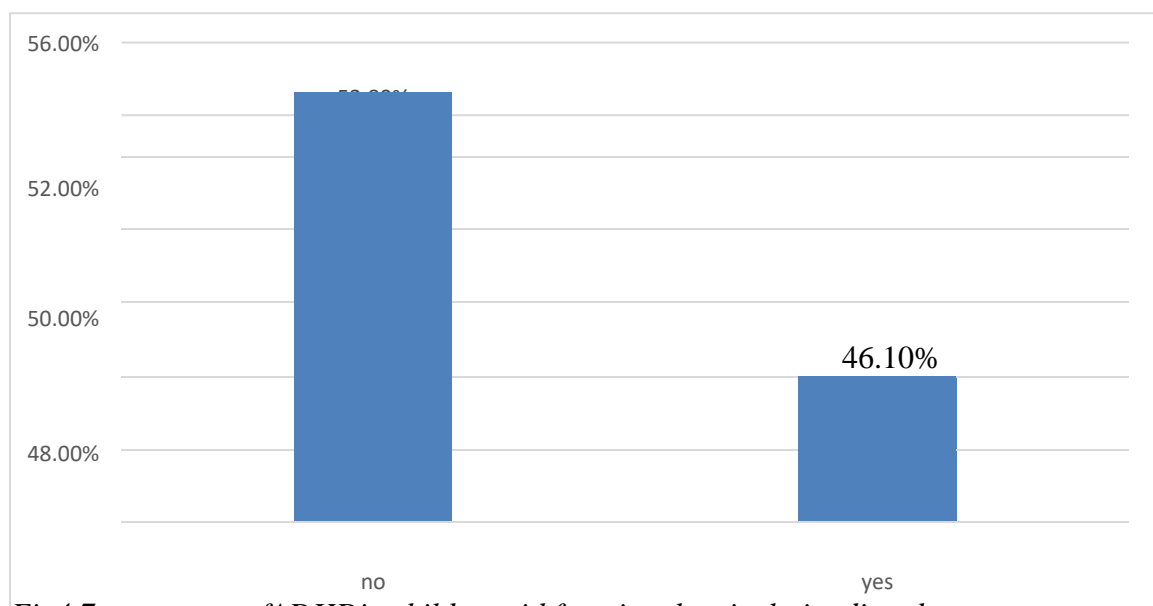


*Fig 4.6 coocurance of Tic disorder in children with functional articulation disorder*

*Table 4.7 Frequency distribution of ADHD disorder in children with functional articulation disorder*

Responses	Frequency	Percent
No	35	53.8
Yes	30	46.15
Total	65	100

Table 4.7 show Frequency distribution of ADHD disorder in children with functional articulation disorder. Result shows that 30(46.2%) patients have ADHD disorder and 35(53.8%) have not ADHD disorder.

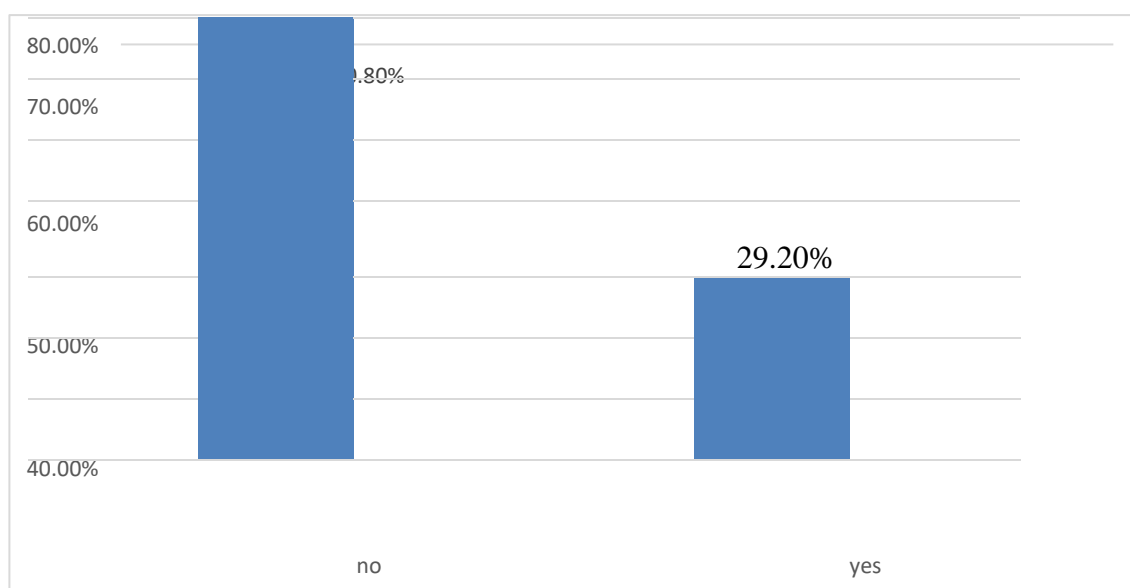


*Fig 4.7 coocurance of ADHD in children with functional articulation disorder*

*Table 4.8 Frequency distribution of LI in children with functional articulation disorder*

Responses	Frequency	Percent
No	46	70.7
Yes	19	29.2
Total	65	100

Table 4.8 show Frequency distribution of LI in children with functional articulation disorder. Result shows that 19(29.2%) patients have Language impairment 46(70.8%) havenot LI.



*Fig 4.8 coocurance of LI in children with functional articulation disorder*

**Discussion:** The present study was conducted in Department of Developmental paediatrics CH&ICHLahore. The purpose of this study was to determine Comorbidities in children with functional articulation disorder

In current study your findings highlighted Comorbidities in children with functional articulation disorder that 40(61.5%) patients have comorbidities and 25(38.4%) patients have no comorbidity. 11(16.9%) patients show the stuttering, 7(10.8%) patients have enuresis disorder, 3(4.6%) patients have Tic disorder, 30(46.2%) patients have ADHD disorder, 9(29.2%) patients have Language impairment.

In the present study, it is indicated that children with articulation disorder have comorbidity with ADHD (30, 46.2%) and 9 (29.2%) have Language Impairment. Another study conducted by J Abnorm Child Psychol (2008) on Children with Comorbid Speech Sound Disorder and Specific Language Impairment are at Increased Risk for Attention-Deficit/Hyperactivity Disorder. This study focuses on the comorbidity between attention-deficit/hyperactivity disorder (ADHD) symptoms and speech sound disorder (SSD). Results indicated that participants in the SSD + SLI group had higher rates of inattentive ADHD symptoms than those in the SSD-only and control groups (J Abnorm Child Psychol, 2008).

In the current study, we explore that children with functional articulation disorder show comorbidity with stuttering (11, 16.9%). Another study conducted by Rachael Unicomb, Elaina Kefalianos, Sheena Reilly, Fallon Cook, Angela Morgan on Prevalence and features of comorbid stuttering and speech

sound disorder at age 4 years. Stuttering and speech sound disorder may co-occur during early childhood, although the exact rate of comorbidity in a community-cohort sample remains unknown. Comorbidity rates of 16%-46% reported in previous studies were based on parent report, speech-language therapist surveys, case file audits, or direct observation studies from clinical samples (Unicomb et al., 2014).

Additionally, in the current study, children with functional articulation disorder show comorbidity with stuttering (11, 16.9%). Another study conducted by Rachael Unicomb, Elaina Kefalianos, Angela Morgan on Prevalence and features of comorbid stuttering and speech sound disorder at age 4 years. Stuttering and speech sound disorder may co-occur during early childhood. Of the 160 children diagnosed with stuttering between 2 and 4 years of age, 6.88% (n = 11) also had a speech sound disorder. Given the small sample size and number of comparisons performed, there was insufficient evidence to rule out that group differences observed were not simply due to chance. The prevalence of comorbid stuttering and speech sound disorder was lower in a community cohort compared to that reported in clinical studies (Unicomb et al., 2014).

In the current study, we explore children with functional articulation disorder; 30 (46.2%) patients have ADHD disorder, and 9 (29.2%) patients have Language Impairment. Another study conducted by AbasHasimoglu and MuhammedTayyibKadak on children with speech sound disorder (SSD) had impairment in comprehensibility and led to significant problems in academic and social life, especially with psychiatric comorbidities. Attention deficit hyperactivity disorder (ADHD) (25.6%), intellectual disability (ID) (23.6%), and Specific Learning Disorder (SLD) (8.3%) were reported among the participants. Multiple linear regression models confirmed that increased total number of incorrectly expressed phonemes, increased age, and low IQ values were associated with global functioning issues. In the adjusted model, only ID had a significant effect on global functioning. Global functioning in SSD is affected by psychiatric comorbidities and especially by ID (Hasimoglu&Kadak, Year).

**Conclusion:** On the basis of results of present study, following conclusions have been made:

- The study's findings are beneficial for medical professionals, occupational therapists, special education centers, and healthcare policymakers in Pakistan.
- Understanding comorbidities in children with functional articulation disorder is crucial for improved diagnosis, treatment, and support.

**Recommendations:**

- Further longitudinal studies are warranted to investigate the long-term impact of comorbidities on children with functional articulation disorder.
- Collaboration between speech-language pathologists, pediatricians, psychologists, and educators is essential for comprehensive assessment and intervention planning.
- Early identification and intervention for comorbid conditions can help mitigate their impact on speech and language development.
- Training programs for healthcare professionals should incorporate education on recognizing and addressing comorbidities in children with articulation disorders.
- Public health initiatives should focus on raising awareness among parents and caregivers about the importance of early intervention for both articulation disorders and associated comorbidities.

**Limitations:**

1. The study's sample size was relatively small, limiting the generalizability of the findings.
2. The use of a questionnaire for data collection may introduce response bias and subjective interpretation.
3. The study was conducted at a single institution in Lahore, Pakistan, which may not represent the diversity of the population.
4. Exclusion criteria, such as excluding individuals who had received treatment for articulation disorders, may have introduced selection bias.
5. The reliance on parental reporting for comorbid conditions may have introduced inaccuracies or underreporting.
6. External factors such as socioeconomic status and cultural differences were not fully

explored but could influence the prevalence of comorbidities.

7. The study's observational design limits the ability to establish causality between articulation disorders and comorbidities.
8. The duration of the study may not capture the full spectrum of comorbidities that children with articulation disorders may experience over time.

### References:

- Feldman, H. M., & Messick, C. (2009). *Developmental-Behavioral Pediatrics* (Fourth Edition). American Speech-Language-Hearing Association. (2016a). Code of ethics [Ethics]. Retrieved from [www.asha.org/policy/](http://www.asha.org/policy/)
- American Speech-Language-Hearing Association. (2016b). Scope of practice in speech-language-pathology [Scope of Practice]. Retrieved from [www.asha.org/policy/](http://www.asha.org/policy/)
- Golisano Children's Hospital Developmental and Behavioral Pediatrics. (n.d.). Condition Information: Speech Sound Disorders.
- Anthony, J. L., Aghara, R. G., Dunkelberger, M. J., Anthony, T. I., Williams, J. M., & Zhang, Z. (2011). What factors place children with speech sound disorders at risk for reading problems? *American Journal of Speech-Language Pathology*, 20, 146–160.
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Huang, T., Shu, X., Huang, Y. S., & Cheuk, D. K. (2011). Complementary and miscellaneous interventions for nocturnal enuresis in children. *Cochrane Database of Systematic Reviews*, 12.
- Robertson, W. C., Jr. (n.d.). American Academy of Neurology, Child Neurology Society.
- American Psychiatric Association. (1980). *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed.). Washington, D.C.: APA.
- Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research*, 40, 1245–1260.
- Macrae, T., & Tyler, A. A. (2014). Speech abilities in preschool children with speech sound disorder with and without co-occurring language impairment. *Language, Speech, and Hearing Services in Schools*, 45, 302–313.
- Baker, L., & Cantwell, D. P. (1987). Factors associated with the development of psychiatric illness in children with early speech/language problems. *Journal of Autism and Developmental Disorders*, 17(4), 499-510.
- Algozzine, B., Ysseldyke, J. E., & Shinn, M. R. (1982). Identifying children with learning disabilities: when is a discrepancy severe? *School Psychology*, 20, 298-3.