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Prevalence of Speech and Language Disorders in Children Presenting to a Tertiary Care Center

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ABSTRACT

Speech and language disorders (SLDs) are among the most common developmental challenges in children. While some children may experience only a speech disorder or a language disorder. **Objective:** To determine the prevalence of SLDs in children presenting to a tertiary childcare hospital in South Punjab, Pakistan. **Methods:** This cross-sectional study was conducted at the Developmental and Behavioural Pediatric Department, The Children's Hospital and Institute of Child Health, Multan. A sample size of 300 was calculated. Children aged 2 to 16 years were analyzed. Non-probability, a convenient sampling technique was adopted. Socio-demographic data, including gender, age, residence and socio-economic status, were collected, and SLDs were identified. SLDs were correlated with gender and age groups, applying a chi-square test ($p<0.05$ considered significant). **Results:** 12,055 (81.0%) had SLDs, with a male predominance (8441, 70.0%). The mean age was 5.04 ± 2.69 years. The most common SLDs were global developmental delay (GDD) (31.3%), cerebral palsy (17.3%), intellectual disability (17.0%), and autism spectrum disorder (ASD) (11.2%). GDD (34.1% vs. 30.1%, $p<0.001$), cerebral palsy (18.3% vs. 16.8%, $p<0.001$), and hearing loss (4.2% vs. 1.9%, $p<0.001$) were more common in females, while ASD (12.3% vs. 8.6%, $p<0.001$) and stammering (5.3% vs. 3.1%, $p<0.001$) were more common in male. GDD and ASD were more prevalent in younger children ($p<0.001$), while cerebral palsy and articulation disorders were more common in older children ($p<0.001$). **Conclusions:** The prevalence of SLDs among children visiting the developmental and behavioural pediatric outpatient department of a tertiary childcare setting is very high, particularly among male, and younger children.

INTRODUCTION

Speech refers to the verbal articulation of language, whereas language involves the conceptual processing necessary for communication [1]. Language encompasses both receptive skills, such as understanding, and expressive skills, which include the ability to convey thoughts, emotions, and information. Speech and language disorders (SLDs) rank among the most common developmental challenges faced by children. SLDs are quite common, affecting between 5-12% of the pediatric population [2, 3]. These difficulties are classified as 'primary' when there is no identifiable cause and 'secondary' when associated with other conditions, such as autism, hearing loss, developmental delays, behavioural or emotional challenges, or neurological issues [4]. While some children may experience only a speech disorder or a language disorder, these conditions frequently overlap. The interventions for both often share similarities, making it challenging to distinguish between SLDs in both research and treatment contexts [5]. Children facing SLDs are at a heightened risk of poorer developmental and educational outcomes [6]. SLDs are often associated with low intelligence, making these children more susceptible to academic difficulties, social isolation, and behavioural and emotional problems [7, 8]. A study conducted in the United Kingdom estimated the prevalence of SLDs to be 7.6% among children [2]. Importantly, despite being less

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frequently studied, SLDs pose comparable or even greater risks to children's academic performance and daily functioning than other relatable conditions.

This study aimed to determine the prevalence of SLDs among children.

METHODS

This cross-sectional study was performed at the Developmental and Behavioural Pediatric Department of the Children's Hospital and Institute of Child Health, Multan, Pakistan, from February 2024 to December 2024 after permission of the ethical review committee (letter number: ERC/204/24). Informed and written consents were obtained from the parents/guardians. A sample size of 300 was calculated using the online Open EPI calculator, considering the prevalence of SLDs among children as 7.6% [2], with a 95% confidence level and 3% margin of error. While the initial sample size of 300 was calculated to provide adequate statistical power based on estimated prevalence and desired precision, the final data included 14,891 children, as a sample of 300 could have been collected in a few days, which would not justify. This significantly larger sample was available through routine clinical records during the study period at the tertiary childcare hospital in South Punjab. Rather than limiting data collection to the minimum required sample, all eligible cases were included to maximize representativeness, reduce sampling error, and improve the precision of prevalence estimates. Children of either gender, aged between 2 to 16 years, presenting at the developmental and behavioural pediatric outpatient department were analyzed. Children with having history of epilepsy were also excluded. Parents/guardians unwilling to allow their children to be part of this study were excluded. Non-probability, a convenient sampling technique was adopted. For all children involved in this study, demographic information like gender, age, residence and socio-economic status was noted. Children living in cities below the district level were labelled as belonging to rural areas. Monthly family income below PKR 30,000 was described as low, PKR 30,000 to 50,000 as middle, or PKR >50,000 as high. Global developmental delay (GDD) was diagnosed in a child <5 years who displayed significant delay (>2SD) in acquiring developmental milestones in 2 or more domains of development [9]. Intellectual disability (ID) was described as a deficit of adaptive and intellectual functioning and onset before maturity [10]. Cerebral palsy was characterized as a disorder of movement and posture, causing activity limitation due to non-progressive damage to the developing brain [11]. Autism spectrum disorder (ASD) was defined as a neurobiological disorder with the key feature of a deficit in social communication and interaction, accompanied by restrictive and repetitive movements with sensory issues [12]. Isolated expressive language disorder (IELD) was stated as an age-appropriate delay in socialization and receptive language (only in expressive language) [13]. Articulation disorder was described as the atypical production of speech sounds characterized by substitution, omission, addition or distortion that may interfere with intelligibility [14]. Stammering was stated as a speech disorder that results in interruption of the normal flow of speech through repeated or prolonged sounds, syllables or single-syllable words [15]. Hearing loss was labelled as disabling hearing loss that was more than 30 dB in children. Data were gathered on a specifically designed proforma. Data analysis was performed using IBM-SPSS Statistics, version 26.0. Qualitative data were represented as frequencies and percentages. Age was shown as the mean and standard deviation. Comparison of categorical data was made employing the chi-square test. A p-value <0.05 was taken as significant.

RESULTS

During the study span, a total of 14891 children visited the outpatient developmental and behavioural pediatric department. Out of these, 12055 (81.0%) had SLDs. In a total of 12055 children, 8441 (70.0%) male. The mean age was 5.04 ± 2.69 years, ranging between 2-16 years. There were 10325 (85.6%) children who were aged between 2-8 years. The residential status of 7395 (61.3%) children was rural. The socio-economic status of 10372 (86.0%) children was low. Evaluation of maternal education status revealed that 3536 (29.3%) were illiterate. Family history of SLDs was reported in 4862 (40.3%) cases (Table 1).

Table 1: Socio-Demographical Characteristics of Children (n=12055)

Characteristics		Frequency (%)
Gender	Male	8441 (70.0%)
	Female	3614 (30.0%)
Age (Years)	2-8	10325 (85.6%)
	9-12	1062 (8.8%)
	13-16	668 (5.5%)
Birth Order	1	6950 (57.7%)
	>1	5105 (42.3%)
Residence	Urban	4660 (38.7%)
	Rural	7395 (61.3%)
Socio-Economic Status	Low	10372 (86.0%)
	Middle	1415 (11.7%)
	High	268 (2.2%)
Maternal Education	Literate	8519 (71.7%)
	Illiterate	3536 (29.3%)
Family History of Speech and Language Disorders		4862 (40.3%)
Healthcare Facility Admission in the Neonatal Period		5327 (44.2%)

The most common SLDs were GDD, cerebral palsy, ID, and ASD, noted in 3773 (31.3%), 2084 (17.3%), 2052 (17.0%), and 1345 (11.2%) children, respectively (Figure 1).

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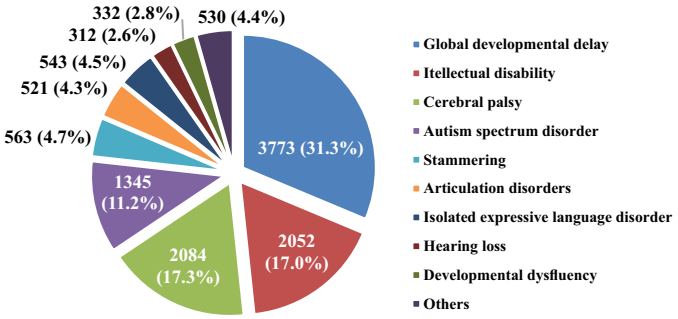

Figure 1: Prevalence of Speech and Language Disorders (n=12055)

The GDD were significantly more common among female children (34.1% vs. 30.1%, p<0.001). Cerebral palsy was significantly more common among females (18.3% vs. 16.8%, p<0.001). ASD prevalence was significantly higher in males (12.3% vs. 8.6%, p<0.001). Stammering was common among male children (5.3% vs. 3.1%, p<0.001). Hearing Loss was significantly more common among female children (4.2% vs. 1.9%, p<0.001) (Table 2).

Table 2: Prevalence of Speech and Language Disorders Concerning Gender (n=12055)

Speech and Language Disorders	Male (n=8441)	Female (n=3614)	p-value
Global Developmental Delay	2539 (30.1%)	1234 (34.1%)	<0.001
Intellectual Disability	1457 (16.8%)	595 (16.5%)	0.288
Cerebral Pasly	1421 (16.8%)	663 (18.3%)	0.001
Autism Spectrum Disorder	1035 (12.3%)	310 (8.6%)	<0.001
Stammering	450 (5.3%)	113 (3.1%)	<0.001
Articulation Disorders	366 (4.3%)	155 (4.3%)	0.506
Isolated Expressive Language Disorder	392 (4.6%)	151 (4.2%)	0.729
Hearing Loss	159 (1.9%)	153 (4.2%)	<0.001
Developmental Dysfluency	239 (2.8%)	93 (2.6%)	0.853
Others	383 (4.5%)	147 (4.1%)	0.602

The GDD was significantly higher in the 2-8 years' age group (p<0.001).Cerebral palsy was considerably higher in the older age group (p<0.001).ASD was significantly more prevalent in the 2-8 years' age group (p<0.001). Stammering was substantially more prevalent in the 9-12 years' age group (p<0.001). Articulation disorders were significantly more prevalent in the older age group (p<0.001).Hearing loss was significantly more prevalent in the 9-12-year age group (p<0.001). No significant age differences were found for ID (p=0.576), IELD (p=0.075), or developmental dysfluency (p=0.190) (Table 3).

Table 3: Comparison of Various Speech and Language Disorders Concerning Distribution of Age Groups

Speech and Language Disorders	Age (Years)			p-value
	2-8 (n=10325)	9-12 (n=1062)	13-16 (n=668)	
Global Developmental Delay	3378 (32.7%)	253 (23.8%)	142 (21.3%)	<0.001
Intellectual Disability	1747 (16.9%)	193 (18.2%)	112 (16.8%)	0.576
Cerebral Pasly	1723 (16.7%)	186 (17.5%)	175 (26.2%)	<0.001
Autism Spectrum Disorder	1240 (12.0%)	62 (5.8%)	43 (6.4%)	<0.001
Stammering	448 (4.3%)	92 (8.7%)	23 (3.4%)	<0.001
Articulation Disorders	420 (4.1%)	51 (4.8%)	50 (7.5%)	<0.001
Isolated Expressive Language Disorder	447 (4.3%)	58 (5.5%)	38 (5.7%)	0.075
Hearing Loss	202 (2.0%)	82 (7.7%)	28 (4.2%)	<0.001
Developmental Dysfluency	274 (2.7%)	33 (3.1%)	25 (3.7%)	0.190
Others	446 (4.3%)	52 (4.9%)	32 (4.8%)	0.601

DISCUSSION

This study provides an in-depth analysis of the prevalence, socio-demographic characteristics, and specific types of SLDs in a large cohort of children aged 2 to 16 years. The high prevalence of SLDs in this study (81.0%) is comparable to Memon *et al.*, who documented the prevalence of SLDs as 61.8% in a similar setting [16]. Mondal *et al.*, described the proportion of language delay as 27%, which is quite lower than what this study revealed [17]. The discrepancy could be due to differences in study populations, diagnostic criteria, or regional healthcare practices. In this study, male was predominantly affected, comprising 70.0% of the SLD cases. Memon *et al.*, also reported a higher prevalence of SLDs among males (68.5%) in a sample from a pediatric rehabilitation ward [16]. Mumtaz *et al.*, found a male-to-female ratio of 2.28:1, further supporting the higher vulnerability in males to these disorders [18]. Although the exact mechanism behind the male predominance in SLDs remains unidentified, the contribution of genetic, neurological and environmental factors could be credited behind these findings. This study documented that 85.6% of children with SLDs were aged between 2-8 years. Memon *et al.*, [16] and Shrestha *et al.*, [19] also revealed a higher proportion of SLDs in relatively younger children.This research also observed that the majority of the children with SLDs were from rural areas (61.3%) and belonged to low socio-economic status (86.0%). Some other studies, like Kumar *et al.*, [20] and Mulk *et al.*, [21], have also shown that socio-economic status was a significant factor influencing the prevalence of SLDs.These findings could be attributed to limited access to healthcare services and poor educational resources. In this study, mothers of 29.3% of children with SLDs were illiterate.Sunderajan and Kanhere showed that low parental education was significantly associated with SLDs [22], suggesting that maternal education might be playing a critical role in child development of SLDs.This study found the family history of SLDs in 40.3% of cases. Mondal *et al.*, [17] and Mulk *et al.*, [21] had shown that a family history of SLDs is a significant risk factor for SLDs. The high prevalence of SLDs among children with a family history suggests a potential genetic predisposition, which could be explored further through genetic and epigenetic studies. In this research, GDD and cerebral palsy were significantly more common among female, while ASD and

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stammering were more prevalent among male. The higher prevalence of ASD in male (12.3% vs. 8.6%) is consistent with the findings of Wu *et al.*, who also reported a higher rate of ASD among boys [23]. Shrestha *et al.*, who reported a higher prevalence of language delay due to hearing loss in females, indicated that specific conditions might affect genders differently [19]. GDD was more prevalent in the 2-8-year age group, while cerebral palsy and articulation disorders were more common in older children.This pattern suggests that certain disorders may become more apparent or develop as children grow older.The late emergence of articulation disorders could be due to the increased complexity of language and speech tasks encountered by older children. Mulk *et al.*, also reported that older children showed higher rates of stammering and articulation issues [21]. de Goulart *et al.*, [24] and Melchiors *et al.*, [25] highlighted the role of environmental factors in the development of SLDs.This study supports the recommendations for the implementation of targeted interventions, particularly in high-risk populations [23]. These interventions should include not only speech therapy but also broader developmental support, including parental education and environmental enrichment.The gender and age-related differences observed in this study suggest that screening programs should be tailored to the specific needs of different demographic groups. Younger children and males may benefit from more intensive monitoring for ASD and stammering, while older children and females may require more focused support for GDD and cerebral palsy.

CONCLUSIONS

This study found a high prevalence of SLDs among children attending a tertiary childcare hospital, particularly among younger male. GDD, cerebral palsy, intellectual disability, and ASD were the most common. Significant age and gender related differences highlight the need for targeted screening and intervention programs.

Authors Contribution

Conceptualization: KA
Methodology: KA, EA, IM, RT, HMI
Formal analysis: KA
Writing review and editing: IM, RT, HMI
All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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