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Original Article

Assessment of speech and language delay among 0-3 years old children attending well-baby clinics using Language Evaluation Scale Trivandrum

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ABSTRACT

Objectives: To assess the prevalence of language delay in children aged 0-3 years and to evaluate the association of socio-demographic, perinatal, and home environment factors with language delay. **Materials and Methods:** A total of 200 children aged 0-3 years attending the well-baby clinic or the outpatient department were included in the study, with exclusion of children with severe illnesses or those with known developmental delays. The parents of the children were asked to fill a risk factor analysis questionnaire consisting of questions related to the socio-demographic, perinatal factors, and home environment. Children were screened for developmental delay using Language Evaluation Scale Trivandrum for children aged 0-3 years. **Results:** Prevalence of language delay in our study was 13%. Positive home environment was significantly associated with no language delay in children ($p=0.0481$); the association was also seen with the parental habit of reading and the happy nature of children ($p<0.05$). Language delay was more common in the age group of 13-24 months, and other socio-demographic or perinatal factors did not have a statistically significant association with language delay. **Conclusion:** Positive home environment is significantly associated with less language delay in children aged 0-3 years. Association of different socio-demographic, perinatal, and home environmental factors with language delay needs to be evaluated with further research.

Key words: *Child development, Child language, Environment, Language development, Parenting*

Language encompasses every means of communication, in which thoughts and feelings are symbolized, to convey meaning to others. It includes writing, speaking, sign language, facial expression, gesture, pantomime, and art [1,2]. Two major components of language are receptive language, i.e., understanding verbal and non-verbal communication, and expressive language, i.e., conveying through verbal or non-verbal communication [2].

Development of language in children is a complicated and multidimensional process [3]. Although receptive language is acquired earlier than expressive language, patterns of development of receptive and expressive language in normal children may exhibit significant variations due to the influence of genetic, sociocultural, and environmental factors. Language delay in children is often an early indicator of intellectual disability, pervasive developmental disorder, and specific learning disorder. Hence, it is important to detect language delay during early age and to begin early intervention measures [2,3].

Although many researchers have evaluated the association of different socio-demographic, antenatal, and perinatal factors with language delay in children, many findings are inconsistent or contradictory [4-6]. The effect of home environment on language development has been evaluated by only a few researchers in India [7]. We conducted this study to evaluate the association of certain socio-demographic and home environmental factors with language delay in children aged 0-3 years and to assess the prevalence of language delay in the study population.

MATERIALS AND METHODS

The study was conducted from April 14, 2014, to September 14, 2014, in a secondary level private hospital in Gurgaon, Haryana, India. The study population consisted of children aged 0-3 years attending the well-baby clinic for routine health checks/immunization or those attending the outpatient department for minor complaints. Children with severe illnesses, with known developmental delays, or those without parental consents were excluded from the study. Parents were informed about the purpose and methodology of the study.

Two tools were used in the study: Risk factor assessment questionnaire and Language Evaluation Scale Trivandrum for children aged 0-3 years (LEST 0-3).

Risk factor assessment questionnaire consists of two parts. The first part includes socio-demographic parameters (name, age, gender, religion, parental education, occupation of the family head, family income per month, socioeconomic classification based on Kuppuswamy scale 2007, place of residence, type of family, total number of members in family, birth order of the

child) and antenatal and perinatal parameters (gestational age at birth, age of mother and father at the time of birth, birth weight of the child, type of delivery, antenatal/natal/post-natal problems if any, presence or absence of cleft lip/palate). The second part of the questionnaire consists of 30 questions that are a part of the Home Screening Questionnaire (HSQ) [8] used to assess the home environment and the involvement of parents/caregivers in child's development. In our study, the positive home environment was defined as HSQ score of 20 or above, whereas the negative home environment was defined as HSQ score of 19 or below.

LEST 0-3 is a simple, reliable, and valid tool used to screen children aged 0-3 years for language delay [2,9]. It was used by the investigators after the parents filled the risk factor assessment questionnaire. The child's chronological age in months was plotted on LEST 0-3 as a line, and it was checked if the child was able to do all the items to the left of the line. If a child was able to perform all the expected items, his language development was considered normal. If a child was not able to perform only one of the expected items, a follow-up was advised to the parents. For the purpose of the study, children, who were able to perform all or unable to perform only one item, were considered to have no language development delay. Language delay in our study was defined as the inability to perform two or more of the expected items for child's chronological age on LEST 0-3.

The collected data were entered into a Microsoft Excel Sheet. Statistical analysis was done using Graph Pad software. In addition to simple arithmetic calculations, Chi-square test and Fisher's exact test were also used. For statistical significance, $p<0.05$ was considered significant.

RESULTS

Prevalence of language delay in our study population was 13%. Table 1 shows statistical analysis of socio-demographic and antenatal/perinatal parameters of risk factor assessment questionnaire in the study population.

Language development delay was present in 13 (19.69%) children with the negative home environment as compared to 13 (9.7%) children with positive home environment, the difference being statistically significant (p=0.0481). Table 2 shows statistical analysis of the items of HSQ in the study population.

Table 1: Statistical analysis of parameters of risk factor assessment questionnaire and language delay in the study population

Risk factor	Children with delay (%)	Children with no delay (%)	p value
Age group			
0-12 months	4 (4.82)	79 (95.18)	0.0102
13-24 months	14 (21.21)	52 (78.79)	
25-36 months	8 (15.69)	43 (84.31)	
Sex			
Male	16 (14.68)	93 (85.32)	0.5744
Female	10 (10.99)	81 (89.01)	
Socioeconomic status			
Upper class	20 (13.07)	133 (86.93)	0.9277
Upper middle class	6 (13.04)	40 (86.96)	
Upper lower class	0 (0.00)	1 (100.00)	
Family type			
Extended/joint	15 (14.42)	89 (85.58)	0.5334
Nuclear	11 (11.46)	85 (88.54)	
Gestational age			
Term	21 (11.73)	158 (88.26)	0.1611
Preterm	5 (23.81)	16 (76.19)	
Birth order			
1	17 (11.97)	125 (88.03)	0.7138
2	9 (15.79)	48 (84.21)	
3	0 (0.00)	1 (100.00)	
Birth weight			
>4000 g	0 (0.00)	1 (100.00)	0.5826
3501-4000 g	0 (0.00)	7 (100.00)	
3001-3500 g	10 (13.89)	62 (86.11)	
2501-3000 g	8 (9.88)	73 (90.12)	
2001-2500 g	6 (19.35)	25 (80.65)	
1501-2000 g	2 (28.57)	5 (71.43)	
<1500 g	0 (0.00)	1 (100.00)	
Antenatal issues			
No	22 (15.60)	119 (84.40)	0.1089
Yes	4 (6.78)	55 (93.22)	
Natal issues			
No	22 (12.64)	152 (87.36)	0.7539
Yes	4 (15.38)	22 (84.62)	
Post-natal issues			
No	21 (12.14)	152 (87.86)	0.3599
Yes	5 (18.52)	22 (81.48)	
Cleft lip/palate			
No	25 (12.63)	173 (87.37)	0.2437
Yes	1 (50.00)	1 (50.00)	

DISCUSSION

Prevalence of language delay in children (0-3 years) in the community has been reported to be 4.5-6.2% according to different studies in India [4,10]. The higher prevalence of language delay in our study (13%) can be explained by the difference in study populations. Another factor influencing the prevalence could be the use of different screening tools by different researchers. In other studies, socio-demographic risk factors reported to be associated with language delay, with variable consistency, are male sex, sub-optimal health, lower intellectual levels, family history of language delay, larger family size, lower parental education, lower socioeconomic status, and authoritarian training [4-6].

The most common age group associated with language delay in our study was 13-24 months, as compared to age groups 0-12 months and 25-36 months; the difference being statistically significant (p=0.0102). This was in contrast to another study [5] which showed age group of 2-3 years to be the most

Table 2: Statistical analysis of items of HSQ and language delay in the study population

HSQ item	Delay	No delay	p value
Visiting relatives			
Often	18 (14.40)	107 (85.60)	0.4472
Rarely	8 (10.67)	67 (89.33)	
Magazine subscription			
Yes	15 (10.14)	133 (89.86)	0.0730
No	11 (21.15)	41 (78.85)	
Time spent alone by the kid			
Less	19 (12.10)	138 (87.90)	0.4705
More	7 (16.28)	36 (83.72)	
Children's books			
More	15 (14.85)	86 (85.15)	0.4316
Less/No	11 (11.11)	88 (88.89)	
Parents' books			
More	12 (8.57)	128 (91.43)	0.0044
Less/No	14 (23.33)	46 (76.67)	
Babysitter/day care			
No/≤ 1	24 (13.33)	156 (86.67)	1
>1	2 (10.00)	18 (90.00)	
Talking to the child			
Early	18 (11.46)	139 (88.54)	0.3283
Late	8 (18.60)	35 (81.40)	
Child's nature			
Happy	18 (10.23)	158 (89.77)	0.0016
Cranky	8 (33.33)	16 (66.67)	
Conversing during household tasks			
Yes	24 (12.70)	165 (87.30)	0.6389
No	2 (18.18)	9 (81.82)	
Reading stories/picture books			
Often	11 (11.96)	81 (88.04)	0.6855
Less/No	15 (13.89)	93 (86.11)	
Regular visits to the doctor			
Yes	23 (12.17)	166 (87.83)	0.1582
No	3 (27.27)	8 (72.73)	
Father's involvement in child care			
Often	25 (12.95)	168 (87.05)	1
Less/No	1 (14.29)	6 (85.71)	
Mother involved with active play with child			
Often	24 (12.97)	161 (87.03)	1
No	2 (13.33)	13 (86.67)	
Duration of TV watching			
Kid			
Less	20 (14.60)	117 (85.40)	0.3215
More	6 (9.52)	57 (90.48)	
Mother			
Less	20 (12.27)	143 (87.73)	0.5193
More	6 (16.22)	31 (83.78)	

HSQ: Home Screening Questionnaire

commonly associated with language delay. As language develops rapidly between 2 and 5 years [3], it is likely that language disorders are more commonly detected after infancy. However, a study by another researcher [4] found no association of age with language delay.

Male sex has been reported as a risk factor for language delay in a few studies [6,11]. Possible explanations include slower maturation of nervous system and influence of testosterone in boys. In our study, language delay was more common in males, but the difference was not statistically significant. A few other studies also have not found association between male sex and language delay [4,5].

Educated parents are likely to provide a cognitively enriched environment to their children, and a few studies have also reported the positive influence of parental education on the development of children [12-14]. However, the results have not been consistent, and some researchers have reported no such association. In our study, only one of the mothers and only four of the fathers had education below graduate level. Hence, it was not possible to evaluate the effect of lower parental education on language delay in children. However, professionally educated parents did not seem to have a significant advantage over graduate/post-graduate parents.

Effect of the family size and family structure on the language development of children is complex [15,16]. Although it can be expected that increased family size and joint or extended families would give more opportunities for communication and stimulation to children, overcrowding, noisy home environment, and increased family tension may be associated with delayed linguistic development in children [17]. In our study, neither the type of family (nuclear or joint/extended) nor the size of family showed statistically significant association with language delay in children.

Other demographic factors studied were the occupation of the family head, family income, and the socioeconomic status. However, it is not possible to interpret the association of these factors with language delay as our study population mainly consisted of at least semi-professional or professional family heads (88.5%), monthly family income >19,575 Rs. (99.5%), and upper middle or upper socioeconomic classes (99.5%).

Different antenatal/perinatal risk factors possibly associated with language delay in children are prematurity, low-birth weight, late birth order, increased maternal age at time of birth, maternal medical conditions, alcohol consumption or smoking during pregnancy, birth asphyxia, meconium aspiration, poor APGAR score, delayed crying, long hospital duration, adverse neonatal health conditions, etc. [6,18,19].

In our study, language delay was more common in children born preterm, in low-birth weight children, and in children with birth weight between 1501 and 2000 g than those with birth weight between 2001 and 2500 g. However, the differences were not statistically significant. This contrasts with other studies that have identified prematurity and low-birth weight as being associated with language delay in children [13,20]. The possible explanation could be the inclusion of only 21 preterm children and only 1 child with very low-birth weight.

Language delay was more common in 2nd born children than 1st born children, the difference not being statistically

significant. As there was only one child with the 3rd birth order, it is not appropriate to comment about 3rd born children. A study by Tomblin et al. [11] has shown that language delay is more common in children who are born later in the birth order. Other factors such as maternal age at time of birth, paternal age at time of birth, or the type of delivery did not show significant association with language delay. A majority of the children included in the study had normal antenatal, natal, and post-natal periods, and we could not find any significant correlation between these risk factors and language delay.

In our study, negative home environment is significantly associated with language delay in children. This is also seen in another study in India [7]. Among individual parameters of the home environment, the two parameters that were significantly associated with children with no language development delay were parental reading and happy nature of children. Language delay was less common in children of parents who have the habit of reading and who owned at least 10 books (p=0.0044). Children who were described by their parents as being "happy" or "smiling" were also less commonly delayed in language (p=0.0016) than the children who were "cranky."

Home environment characteristics without significant association with language delay were subscription of magazine by parents, less time spent alone by child, having a special place to keep toys at home, taking the child to grocery store often, having pets in the house, not spanking the child, early talking to the child, conversing during household tasks, exploring toy with kids, reading stories/picture books, playing toys when child gets bored, presence of plants in the house, regular visit to the doctor, interacting with friends about kids, mother trying out new recipes, father's involvement in child care, child often going out of the house, family member in college, mother deciding family expenditures, mother often involved with active play with the child, and mother spending less time with television. However, none of these characteristics showed statistical significance.

We came across some studies that evaluated the individual parameters of home environment on language development. For example, father-child interactions during early age are important in language and cognitive development of the child as seen in some studies [21,22], average daily television watching time of more than 2 h is associated with language delay [23], etc. However, we could not find studies evaluating some of the parameters such as presence of plants in the house and mothers trying out new recipes. Hence, considering findings from our study, it seems reasonable to believe that it is the overall home environment that is more important for the prevention of language delay in children. Further studies evaluating effects of different aspects of home environment on language development should make the picture clearer.

Some limitations of our study were reflected in the results. As mentioned earlier, it was not possible to interpret the association of some characteristics with language delay in the study population because of a smaller number of subjects having those characteristics. The study was conducted at a private urban hospital, and the study population had a greater number of parents who were well educated and belonged to at least upper middle socioeconomic class. The results of our study cannot be generalized, as a significant proportion of the Indian population is from villages with poor parental education and low socioeconomic status.

However, our study holds its importance as the role of different socio-demographic and antenatal/perinatal parameters in language delay is relatively less explored in Indian population. Furthermore, apart from a study by Mishra [7], we could not find a study evaluating effects of home environment in language development in children in India. The significant association of positive home environment with no language delay found in our study is an important message for parents, educators, and researchers.

CONCLUSION

We conclude that prevalence of language delay in our study was 13%. Although language delay is more common in age group of 13-24 months, association of other socio-demographic and antenatal/perinatal factors with language delay in children aged 0-3 years is less clear. Positive home environment is significantly associated with less language delay, important individual characteristics being parents having reading habits and happy nature of children. Further studies evaluating the association of different risk factors in the home environment with language development in children are needed in India.

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