

Assessment of speech and language delay in children up to 6 years using Trivandrum development screening chart and language evaluation scale Trivandrum

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Abstract

Background: Speech and language delay is one of the most common neurodevelopmental difficulties in early childhood. A delay in the speech or language implies that the child is developing speech or language in the proper sequence but at a rate slower than expected, where as in a speech or language disorder, the child's speech or language ability is different from the typical development. TDSC and LEST are screening tools are simple and less time consuming. **Aims:** To study the role of TDSC and LEST charts for identifying speech and language delay among children 0–6 y of age and to study the sensitivity and specificity of TDSC as a screening tool for speech and language delay. **Methods:** This is a cross sectional study conducted after Institutional ethics committee approval and written informed consent. All children were evaluated for speech and language delay using screening tools- LEST and TDSC. One item delay was considered as delay in LEST and TDSC. Statistical analysis was done using Med Calc. **Results:** 425 children were screened by TDSC and LEST screening charts of which 88 children (20.7%) had a speech and language delay. TDSC screening tool for development was delayed in 50 patients and normal in 38 children that is 10.1% out of 88 children of speech and language delay. The sensitivity of TDSC was 56.81% in detecting speech delay. **Conclusions:** A significant association was found between delay in TDSC and speech and language delay. TDSC and LEST must be simultaneously administered for screening of speech and language delay is recommended.

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INTRODUCTION

Speech and language delay is one of the most common neurodevelopmental difficulties in early childhood. There is a wide variation in prevalence ranging from 2.27% to

19% according to the systematic review by Law *et al.*¹ Speech disorders include articulation disorders, voice disorders and fluency disorders. Language disorders include specific language impairment, dyslexia and less common like aphasia, semantic pragmatic disorder and auditory processing disorders. They could be primary or secondary to neurological problems like cerebral palsy, chromosomal disorders like Downs Syndrome or developmental disorders like Autism. They could be Receptive unable to understand or Expressive not able to express. Speech and language delay due to secondary problems are detected earlier than primary and are usually neglected. They lead to difficulty in cognition, social adaptation and learning disabilities and poor school performance. A delay in the speech or language implies that the child is developing speech or language in the

proper sequence but at a rate slower than expected, where as in a speech or language disorder, the child's speech or language ability is different from the typical development. The difference between the two is complicated as the screening tools are not able to differentiate between a child who has a delay which will subsequently resolve and the child who will have a speech and language disorder like specific language impairment. Many children with language delays especially expressive language score in the normal range by age 4 or 5 years, but usually their performance is often weak than children without delays.^{2,3,4,5} A vast variety of screening tools are being used to screen for speech and language delays; many of which are a part of broader screening for developmental delays. Few screening tools have been designed to be administered to the child while others are checklists which are designed to be completed by a parent or teacher. Bayley Scales for Infant Development-II (BSID-II), British Ability Scales, Denver Developmental Materials, Stanford-Binet, Ages and Stages Questionnaire, Vineland Adaptive Behavior Scales II are internationally-used tools to assess cognition and other domains in infants from 0 to 3 year(s) of age.⁶ In India screening tools used for assessment of development are Baroda Development Screening Test (BDST), Developmental Assessment Tool for *Anganwadis* (DATA), Disability Screening Schedule (DSS), Ten Questions Screen (TQS) for Childhood Disability, Kilifi Developmental Inventory (KDI), Trivandrum Developmental Screening Chart (TDSC), Guide for Monitoring Child Development (GMCD), Screening Test Battery for Assessment of Psychosocial Development (STBAPD), Parents Evaluation of Developmental Status (PEDS), Comprehensive Developmental Inventory for infants and Toddlers (CDIIT), Rapid Neurodevelopmental Assessment Tool (RNDA), Lucknow Developmental Screen, and Angkor Hospital for Children Developmental Milestone Assessment Tool (AHC DMAT).⁶ An Anganwadi based survey of developmental delay/disability in one ICDS block observed that the speech and language delay was one of the commonest among developmental problems.⁷ In most developmental assessment tools the language development is not represented adequately. There is a need to have a tool for assessing language delay, which can be easily used by health workers. A screening tool for language delay should be simple, less time consuming and easily understood by the community health worker and the parents.

Trivandrum Development Screening Chart (TDSC) (0-6 y) is a screening tool with 51 items was made from different existing developmental tools is validated for children up to six years of age. TDSC is a simple, reliable

and valid screening tool for use in the community to identify children with developmental delay. It was designed and developed the Child Development Centre, SAT Hospital and Medical College, Trivandrum. The range for each test items was taken from the norms given in Bayley Scales of Infants Development (Baroda norms).⁽⁸⁾ TDSC chart with one item delay had a sensitivity and specificity of 84.62% and 90.8% respectively. The NPV was 99.23% and LR (negative) was 0.17.⁹

Language Evaluation Scale Trivandrum (LEST: 0 - 3 years) is a screening tool with thirty-three test items validated against Receptive-expressive emergent language scale (REELS).⁽¹⁰⁾ The sensitivity and specificity of LEST with a delay in one item was 95.8% and 77.5% respectively; Positive predictive value (PPV) and negative predictive value (NPV) was 14.2% and 99.8% each; LR (negative) of 0.05. The sensitivity and specificity of LEST(0-3), with a two item delay was 66.7% and 94.8% respectively with a NPV of 98.7% and LR (negative) of 0.35.¹¹ **Language Evaluation Scale Trivandrum (LEST: 3-6 years)** is a screening tool with 31-items which was validated against extended REELS⁽¹²⁾ in which a community sample size of 606 children between 3 to 6 years were studied. LEST showed a delay of one and two items with a sensitivity of 81% and 47% respectively; specificity of 68% and 94% respectively, PPV of 12% and 31% respectively, NPV of 98% and 97% each and accuracy of 68.5% and 92% respectively. LEST (3-6years), a simple screening tool, validated and easy to administer in the community setting.¹³ Problems with REELS in the community setting are that it is a time consuming test and difficult to administer in a community setting; and it can be administered only by speech and language pathologists. LEST and TDSC on the other hand can be administered by any person with minimal training. They are easy to administer, items are simple to perform and are in Chart form, which is easier than the former one. REELS is in compound and complex language which is difficult to understand and apply in the community, but TDSC and LEST are in a simple language.^{10, 12} This study is done to study the screening tools TDSC and LEST for assessment of Speech and Language Delay in children.

AIM AND OBJECTIVES

To study the role of TDSC and LEST charts the developmental screening tools for identifying speech and language delay among children 0-6 y of age and to study the sensitivity and specificity of TDSC as a screening tool for speech and language delay.

METHODOLOGY

Study Design: Cross sectional study

Study setting: Department of Paediatrics, Dr D.Y. Patil Medical College, Pimpri, Pune.

Study Period: 18 months.

Ethical Approval: Approval was obtained from the Institutional ethics committee.

Consent: Written informed consent was obtained from the parents or caretakers prior to enrolment of the children.

Sample Size: 425 children were enrolled in the study.

Selection Criteria:

Inclusion criteria: All children who were visiting Paediatric OPD and were willing to participate in the study.

Exclusion criteria: Children with motor delay and not willing to participate were excluded.

Method of Data Collection and Tools:

A detailed developmental history was obtained from the informant and recorded. All children were evaluated for speech and language delay using screening tools-Language Evaluation Scale Trivandrum (LEST) and Trivandrum Developmental Screening Chart (TDSC). The Trivandrum Development Screening Chart (TDSC) is a 51-item assessment of developmental milestones for children between 0-6 years old. The Language Evaluation Scale Trivandrum (LEST) for 0 to 3 years has 33 items for language. Language Evaluation Scale Trivandrum (LEST) for 3 to 6 years has 31 items for language. The observer assesses the development of the child by drawing a vertical line through the chart for their chronological age. If the child is able to complete any items that are to the left of the line, then there is no delay for that item. If an item lies to the left of the line and the child is unable to complete the item, then a delay is assumed. The tool is designed to assess a child's development and recommend interventions as required.

In this study a one item delay was considered as delay in LEST and TDSC.

Data Analysis:

The collected data was entered into a Microsoft Excel Sheet. Statistical analysis was done using Med Calc. For statistical significance, $p < 0.05$ was considered to be significant. All tests were carried out at 5% significance level.

RESULTS

425 children were screened by TDSC and LEST screening charts.

88 children (20.7%) of 425 children screened from birth to 6 years by LEST had a speech and language delay.

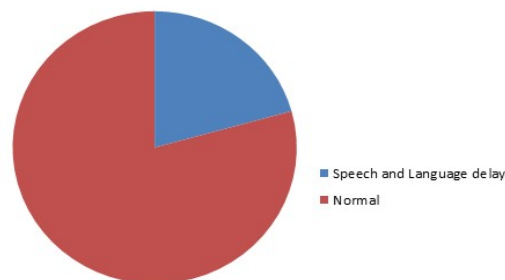


Figure 1: SPEECH AND LANGUAGE DELAY IN CHILDREN BY LEST

There were 215 children in the age group of 0 to 3 years and 210 children in age group of 3 to 6 years. In the age group 0 to 3 years 54 children had delay in LEST but TDSC was delayed only in 24 children. In 3 to 6 year age group 34 children had a delay in LEST but TDSC was delayed only in 26 children.

Diagnosis of speech and language delay with tdsc chart:

Table 1:

TDSC	DELAY (no/%)	NORMAL (no/%)	TOTAL (no/%)
DELAYED	50(100.0)	0(0.0)	50 (11.8)
NORMAL	38(10.1)	337(89.9)	375 (88.2)
	88(20.7)	337(79.3)	425

Table 1: shows that the TDSC screening tool for development was delayed in 50 patients and normal in 38 children that is 10.1% out of 88 children of speech and language delay. The p value is < 0.0001 which is significant.

Table 2: Sensitivity, Specificity, Positive Predictive Value and Negative Predictive Value of TDSC:

Sensitivity	56.818%	45.823% to 67.341%
Specificity	100.000%	98.911% to 100.000%
Positive Predictive Value	100.000%	
Negative Predictive Value	89.867%	87.466% to 91.850%

The sensitivity of TDSC is 56.818% and the specificity is 100%. The Kappa value is 0.67 (0.58-0.76).

DISCUSSION

425 children were enrolled in this study out of which there were 88 children with a delay in speech and language. The prevalence of Speech and Language Delay is 20.7% in our study. The prevalence of speech and language delay was found to be 27% by Mondal *et al.*,⁽¹⁴⁾ 13.7% by Abraham B *et al.* in children upto six years,¹⁵ 6.07% by Konadath *et al.* in 2013¹⁶ in the rural part of India, 16% by Ganavi *et al.* in 2015 and Singraiah *et al.* 2017,^{17,18} 16.27% by Parakh *et al.*¹⁹ This appears to be high as compared to the prevalence described by other authors from western world. In a systematic review by Law *et al.*¹ the prevalence of speech and language delay ranges from 2.27% to 19%. In our study LEST and TDSC were chosen as a screening tools for assessing speech and language. LEST chart is easy to administer, has a high sensitivity of 96% and can be completed quickly. The one-item delay in LEST could be the reason for increased

prevalence. If two items delay is taken, the prevalence decreases. One-item delay was chosen as the screening tool will have a high sensitivity. Thus, LEST with positive one-item delay, has a high sensitivity, negative predictive value of 96% and 99.8% respectively but with a low positive predictive value of 14%. A significant association was found between delay in speech items of TDSC and speech and language delay. The role of TDSC as a screening tool for detecting speech and language delay against LEST (one-item delay) as the 'gold standard' was analysed. The TDSC has a sensitivity of 85% in detecting overall development delay. The TDSC as a screening tool for language development was delayed in 50 patients and normal in 38 children that is 10.1% out of 88 children of speech and language delay. The sensitivity of TDSC is 56.818% and the specificity is 100% with a negative predictive value of 89.867%. Similarly, in the study done by Mondal *et al.* the prevalence of speech delay was 27%. 188 children were screened with TDSC and LEST. 54 children had failed LEST but only 18 had failed TDSC, giving TDSC a sensitivity of only 33% in detecting speech delay. It had a high specificity of 94.5%. Positive and negative predictive values were 79% and 69%, respectively. The low sensitivity is possibly because TDSC has very few language items before 24 months of age. Therefore for screening of speech and language delay in children a simultaneous administration of LEST along with TDSC must be recommended.

CONCLUSIONS

A significant association was found between delay in TDSC and speech and language delay. The sensitivity of TDSC was 56.81% in detecting speech delay. The low sensitivity is due to very few language items in TDSC before 24 months of age. TDSC 3 to 6 years had better sensitivity than 0-3 years. TDSC and LEST must be simultaneously administered for screening of speech and language delay is recommended.

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