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Factors Associated with Speech and Language Disorder in Children Attending Child Development Center of a Tertiary Care Hospital

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Abstract **Original Research Article**

Background*:** Speech and language disorders are amongst the most common developmental difficulties. The current study was aimed to identify the factors associated with speech and language disorder in children attending a child development center. ***Methods*:** This cross-sectional, observational study was carried out at Saleh Child Development & Disability Management Centre of ICMH, Dhaka from July 2020 to June 2021. Children with speech and language disorder attending the speech clinic were enrolled. According to complaints of parents and confirmed by a multidisciplinary team, cases were selected purposively and after taking consent a pre-tested questionnaire was filled up by a face-to-face interview. ***Results: Among participating children majority belonged to age group 4-5 years with male predominance. Almost three fourth patients came from nuclear family. History of perinatal asphyxia and neonatal seizure were found in 9(31.0%) and 8(27.6%) cases, respectively. Majority 28(96.6%) mother was primary care giver. Family history of speech delay was seen in 15(51.7%). Most of the children view TV/play computer games > 2 hours/day. Majority had first meaninful word at 23-36 month and parents had identified speech dealy on 25-36 months. 14 children had poor chewing and 2 had drooling. Majority (37.9%) children were delayed receptive, 13(44.8%) were delayed expressive, 9(31.0%) were both delayed receptive and expressive and 5(17.2%) were stammering. ***Conclusion***: Male gender, care giver other than mother, nuclear family, perinatal asphyxia, neonatal complications, family history of speech delay, TV/Computer/Tab watching >2 hrs were associated with speech and language disorder.

Keywords: Speech, Language disorder, Development, Disability.

INTRODUCTION

Speech is the verbal production of language and language is the conceptual processing of communication. Language may be receptive (understanding) and expressive (ability to convey information, feelings, thoughts) [1].

Speech and/or language disorders are amongst the most common developmental difficulties in childhood. Such difficulties are termed 'primary' if they have no known etiology, and 'secondary' if they are caused by another condition such as autism, hearing impairment, general developmental difficulties, behavioral or emotional difficulties or neurological impairment [2, 3]. Although some children have either a primary speech disorder but not a language disorder, or vice versa, these disorders commonly overlap. In addition, interventions in both cases share commonalities. Therefore, in both research and intervention, it is difficult to make speech and language disorders apart.

Primary speech and/or language disorders can affect one or several of the following areas: phonology, vocabulary, grammar, morphology, narrative skills and pragmatic language [4].

The spectrum of speech problems may include development speech delay, stuttering or dysfluency, articulation disorders, apraxia of speech and unusual voice quality. Some children have disordered language which can involve mostly learning difficulties. Expressive speech delay may occur without receptive delay but often they exist together in children as a mixed expressive-receptive speech delay [5].

Children with speech /language difficulties are at risk of less successful developmental and educational outcomes. Frequently speech delay is seen to be associated with poor intelligence. These children are more vulnerable to academic failure, social exclusion, behavioral and emotional difficulties [6]. Delay in speech and language development is the most common developmental disorder in children aged three to six years. The prevalence of this disorder in the normal population ranges from one to thirty two percent and about sixty percent of cases of speech and language delay tend to resolve spontaneously in children aged under three years [7].

Various factors influence the development of speech and use of language. These factors may include socio- demographic factors such as size of the family, parental education, occupation and working hour, poor knowledge in early care and stimulation, family violence, poverty, birth and family-related factors, developmental issues, positive family history of speech delay, deleterious oral habits, heavy TV watching or fussy temperament of the child and environmental risk factors such as living in an unsafe/stressful surroundings, receiving care within a low-quality setting, poor child-parent interaction, lack of resources available for stimulation etc. [8, 9]. All of these factors need to be taken into careful consideration when gathering information to fully understand and support children's social and emotional health through a comprehensive, ecological approach. Under the Directorate General of Health Services, data from 15 'Shishu Bikash Kendro' (e.g. Child development centre) at different tertiary hospitals in Bangladesh (updated in June, 2016) showed that a total of 5494 children attended their Speech-Language Clinic (SLC) which serves children with speech and language delays and disorders. Among them 0-2 year aged were 1796 (32.69%) and >2-5 year aged were 2687 (48.91%).

However, there is lack of sufficient data so far regarding the risk factors for different speech pathology in Bangladesh. So, we need to know the current situation and explore the contributing factors behind developmental speech and communication disorders in Bangladesh to reduce the burden of it. The aim of this study was to identify the socio- demographic, personal, environmental factors and clinical comorbidities related 2 to 8 years of children associated with speech delay.

METHODS

This cross-sectional, observational study was carried out at Saleh Child Development & Disability Management Centre (SCDDMC) of Institute of Child and Mother Health (ICMH), Dhaka from July 2020 to June 2021.

Children with speech and language disorder who attended the speech clinic of SCDDMC were enrolled into the study. Children diagnosed with hearing impairment, congenital oral anomalies (cleft lip/palate, tongue-tie etc), autism and other pervasive disorders, cerebral palsy, epilepsy, genetic disorders (e.g. Down Syndrome etc), metabolic disorder (e.g. Hypothyroidism etc.) were excluded.

Sample Size Calculation

The sample size was calculated by using following formula-

$$n = \frac{Z^2pq}{d^2}$$

Here, Z is the confidence limit, 'p' is the prevalence rate and 'q' is '1- p'. (or proportion of persons not suffering from the disease), 'd' is the acceptable standard error and 'n' is the required sample size.

Here,

Z ='1.96' standard normal deviate set at '1.96' at 5% corresponds to 95% confidence level.

P= prevalence of speech language delay of positive family history was 52.4% [10].

In unknown population

p=52.4%=0.524

q= 1-p=1-0.524=0.476

d=10%

n= the required sample size

$$= \frac{(1.96)^2 \times 0.524 \times 0.476}{(0.10)^2}$$

95.8 so estimated sample size was 96. Due to time limitation and Covid-19 pandemic situation total 29 samples were taken in this study.

According to complaints of parents and confirmed by multidisciplinary team (by Pediatrician, Psychologist/speech therapist) cases were selected purposively and after taking consent a pre tested questionnaire was filled up by a face-to-face interview. Information regarding cases were also taken from individual master files kept in Child Developmental Center.

Statistical analysis was performed with statistical package for social science (SPSS) version 23.

Ethical clearance certificate was obtained from Institutional Review Board (IRB) of ICMH. Informed written consent was secured from each legal guardian of the study subject.

RESULTS

This was a cross sectional study conducted in the Saleh Child Developmental Center, Department of Paediatrics, ICMH, Matuail, Dhaka during the period of July, 2020 to June, 2021. A total of 29 patients were included in this study.

Majority (55.2%) patients belonged to age group 4-5 years. The mean age was 4.21±1.11 years (Fig.-1). Almost two third (65.5%) attendants were male and 10(34.5%) was female. 95% CI (Lower-upper) of male=48.2% to 82.8% (Fig.-2).

Distribution of pregnancy and birth related factors of the children were thoroughly documented. Among mothers, 19 (65.5%) were multipara, 22 (75.9%) took regular antenatal care, 17 (58.6%) experienced pregnancy related complications, 19(65.5%) delivered at term. Hospital delivery ensued in 16 (55.2%) cases while 13 (44.8%) delivery took place at home. 15 (57.7%) delivery was vaginal and 14 (48.3%) were through C/S. Among the offspring 18 (62.1%) weighed ≥2500 gram at birth. Major complications observed were perinatal asphyxia (9; 31%), neonatal seizure (8; 27.6%) and sepsis/meningitis (7; 24.1%) (Table-I).

Detailed environmental factors attributing speech delay were sought out. Among the attendants 24 (82.8%) spent ≥8 hours/day with mother, 20 (69%) view TV ≥2 hours/day, 19 (65.5%) play PC/TV game ≥2 hours/day. Peer group interaction was observed in 19 (65.5%) cases. 25 (86.2%) children didn't have an outing in a month. Only 1 (3.4%) participant had bilingualism in family and 2 (6.9%) complained of environmental stress. There were 8 working outside home mothers among them 6 (20.7%) worked <8 hours/day and 2 (6.9%) worked ≥8 hours/day.

23 (79.3%) children spent time by listening bedtime story while 6 (20.7%) didn't (Table II).

More than half of the children (17; 58.6%) started babbling at 9 months of age, while first meaningful word was heard in 9 (31%) cases in 12-24 months and 15 (51.7%) cases in 25-36 months. Family identified speech delay in 25-36 months in 17 (58.6%) cases and in 12-24 months in 12 (41.4%) cases. 13 (44.5%) children played physical games and 11 (37.9%) children used toys. Most of the participants (24; 82.8%) were cooperative. Blended food was offered in 11 (37.9%) cases, 14 (48.3%) cases had poor chewing and 2 (6.9%) children had drooling (Table-III).

Regarding speech level of the children it was observed that majority 13(44.8%) children were delayed expressive, 11 (37.9%) were delayed receptive, 9(31.0%) were both delayed receptive and expressive and 5(17.2%) were stammering (Fig.-3).

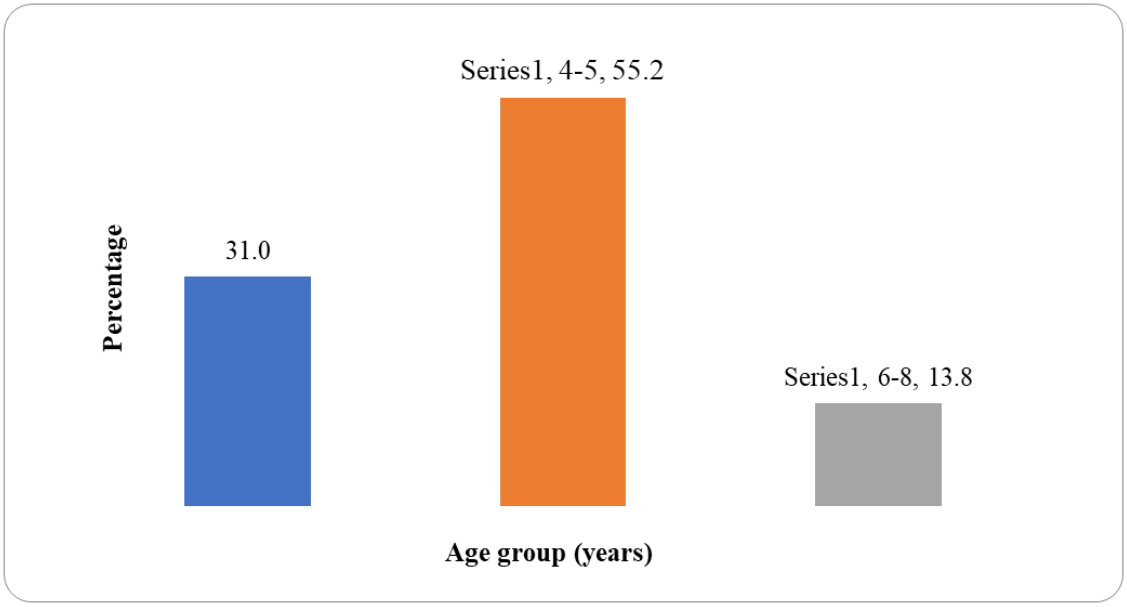

Figure 1: Distribution of the age group of the subjects (n=29)

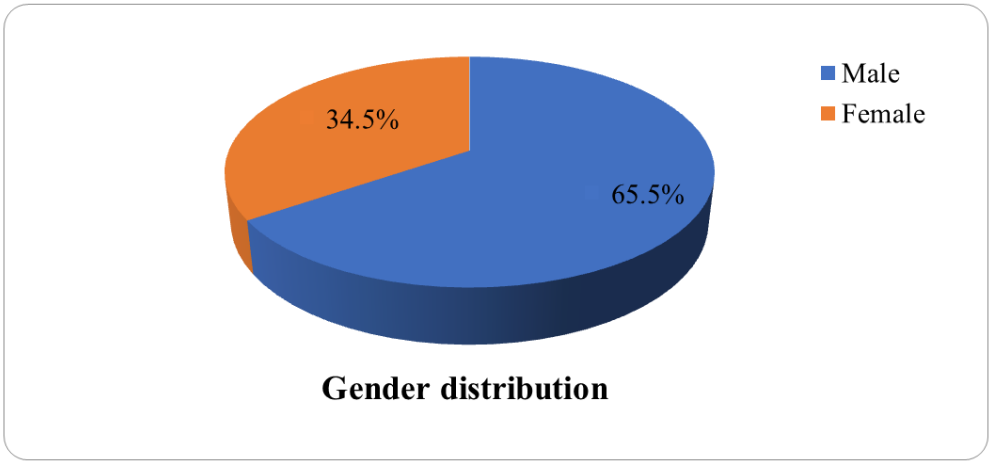

Figure 2: Pie chart showing gender distribution

Table I: Distribution of Pregnancy and Birth related factors of the study children (n=29)

Variables	Frequency	Percentage	95% CI(Lower-upper)
Number of parity of mother			
Primipara	10	34.5	17.18-51.78
Mutltipara	19	65.5	48.22-82.82
ANC in this pregnancy			
Regular (≥3 visit)	22	75.9	60.29-91.44
Irregular (<3 visit)	7	24.1	8.56-39.71
Pregnancy complication			
Yes	17	58.6	40.70-76.55
No	12	41.4	23.45-59.30
Multiple pregnancy	3	10.3	-0.74– 21.43
Spotting/threatened abortion/APH	5	17.2	3.49-30.99
PET/HTN	5	17.2	3.49-30.99
Rash/irregular fever	1	3.4	-0.31 – 10.09
Mental stress	1	3.4	-0.31 – 10.09
Others	3	10.3	-0.74– 21.43
Gestational age			
Term	19	65.5	48.22-82.82
Preterm	10	34.5	17.18-51.78
Birth weight			
Normal (≥2500 g)	18	62.1	44.41-79.73
LBW (<2500 g)	11	37.9	20.27-55.59
Mode of delivery			
NVD	15	51.7	44.14-79.73
C/S	14	48.3	30.09-66.46
Delivery place			
Hospital	16	55.2	37.07-73.27
Home	13	44.8	26.73-62.93
History of Perinatal asphyxia			
Yes	9	31.0	14.20-47.87
No	20	69.0	
Neonatal complication			
N. seizure	8	27.6	11.32-43.85
Sepsis/meningitis	7	24.1	8.56-39.71
Excessive cry	1	3.4	-0.31 – 10.09
Jaundice	2	6.9	-2.33– 16.12
Hospital admission in neonatal period			
Yes	15	51.7	33.54-69.91
No	14	48.3	

Table II: Distribution of environmental factors of the study children (n=29)

Environmental Factors	Frequency	Percentage	95% CI(Lower-upper)
Allocation of time spent with mother			
<8 hours/day	5	17.2	3.49-30.99
≥8 hours/day	24	82.8	69.01-96.51
TV viewing per day			
< 2 hrs	9	31.0	14.20-47.87
≥2 hrs	20	69.0	52.13-85.80
Play computer game/TV game (hr/day)			
<2 hrs	10	34.5	17.18-51.78
≥2 hrs	19	65.5	48.22-82.82
Peer group interaction			
Yes	19	65.5	48.22-82.82
No	10	34.5	
Outing in a month			
Yes	4	13.8	1.24-26.34
No	25	86.2	
Bilingualism in family environment			
Yes	1	3.4	-0.31 – 10.09
No	28	96.6	
Environmental stress			
Yes	2	6.9	-2.33– 16.12
No	27	93.1	
Working hours of mother outside home			
<8 hours/day	6	20.7	5.95-35.43
≥8 hours/day	2	6.9	-2.33– 16.12
Time spent by listening bedtime story (hours/per week)			
≤5	9	31.0	14.20-47.87
>5	14	48.3	30.09-66.46
None	6	20.7	5.95-35.43

Table III: Personal factors with speech delay of the study children (n=29)

Variables	Frequency	Percentage	95% CI (Lower-Upper)
Speech development (babbling at 9 month)			
Yes	17	58.6	40.70-76.55
No	12	41.4	23.45-59.30
First meaningful word at (months)			
12-24	9	31.0	14.20-47.87
23-36	15	51.7	33.54-69.91
Age when speech delay was identified (month)			
12-24	12	41.4	23.45-59.30
25-36	17	58.6	40.70-76.55
Use of play materials			
Toys	11	37.9	20.27-55.59
Physical games	13	44.8	26.73-62.93
Others	5	17.2	3.49-30.99
Personality type			
Shy	2	6.9	-2.33– 16.12
Cooperative/sociable	24	82.8	69.01-96.51
Irritable	2	6.9	-2.33– 16.12
Hyperactive	1	3.4	-0.31 – 10.09
Feeding habit			
Blended food	11	37.9	20.27-55.59
Poor chewing	14	48.3	30.09-66.46
Others	4	13.8	1.24-26.34
Excessive salivation/ Drooling			
Yes	2	6.9	-2.33– 16.12
No	27	93.1	83.88-99.33

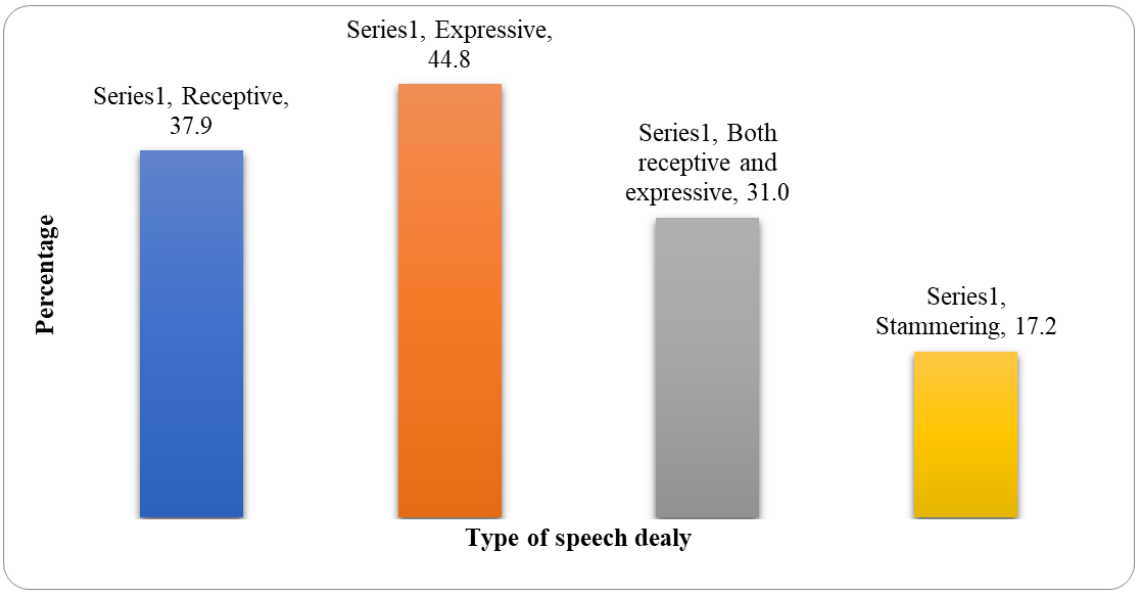

Figure 3: Bar diagram showing type of speech dealy of the study children (n=29)

DISCUSSION

This study found that majority (55.2%) patients belonged to age group 4-5 years. The mean age was 4.21±1.11 years. Almost two third (65.5%) patients were male and 10(34.5%) was female. 95% CI (Lower-upper) of male=48.2% to 82.8%. De Goulart *et al.*, in his study observed that the majority (36.8%) children aged 0-6 years, where male was 54.7% and female was 45.3% [11]. Their study results showed no relationship between gender or age and speech disorders, contrasting with other studies [12, 13]. A study de Oliveira *et al.*, reported prevalence of speech disorders in children older than five [14]. In another study by Goulart and Chiari the authors described the main characteristics of individuals with speech-language disorders [15]. They found that speech-language disorders were more commonly seen in males around the age of five. Our study result also showed male predominance and this data can contribute to further studies on cause of prevalence of communication disorders in boys and consequential treatments and preventions.

Mondal *et al.*, reported the age of the subjects ranged from 2 to 36 months, with a median of 11 months [16]. The age groups were divided into three categories 0 - 12, 13 - 24 and 25 - 36 months. Maximum number of children belonged to the 0 - 12 months age group.

Molini-Avejonas *et al.*, observed that the predominant age group of the participating children was between 2 and 5 years of age, male gender, race declared as white and socioeconomic level C [17].

In this study showed that almost three fourth (72.4%) [95% CI 56.15-88.68%] patients came from nuclear family. Consanguinity of parents was found 9(31.0%) [95% CI 14.20-47.87%]. Majority 28(96.6%) [95% CI 89.91-99.8%] mother was primary care giver and 11(37.9%) [95% CI 20.27-55.59%] grandmother were secondary care giver. Family history of speech delay was seen in 15(51.7%) [95% CI 33.54-69.91%].

Mondal *et al.*, observed Joint/Extended family was found in 34(30.4%) and nuclear was 20(22.7%) [16]. More than 4 members was found in 37(30.1%). Family history of speech and language disorders was found in 55.6%.

Molini-Avejonas *et al.*, also reported that the 238 children, 156 had siblings [17]. In most cases, the participating child was the youngest son. Sunderajan and Kanhere found consanguinity to be a statistically significant risk factor [18]. Other studies have documented the association between consanguinity as an important risk factor for hearing loss leading to speech delay [19]. Interestingly, in our study consanguinity was found to be a significant risk factor for speech–language delay even in the absence of hearing loss. A positive family history of speech-reading disorders (stuttering, unclear speech, late speaking, poor vocabulary, dyslexia) with the affected member being a first-degree relative has been known to be associated with speech and language delay [16, 20]. A large family size being a significant factor in speech delay was documented by Karbasi *et al.*, [21] In their study, large family size was found in both the groups, and hence family size was not found to be significant. Saeed *et al.*, also reported the association between primary speech-language delay and family history of delay significant (p-value 0.0361) [10].

In this study it was showed that almost two third (65.5%) [95% CI 48.22-82.82%] mothers were multipara. Regular ANC was found in 22(75.9%) [95% CI 60.29-91.44%]. Majority (58.6%) [95% CI 40.70-

76.55%] of the mother's had complication during pregnancy, out of which 5(17.2%) [95% CI 3.49-30.99%] had spotting/threatened abortion/APH and 5(17.2%) [95% CI 3.49-30.99%] had PET/HTN. Preterm gestational age was found in 10(34.5%) [95% CI 17.18-51.78%]. More than one third (37.9%) [95% CI 20.27-55.59%] patients were low birth weight. Normal vaginal delivery was found in 15(51.7%) [95% CI 44.14-79.73%]. More than half (55.2%) [95% CI 37.07-73.27%] patients were delivered in hospital. History of perinatal asphyxia was found in 9(31.0%) [95% CI 14.20-47.87%]. Regarding neonatal complication, 8(27.6%) [95% CI 11.32-43.85] patients had neonatal seizure. Hospital admission in neonatal period was found in 15(51.7%) [95% CI 33.54-69.91%].

Mondal *et al.*, in their study reported neonatal sepsis was 6(33.3%).[16] Low birth weight was 10(31.2%). Sunderajan and Kanhere reported there was a statistically significant difference between the two groups for three factors – seizure disorder, birth asphyxia, and physical (oro-pharyngeal) deformity, suggesting an association between these risk factors and speech–language delay [18].

The present study showed that majority 24(82.8%) [95% CI 69.01-96.51%] of the patients ≥8 hours/day time spent per day with mother. Majority 20(69.0%) [95% CI 52.13-85.80%] patients were TV viewing more than 2 hrs per day. Almost two third (65.5%) [95% CI 48.22-82.82%] patients had play computer game/TV more than 2 hrs per day. Peer group interaction was found in 19(65.5%) [95% CI 48.22-82.82%]. Outing per a month was 4(13.8%) [95% CI 1.24-26.34]. Bilingualism in family environment was found in 1(6.9%) [95% CI -0.31 – 10.09%]. Enviromental stress was found in 2(6.9%) [95% CI -2.33– 16.12]. Majority 6(20.7%) [95% CI 5.95-35.43%] mother working <8 hrs outside home. Majority 14(48.3%) [95% CI 30.09-66.46%] patients had time spent >5 hrs by listing bed time story per week.

Silva *et al.*, observed most of the parents (48.2%) spend from four to eight hours a day with the children [22]. Other risk factors would include environmental factors (such as impoverished or high risk environments), delays in symbolic play and/or social skills. Sunderajan and Kanhere explored environmental factors such as trauma, chronic noise exposure and television viewing >2 hrs [18]. Saeed *et al.*, observed that the daily television watching time and timing of using I-pad per day, was associated with delay in speech more in children who were watching TV more than 2 hours per day (50%) [10].

In their study Sharifa *et al.*, found that developmental of speech delay in under-5 children should not be attributed to a single factor, rather and multifactorial approach is required to estimate the accumulation of risk of speech deficit [23]. They studied a total of 120 children with speech delay and found mixed expressive receptive delay was a predominant. Our study had the similar finding. They demonstrated positive history of speech delay had significant association, but in the present study we had no such conclusion. In their multivariate logistic regression analysis, they found being a single child having neonatal complication and a positive family, history of speech delay, extended screen on time, deleterious feeding habit and stressful family environment had significant association with speech delay in children. Many of our study findings were also in concordance with this study done on Bangladeshi children.

In this study we showed that babbling at 9 month speech was found in 17(58.6%) [95% CI 40.70-76.55%]. Majority 15(51.7%) [95% CI 33.54-69.91%] patients had first meaninful word at 23-36 month. Majority 17(57.3%) [95% CI 40.70-76.55%] parents had identified speech dealy 25-36 months. Majority 13(44.8%) [95% CI 26.73-62.93%] patients used physical games for play. Majority 24(82.8%) [95% CI 69.01-96.51%] patients had cooperative/sociable. Regarding feeding habit, poor chewing was found in 14(48.3%) [95% CI 34.07-56.60%] and 2(6.9%) [95% CI -2.33– 16.12] were excessive salivation/drooling.

Regarding speech level of the children it was observed that majority (37.9%) children were delayed receptive, 13(44.8%) were delayed expressive, 9(31.0%) were both delayed receptive and expressive and 5(17.2%) were stammering.

Conflict of Interest: The authors declare no conflict of interest.

Limitations

The study was done in a single center. The sample size of the study was relatively smaller. So, it does not reflect the whole population of the country. A multi-center study with large sample size may be undertaken to make representation of the population of whole country

CONCLUSIONS

Male gender, less time spent with mother, care giver other than mother, nuclear family, being single child, perinatal asphyxia, neonatal complications, family history of speech delay, TV/Computer/Tab watching >2 hrs were associated with speech and language disorder. These factors deserve attention of health professionals during child development. Multifactorial approach is required to estimate the cumulative risk for speech and language disorder.

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