

## Prevalence and Risk Factors Affecting Speech and Language Delay in Children Aged 3- 6 Years in North Maharashtra

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Received: 11-03-2023 / Revised: 10-04-2023 / Accepted: 14-05-2023

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Conflict of interest: Nil

### Abstract

**Background:** There is a large amount of data on the prevalence and risk factors of speech and language delay from the West. As of now an Indian data is more from tertiary care centers and there is a very scanty data from rural parts of the country or at community screening level.

**Objectives :** The aim of this study was to assess the prevalence and risk factors of speech and language delay in children from 3-6 years age group, using the Language Evaluation Scale Trivandrum (LEST 3-6).

**Methods:** A descriptive, cross-sectional study was conducted in the pediatrics department of District Hospital, Nasik, Maharashtra, on a sample of 150 children, three to six years old, who attended pediatric Outpatient Department (OPD) of District Hospital, Nasik, Maharashtra State. Language was assessed using Language Evaluation Scale Trivandrum (LEST 3-6). Various biological and environmental predisposing factors were analyzed.

**Results:** The prevalence of speech and language delay was found to be 21%. There was no significant association of gender difference with speech and language delay. Age group affected more was 4 to 5 years. In this cross sectional study, male predilection was found to be significantly associated with speech and language delay were male gender, educational status of the parents, preterm delivery, history of convulsions, low birth weight, intra uterine growth retardation, down syndrome and positive family history of speech and language delay.

**Conclusions:** Prevalence of speech and language delay is high (21%) in children between 3-6 years of age. Negative home environment, educational status of family members, family history of speech and language disorders were the common risk factors for speech and language delay. There is a strong association of speech and language delay with perinatal risk factors like prematurity, LBW, IUGR, convulsions, neonatal jaundice, birth asphyxia and also early stimulation.

**Keywords:** Educational Status, LEST (3-6), Predisposing Factors, Speech and Language Delay.

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### Introduction

Language is the medium to exchange our thoughts, ideas, feelings, and emotions. Pei defined language as ‘sound produced by the human voice, received by the human ear and interpreted by the human brain. [1] Language is a communication tool in

different forms such as – writing, speaking, sign language, facial expression, gesture and art. [2] In children speech and language development occurs in a sequential manner and as age advances the child has more and more to communicate, first learning to

listen and understand language before they learn to talk.

Language can be divided into two major components – receptive and expressive.

1. Receptive language which includes verbal and non-verbal communication
2. Expressive language pertaining to ability of children to say about what they want to communicate.

The studies have shown most of the children communicate at similar pace without any assistance. There are mainly four theories, which explain the process of language acquisition, but none gives a complete explanation. A potential to acquire native language naturally is present in all children, without additional training. A normal development of speech and language is indicated from the skills to hear, see, comprehend and remember in addition to understanding oral movements. [2]

Speech and language are influenced by a wide range of factors some of which include, socio economic status, parental education status, other special senses problem (vision, hearing etc). However, the chances of neurological injury are absent in a large proportion of children with language impairment. The genetic factor plays a major role in defining the speech style of children. [3]

### **Language development in Preschool children**

Preschool children command significant computational skills and understanding of statistical patterns that allow them to learn about both language and causation. The 2 and 3yr old child employs frequency distributions to identify phonetic units distinguishing words in his or her native language from other languages. [4]

Language acquisition depends critically on environmental input. Key determinants include the amount and variety of speech directed toward children and the frequency with which adults ask questions and encourage verbalization.

Preschool language development lays the foundation for later success in school. Children may enter school lacking the language skills that are the prerequisites for acquiring literacy. Children from socially and economically disadvantaged backgrounds have an increased risk of school problems, making early detection, along with referral and enrichment, highly crucial for later development. Although children typically learn to read and write in elementary school, critical foundations for literacy are established during the preschool years.<sup>5</sup> Through repeated early exposure to written words, children learn about the uses of writing (telling stories or sending messages) and about its form (left to right, top to bottom). Early errors in writing, like errors in speaking, reveal that literacy acquisition is an active process involving the generation and revision of hypotheses. [5, 6]

The period of rapid language acquisition is also when developmental dysfluency and stuttering are most likely to emerge (these can be traced to activation of the cortical motor, sensory, and cerebellar areas). Common difficulties include pauses and repetitions of initial sounds. Stress or excitement exacerbates these difficulties, which generally resolve on their own. [7] Although 5% of preschool children will stutter, it will resolve in 80% of those children by age 8 yr. Children with stuttering should be referred for evaluation if it is severe, persistent, or associated with anxiety, or if parental concern is elicited. Treatment includes guidance to parents to reduce pressures associated with speaking. [8]

This study was planned for children aged 3 to 6 years at community level of Nasik district of Maharashtra state by using Language Evaluation Scale Trivandrum (LEST 3 -6), developed and validated by CDC, Trivandrum, Kerala.

## Material and Methods

This cross-sectional study was conducted in children aged 3-6 years at randomly selected from the patients attending pediatrics outpatient department at District hospital, Nasik. This study was conducted for the period of 6 months starting from October 2019 to October 2020. Total 150 children aged 3-6 years were studied for speech and language delay using pre-tested, structured proforma for information on socio-demographic and pre-disposing factors. A pre-validated LEST 3-6 (Language Evaluation Scale Trivandrum) scale was used to detect speech and language delay. All the children selected were from urban as well as from rural area of Nasik (North Maharashtra).

Following inclusion and exclusion criteria will be used for data collection purpose.

Children aged 3-6 years whose Parent's/legal guardian's willing to give consent were included in the study.

Children, who were seriously ill, Hearing impairment, observed to have physical abnormality and with history of developmental delay were excluded from the study.

### Data Collection Tool:

LEST3-6 (Language Evaluation Scale Trivandrum) was used for this study. LEST 3-6 is a improvised, developed and validated by MKC Nair et al at CDC, Trivandrum, Kerala. [1-6]

LEST [3-6] is a simple Indian tool for identifying children of 3 to 6 years with language and speech delay in the community with an acceptable sensitivity (47%), specificity (94%), positive predictive value. 31 items are included in this tool. This contains 31 items with range are represented by horizontal dark line. Horizontal dark bar on x- axis indicates the percent of children completing this item (left end indicates 3% and right indicates 97% of children are completing that item). These items are selected from existing developmental/speech and language

assessment scales, tools, guidelines like Denver developmental screening test, Receptive- Expressive Emergent Language Scale (REELS), Early Language Milestone Scale (ELM scale - 2), Hearing checklist etc.[2,3]

### Process:

A vertical line or pencil is kept on the dark line showing the test item against the age of the child. Items on the left side of the line drawn should be passed by the child. Two items delay was considered as a delay in language and speech for that child.

A team members from pediatrics OPD and DEIC were selected and trained for how to apply this simple Indian tool. All information, importance and purpose of the study, importance of language and speech development were explained to the participant children's parents.

Patient information sheets (in English and local language-Marathi) were distributed among the parents/legal guardian and also displayed in OPD. Detail information was explained to the parents/legal guardian. Informed consent (in English and local language Marathi) was obtained from the parents/legal guardian of the participant children's parents. Prior permission was obtained from concerned govt authorities for conducting this study in pediatrics OPD. LEST delay interpretation [7]:

1. One item delay is questionable delay
2. Two item delay is suspect delay which is considered as language and speech delay; and these children were sent to DEIC for further evaluation and interventions.

### Data Analysis:

Data analysis was done by using Microsoft office -excel software. Descriptive analysis for factors affecting speech and language delay was performed and proportion of children having such delay was calculated.

### Results

This study was aimed at diagnosing language and speech delay early so as to intervene at an early age for the speech and

language delay with speech therapy and specific treatment for each etiology.

This study also took various factors into account which led to speech delay in the child. The major findings in the study were:

Most of the parents were not aware of the speech and language delay in their children until this screening was done. 150 children between the age group of 3-6 years and were divided in to age groups of 3-4 years (38%), 4-5 years (33%) and 5-6 years (29%) as shown in Table1.

**Table1: Demographic distribution**

Characteristics	Subgroup	Number	%
Age group(years)	3-4	57	38
	4-5	50	33
	5-6	43	29
Gender	Male	100	66.66
	Female	50	33.34
Parental Education status	10th fail	67	44.66
	10th pass	62	41.33
	Graduation	21	13.01

Of which 100 children (66.66%) were males and 50 (33.64%) were females. Parental education status was 10<sup>th</sup> fail (44.66%) and 10<sup>th</sup> pass (41.33%). 13% were having education up to graduation as shown in table 2.

**Table 2: Showing Association of parental education with LEST Results**

Parental Education status	No Delay	LEST positive	Total	%
10th fail	53	14	67	44.66
10th pass	50	12	62	41.33
Graduation	15	06	21	14.01
Total	118	32	150	100

The prevalence of speech and language delay was found to be 21.33% among these 150 children. [Table 3]

**Table 3: Showing Statistical analysis of LEST Results**

Age Group (years)	No Delay	LEST positive	Row Totals
3-4	50 (44.84) [0.59]	7 (12.16) [2.19]	57
4-5	35 (39.33) [0.48]	15 (10.67) [1.76]	50
5-6	33 (33.83) [0.02]	10 (9.17) [0.07]	43
Column Totals	118	32	150

The chi-square statistic is 5.1159. The p-value is .077463. The result is significant at  $p < .10$ .

The study sample was representative of children brought to a secondary care centre in north Maharashtra and the prevalence of speech and language delay was estimated to be 21.33 %. 22 males and 10 females were having LEST positive. [Table 4]

**Table 4: Statistical analysis of Language and Speech delay in Gender difference**

Gender	LEST pass	LEST positive	Marginal Row Totals
Males	78 (78.67) [0.01]	22 (21.33) [0.02]	100
Females	40 (39.33) [0.01]	10 (10.67) [0.04]	50
Marginal Column Totals	118	32	150 (Grand Total)

The chi-square statistic is 0.0794. The p-value is .778045. Not significant at  $p < .01$ .

The chi-square statistic with Yates correction is 0.005. The p-value is .943822. Not significant at  $p < .01$ .

During this study the frequently found pre-disposing factors were prematurity at the time of birth (34%), history of convulsions (21%). Down syndrome, low birth weight, intra uterine growth retardation and the positive family history of speech and language delay were 9% each as shown in Table 5.

**Table 5: Predisposing Factors for Language and Speech delay**

Predisposing Factors	Positive LEST	%
Prematurity	10	31.3
Low Birth Weight	3	9.4
IUGR Convulsive Disorder	3	9.4
Neonatal Jaundice	3	9.4
Down syndrome	3	9.4
Family h/o speech delay	7	21.7
Total	32	100

## Discussion

Among various studies done on language and speech delay in 3-6 years, the prevalence was 4-16% and up to 27%. [5,6] The prevalence of language and speech delay in our study was 21%. Mondal N et al [6] reported higher prevalence of 27% in their study below 3 years of age and reported 26.2% children having specific language impairment.

In the present study, higher prevalence may be due to the area under secondary care centre and it is the unique referral centre (DEIC) for the rural population in the Nasik and nearby districts of North Maharashtra. More blocks of this district are occupied by tribal population. This is visited by children at a higher risk for delayed development.

Studies done by Nair et al [4] who have developed the LEST scale among 3-6 years stated that the prevalence was 5%. He also noted that there was a prevalence of 13.75% speech delay among children attending routine clinics. Dharmalingam et al [8] reported the prevalence of speech and language delay to be 10.5%, 13.1 % and 9.54 % among the age group of 3-4, 4-5 and 5-6 years respectively. Prevalence in the age group 4-5 years was higher than other age groups in the study. In our study among the age group of 3 to 4 yrs the speech and language delay was 10.52% which is also higher than that of observed (5%) in a study

done by J. Bruce Tomblin. [9] Among the age group of 5 to 6 yrs the speech and language delay in our study was 9.83% which is comparable to 11.78% observed by Pike A et al. [10]

Dharmalingam et al [8] and Campbell TF [11] reported more prevalence of language and speech delay in the boys as compared to girls with the male: female ratio of 2.2:1 whereas Davis -Kean PES et al [12] found that male: female ratio of 1.3:1. In our study we statistically did not find any significant association of language and speech delay and gender difference. Similar findings were reported by Tina L Stanton-Chapman [13] and Tomblin et al. [9]

In the present study, the association of language and speech delay with parental education was not significant, also reported by Sidhu m et al [14] and by Dharmalingam et al. [8]

Income and maternal education emerged as significant factor to the language quotient of the child. Evidence indicates that socio-economic disadvantage is associated with inadequate food, poor nutrition and hygiene, poor maternal education, inadequate stimulation at home, inadequate schooling and suboptimal physical environment at home.

Numbers of medical factors related to the language delay are reported in various studies. These factors include- Premature

birth, low birth weight, intrauterine growth retardation, seizure disorders, birth asphyxia, oro-pharyngeal deformities etc. In the present study we reported prematurity and convulsive disorder, more common predisposing factor. LBW, IUGR, neonatal jaundice was present in 3 children each. Along with medical conditions other genetic factors also have a role in language delay. We reported 3 children with Down syndrome with language and speech delay. Down syndrome (DS) is associated with abnormalities in multiple organ systems and a characteristic phenotype that includes numerous behavioral features. Language, however, is among the most impaired domains of functioning in DS and, perhaps, also the greatest barrier to independent meaningful inclusion in the community as reported by Manjit Sidhu et al [14, 15]

Family history was defined as family members who were late talking or had language disorders, speech problems or learning problems. In the present study we reported 3 children having family history of language and speech delay. This finding was similar to Leonard Abbeduto et al.[16]

It is highly recommended that the LEST 3-6 is a simple and very easy to apply tool and can be used for screening of toddlers at community level as well as at outpatient department in private as well as a government set up. It requires a very minimum training.

### Conclusion

This study uses simple screening tests like LEST (3-6) which can be easily carried out in an outpatient department, to identify children with speech and language delay.

This study emphasizes the fact that early detection of speech delay will facilitate early initiation of speech therapy which helps in improved outcome in these children.

It has been shown that language disorders are the most common childhood disabilities in children less than 5 years of age. It is also

known that delay in language development may be an early indicator of Autistic spectrum disorders (ASD), and impending Learning disabilities. Regardless of the etiology or severity of the delay early intervention is critical. By using simple, easy to administer, validated tool will be useful for the better implementations of government programmers and for the professionals working in the field of child development.

The small sample size does not represent the population and more controlled studies are required. This study was done only to those toddlers who sought health services to the district hospital, a secondary level care centre. A community based study could not be done. Even though speech therapy was initiated in all the affected toddlers, follow up study could not be done due to time constraint.

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