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Language Evaluation Scale Trivandrum (LEST 3-6 years) – Development and Validation

Language Evaluation Scale Trivandrum (LEST:3-6 years) with 31-items, was validated against 'extended REELS' with a community sample-606 children (3-6yrs). One item and two item delay as 'LEST delay' showed a sensitivity of (81%, 47%); specificity (68%, 94%), PPV (12%, 31%); NPV (98%, 97%) and accuracy (68.5%, 92%), respectively. LEST (3-6years) is a simple, valid, community screening tool.

Keywords: *Language development, LEST, Screening tool, Validation.*

Children learn to articulate speech sounds as they develop, with some sounds taking more time than others [1]. Screening is the preliminary step to determine if sensory, behavioral and developmental skills are progressing as expected, or if there are causes for concern for further evaluation. Language Evaluation Scale Trivandrum (LEST 0-3 years) [2] is a simple screening tool developed and validated by Child Development Centre (CDC), Kerala, and was found useful for early intervention [3]. The prevalence of speech and language delay in literature below 6 years old is 3.8% [4]. As majority of children present with speech and language problem in the pre-school years, the present study aimed to develop the scale for children aged 3-6 years [LEST (3-6 yrs)], and validate it using the 'available' reference standard, extended Receptive Expressive Emergent Language Scale (extended REELS) [5].

LEST (3-6) with 31 test items, was developed at CDC Kerala and validated in a community sample of children.

The detailed methodology was reported in a previous article on LEST (0-3) [2]. The additional test items and the ranges were selected from different existing developmental/speech and language assessment scales, tools or guidelines like, Hearing check list by American Speech-Language-Hearing Association [6], Speech and language development in babies by Abby Deliz [7], Gilman and Gorman's Speech Language Development Chart [8], Speech Sound Development Chart by Sander's [9], and Ages and stages milestones for receptive and expressive language acquisition by Caroline Bowen [10].

Children between 3-6 years belonging to 11 *Anganwadis* from an urban ward, 20 *Anganwadis* from a rural *Panchayat* and 3 *Anganwadis* from tribal area, participated in this study. LEST (3-6), was applied by two trained persons having similar educational qualification as that of an ICDS Supervisor, and "extended REELS" by two Speech and Language therapists. For LEST [3-6], a vertical line was assumed by keeping a scale vertically, at the chronological age in months given horizontally in the 'X' axis (**Web Fig. 1**). All items falling short on the left side of the age line was expected to be done by the child. If not done, it was taken as that item delay. First preference was given for observation of the child and testing of the items; if it was not possible, for some of the items, parental reporting was considered valid.

The test re-test reliability (intra-class correlation of 0.61; 95% CI 0.41-0.76) and inter-rater reliability (intra-class correlation of 0.96; 95% CI 0.93-0.97) were acceptable in valid samples of 50 children.

Test results for both LEST (3-6) and the reference standard were available for a sample of 606 children (292 boys); 247 (3-4 years), 221 (4-5 years), 138 (5-6 years). **Table I** shows the results with one-item delay and two-item delay as test positive, against extended REELS. One-item

delay and two-item delay showed a sensitivity of 81% and 47%; specificity 68% and 94%; positive predictive value 12% and 31%; negative predictive value 98% and 97%; and accuracy 68.5% and 92%, respectively. Changing the tool positivity from one-to-two item delay, resulted in decrease of sensitivity from 81% to 47% though specificity increased from 68% to 94%.

For LEST(3-6) as a screening tool for Language delay, we suggest delay in two item as test positive, because of the relatively higher positive predictive value and lesser false positives in the screened sample, with an excellent negative predictive value (97%). Since speech and language development is a continuous process without a definite line for normal/abnormal, and with limited resources for language stimulation/therapy available, a lower sensitivity (47%) may be accepted. The choice between one-item and two-item delay as "LEST delay" depends on the need, whether to have a highly sensitive test with a low positive predictive value or to have a more specific test having a higher positive predictive value, and a lower, but acceptable sensitivity. This depends also on resources available for further evaluation of screen positives, having larger (with one-item delay) or smaller (with two-item delay) false positives in screened sample.

We conclude that LEST (3-6 years) is a simple, reliable and valid Indian tool for identifying children of 3-6 years with language delay in the community.

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TABLE I TEST CHARACTERISTICS WITH TWO DIFFERENT CRITERIA

	<i>One-item delay % (95% CI)</i>	<i>Two-item delay % (95% CI)</i>
Sensitivity	81 (64-93)	47 (29-65)
Specificity	68 (64-72)	94 (92-96)
Positive Predictive Value	12 (8-18)	31 (18-45)
Negative Predictive Value	98 (97-99)	97 (95-98)
Positive Likelihood Ratio	2.5 (2-3)	7.9 (4.8-13)
Negative Likelihood Ratio	0.28 (0.13-0.57)	0.56 (0.41-0.78)
Accuracy	68.5 (65-72)	92 (89-94)
Prevalence and Bias Adjusted Kappa	0.37	0.83