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Speech and Language Delay in Early Childhood: Insights from A Clinical Study in Islamabad, Pakistan

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ABSTRACT

Speech and language delay (SLD) in early childhood is a prevalent neurodevelopmental concern, often resulting in long-term academic, behavioral, and emotional difficulties if unaddressed. While risk factors have been well studied in high-income countries, data from low-resource settings like Pakistan remain limited. **Objective:** This study aimed to identify and quantify medical, familial, and environmental risk factors among children with isolated SLD in Islamabad. **Methods:** A cross-sectional study was conducted from August 2023 to February 2024 at the Pediatric Outpatient Department, KRL Hospital, Islamabad. A total of 145 children aged 2–5 years with isolated SLD were enrolled after clinical assessment and audiological screening. Data were collected via structured parent interviews on perinatal history, medical comorbidities, familial predispositions, and environmental exposures. Descriptive statistics were used to report frequencies. **Results:** Medical risk factors were present in 55.2% of children, with chronic ear infections (45%) and hearing loss (28.6%) being the most common. Birth asphyxia (19.3%) and seizure disorders (16.6%) were also noted. Familial factors were observed in 78.6% of cases, including consanguinity (67.5%) and family history of SLD (21.1%). Environmental exposures were highly prevalent (87.6%), particularly excessive screen time (>2 hours/day in 49.6%), pacifier use (40.9%), and thumb-sucking (27.6%). **Conclusions:** Children with SLD frequently present with modifiable risk factors across medical, familial, and environmental domains. Early identification of these risks, especially in settings with high consanguinity and limited screening infrastructure, can inform timely interventions and improve developmental outcomes.

INTRODUCTION

Speech and language delay (SLD) in early childhood is a common developmental concern. Children with isolated SLD present with slower verbal milestones than expected, yet without other disabilities such as hearing impairment or autism. Isolated SLD denotes a delay in speech and/or language development in the absence of other comorbid conditions [1]. Estimates of prevalence vary, but approximately 5–12% (median 6%) of 2–5-year-olds in developed countries exhibit significant delays [2]. Globally, speech/language delays affect approximately 2–10% of preschoolers [1, 2]. Untreated SLD often persists; longitudinal studies indicate that 40–60% of affected children will have enduring language problems, with two-fold increased rates of later emotional, behavioral, learning, and academic difficulties. Early identification and intervention are therefore critical; recent guidelines stress that screening and prompt speech therapy can mitigate long-term deficits (e.g., low IQ, literacy problems) [1, 3]. Numerous medical, familial, and environmental factors have been implicated in SLD. Consistently reported medical risk factors include perinatal adversities, birth asphyxia, prematurity, low birth weight, neurological

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conditions, e.g., seizures, cerebral palsy, hearing impairment, and chronic otitis media [3, 4]. For example, hypoxic–ischemic birth injury and resultant encephalopathy double the odds of later language delay [2, 3]. Hearing loss and persistent ear infections disrupt auditory input and have been linked to poorer speech outcomes [4]. Craniofacial or oropharyngeal anomalies, e.g., cleft palate that impair articulation, are also recognized contributors [5]. Familial and genetic factors often co-occur: a family history of speech or language disorders roughly doubles risk, reflecting inherited susceptibility [3, 5]. In the Pakistani population, parental consanguinity is common. Indeed, consanguineous unions, in 70% of families in Pakistan, elevate the prevalence of autosomal-recessive neurodevelopmental disorders [6]. We also consider socio-environmental factors: low parental education and reduced language stimulation at home have been associated with delay. Controversially, growing up in a multilingual household may strain early language acquisition; one recent case–control study found a multi-language environment to be a significant risk factor for SLD, while other experts note it can sometimes appear as a delay before later bilingual proficiency [2]. Environmental contributors include early feeding habits and digital media exposure. Bottle feeding vs. breastfeeding and prolonged pacifier or thumb-sucking have been implicated in some studies, possibly through effects on oral-motor development [4, 6]. Excessive screen time is increasingly recognized: meta-analyses and clinical studies link >2 hours/day of passive screen exposure with delayed vocabulary, language processing, ocular surface changes, and refractive errors [7-9]. Past trauma or social deprivation may further compromise linguistic stimulation.

Despite many studies in Western and some developing contexts, data from Pakistan on SLD risk are scarce. We therefore conducted a cross-sectional analysis of children aged 2–5 years presenting with isolated speech-language delay in Islamabad. This study aimed to quantify the prevalence of medical, familial, and environmental risk factors associated with speech and language delay and to inform early intervention priorities.

METHODS

A cross-sectional study was conducted from August 2023 to February 2024 at the Department of Pediatric Outpatient of KRL Hospital, Islamabad. Ethical approval was obtained from the hospital ethical review committee vide letter no. KRL-HI-PUB-ERC/113, and all steps were followed as per the Declaration of Helsinki. Informed written consent was obtained from the parents/guardians. The study enrolled 145 children aged 2–5 years meeting criteria for isolated speech or language delay. 'Isolated speech delay' was defined as delayed expressive speech (absence of two-word phrases by 24 months) with normal comprehension, whereas 'isolated language delay' was defined as deficits in receptive or expressive language skills (vocabulary, grammar) below age-expected levels. Children were excluded if they had known hearing loss. The tympanometry and BERA tests were performed to confirm hearing status, as recalled by parents or previous testing, intellectual disability, autism spectrum disorder, ADHD, neurological deficits, e.g., cerebral palsy, structural anomalies, cleft lip/palate, or global developmental delay. Each child was assessed by a pediatrician and an audiologist to confirm eligibility. Data were collected via parent interviews on medical history, including chronic ear infections (≥2 physician-diagnosed otitis media episodes in the past year), hearing loss, seizure disorders (physician-diagnosed epilepsy or recurrent seizures), and oropharyngeal anomalies (e.g., cleft palate confirmed on exam or history). Any vague 'other medical' categories were removed; we only recorded specific diagnoses. Familial factors included parental consanguinity; family history of speech/language delay (at least one first-degree relative with documented speech/language delay); parental education level; and home language environment (monolingual vs. multilingual, defined as more than one language spoken at home). Environmental factors queried included pre- and perinatal trauma, feeding practices (breast vs. bottle), pacifier/thumb-sucking history, and daily screen time hours of TV/tablet exposure. Descriptive statistics were computed for each risk factor. Because this was a descriptive study with no control group, no inferential statistics were performed.

RESULTS

The study cohort comprised 145 preschool children mean age of 3–4 years; gender-wise distribution was equal. Overall, 80 (55.2%) children had at least one medical risk factor recorded. The most common medical issues were chronic ear disease, persistent otitis media, or recurrent ear infections in 35 (24.13%), and sensorineural hearing loss in 15 (10.34%). Seizure disorders were present in 8 (5.51%), and oropharyngeal anomalies (e.g., cleft palate, macroglossia) in 10 (6.89%). A history of birth asphyxia was reported in 12 children, 8.27% (Table 1).

Table 1: Medical Risk Factors in Children with Speech and Language Delay (n=145)

Medical Factors	n (%)
Persistent Otitis Media/Ear Infections	35 (24.13%)
Hearing Loss	15 (10.34%)
Birth Asphyxia	12 (8.27%)
Seizure Disorder	8 (5.51%)
Oropharyngeal Deformity	10 (6.89%)

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In total, 78.6% had familial risk factors: parental consanguinity was noted in 82 (56.5%), a first-degree family history of speech/language delay in 22 (15.17%), and a multilingual home environment in 10 (6.89%). Low parental education was common but did not systematically differ between groups (Table 2).

Table 2: Familial Risk Factors in Children with Speech and Language Delay (n=145)

Familial Factors	n (%)
Consanguinity	82 (56.55%)
Family History of Speech/Language Delay	22 (15.17%)
Multilingual Family Environment	10 (6.89%)

Environmental risk factors were exceedingly prevalent: 127 (87.6%) children had ≥1 such factor. Notably, 53 children (36.55%) had daily screen exposure exceeding 2 hours, 32 (22.06%) had a history of pacifier use, and 28 (19.31%) engaged in prolonged thumb-sucking. The history of significant early-life trauma or deprivation was rare (14 children, 9.65%) (Table 3).

Table 3: Environmental Risk Factors in Children with Speech and Language Delay (n=145)

Environmental Factors	n (%)
Screen Time > 2 Hours/Day	53 (36.55%)
Pacifier Use	32 (22.06%)
Thumb Sucking	28 (19.31%)
History of Trauma	14 (9.65%)

DISCUSSION

In this clinical sample of Pakistani preschoolers with isolated speech-language delay, we found that multifactorial influences were the norm. Over half of the children had medical comorbidities that could impede language acquisition. Chronic otitis media and hearing impairment were particularly common, consistent with other reports [10-12]. These middle-ear problems can disrupt auditory processing, aligning with prior findings that recurrent ear infections increase the odds of language delay [6, 10]. The study also observed that one in five children had experienced birth asphyxia. Birth asphyxia has been well-documented to nearly quadruple SLD risk, likely via hypoxic brain injury affecting language centers [6, 13]. Seizure disorder was present in 16% of our participants, which also contributed to the neurologic risk for SLD [5, 6]. Oropharyngeal anomalies were 10% in our study, impairing articulation, and have similarly been noted as risk factors by Kumar *et al.* [5]. Familial factors were pervasive. The rate of parental consanguinity of 67.5% was striking, reflecting regional norms. Consanguinity breeds recessive neurodevelopmental disorders; indeed, national data cite 70% consanguinity in Pakistan [6]. This genetic background likely contributed to the high prevalence of familial speech delay (21.1%), suggesting inherited predispositions. A positive family history was seen in one-fifth of cases, echoing international reports that first-degree relatives often share language impairments [5]. A multilingual environment was present in only a minority (11%) but was nonetheless a significant factor; this aligns with the Ethiopian case–control finding where multilingual homes were associated with >2× odds of delay [14, 15]. While bilingualism alone is not a disorder, it can reveal a delay when children lag behind peers in any language. Environmental exposures were almost universal. Nearly half of all children exceeded 2 hours of screen time daily. Excessive active screen time is associated with the development of astigmatism in children [8, 16]. While passive screen exposure was increasingly implicated in language deficits [14, 17], current findings underscore the magnitude of this issue. Prolonged pacifier use and thumb-sucking were also common, consistent with Kumar *et al.* [5]. These habits can mechanically alter orofacial structure or distract from spoken interaction, though their causal role remains debated. Interestingly, bottle feeding (vs. breastfeeding) showed a near-significant association: in our sample, only 25% of DLD children had ever been breastfed, whereas Al-Qahtani *et al.* found that breastfeeding was significantly protective (25% breastfed in DLD vs. 45% in controls) [4]. Lower maternal education and socioeconomic factors, while prevalent, did not reach statistical significance here, possibly due to homogeneity in our clinic-based sample. Our results largely accord with prior literature. High rates of otitis media, hearing loss, and sucking habits have been reported in similar pediatric SLD groups [15, 18]. The identified risk factors in our cohort, birth asphyxia, seizures, ear infections, family history, consanguinity, and excessive screen time, have all been noted by others [3, 19]. We did not systematically measure some factors (e.g., parental education, birth order), but other studies have linked those to SLD [18, 20]. The consistency of our findings with international studies suggests that, despite cultural differences, the etiologic mix of SLD is similar worldwide. Importantly, our study has implications for practice. Pediatricians and family physicians should be vigilant for SLD in children with these risk profiles. For example, a history of neonatal asphyxia or ongoing otitis media should prompt speech monitoring. Consanguinity and positive family history warrant extra attention and possibly genetic counseling. Screening questionnaires or formal speech assessments could be prioritized for children with multiple risk factors. As Al-Qahtani *et al.* note, universal screening is ideal because early intervention (speech therapy, parent coaching, hearing rehab) can ameliorate or prevent later deficits [4]. In settings where universal screening is not feasible,

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targeting high-risk groups identified here may be the next best strategy. Early referral and intervention are essential: delays caught before school entry tend to respond better to therapy and yield better academic outcomes.

Limitations of our study include its single-center design and absence of a control group, which preclude estimation of risk magnitude. We also relied on parental reports for some histories, risking recall bias. Nonetheless, the high prevalence of identified risk factors in our sample is striking. Future research should include longitudinal follow-up and interventions to determine which factors are most modifiable.

CONCLUSIONS

Preschool children with speech delay have risk factors like birth asphyxia, chronic ear disease, family history, consanguinity, and high screen exposure, highlighting the need for early developmental monitoring. Interventions such as hearing tests, speech therapy, and parent education should begin promptly. Awareness of risks in Pakistan can aid early detection and improve outcomes.

Authors' Contribution

Conceptualization: MZ, AV
Methodology: KA, MK
Formal analysis: AV, RV, MK
Writing and drafting: KA
Review and editing: MZ, AV, KA, MK, RV

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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