TRIVANDRUM DEVELOPMENTAL SCREENING CHART

M.K.C. Nair
B. George
E. Philip
M.A. Lekshmi
J.C. Haran
N. Sathy

ABSTRACT

The Trivandrum Developmental Screening Chart (TDSC) was designed by selecting 17 test items from BSID (Baroda Norms). It was validated both at the hospital and community level against the standard DDST. TDSC had a sensitivity of 66.7% and specificity of 78.8%, which makes it an acceptable simple screening tool even for the community level worker.

Key words: *Developmental delay, Developmental screening, Bayley Scales of Infant Development, Denver Developmental Screening Test.*

From the Department of Pediatrics, S.A.T. Hospital, Medical College, Trivandrum, Kerala.

Reprint requests: Dr. M.K.C. Nair, Associate Professor of Pediatrics, Child Development Center, S.A.T. Hospital, Medical College, Trivandrum, Kerala.

Received for publication May16, 1991; Accepted June 13, 1991

Early detection of neuro developmental abnormalities is important because of the possibility of instituting community based early intervention programs. Developmental delay in a baby can be identified with ease when they come for medical advice of professionals. But at the community level these babies may not be identified due to lack of simple techniques of assessment. Baroda Development Screening Test for infants(1) is one such test which is easy to be administered by health workers. In the National Seminar on "Reducing the Incidence of Cerebral Palsy in Children" held in January, 1989 at New Delhi, one of the major recommendation was to implement research studies for development of simple, sensitive, specific, standardized screening kits for use of health workers(2). The present communication deals with the development of one such screening tool.

Material and Methods

Design of the Screening Chart

The Trivandrum Developmental Screening Chart (TDSC) was designed and developed at the Child Development Center, SAT Hospital, Medical College, Trivandrum. Seventeen test items were carefully chosen after repeated trial and error method so as to include adequate mental and motor developmental milestones spread over the first 2 years of age. Care was taken to include items for testing hearing and visual functions. There is an over representation of items near one year of age because one year is an ideal age for formal developmental assessment in a community setting. The range for each test item was taken from the norms given in Bayley Scales of Infant Development (Baroda norms)(3) (*Table I*). The left hand

side of each horizontal dark line represents age at which 3% of children passed the item and the right end represent the age at which 97% of children passed the item in the Baroda sample. A vertical line is drawn, or a pencil is kept vertically, at the level of the chronological age of the child being tested. If the child fails to achieve any item that falls short on the left side of the vertical line, the child is considered to have a developmental delay. Any obvious abnormality or asymmetry is also considered as abnormal.

Validation of TDSC

The sample for the validation was obtained from the coastal Neendakara Panchayat in Kollam district of Kerala and from the Well Baby Clinic of S.A.T. Hospital, Trivandrum. The interns posted at the Neendakara health center were given hands on training in the use of the TDSC and their ability to use the chart was checked repeatedly. The Anganwadi workers persuaded the mothers to bring children less than 2 years of age to the Anganwadi on a specified date and time and the screening test was administered. Those who failed to turn up were visited at home and the screening test administered there, thus covering all the 455 children less than 2 years of age in the Panchayat.

All those children who failed any one or more test item (developmental delay) and every 10th normal child (without developmental delay) were called to the health center on a specified date and time. Those who failed to turn up were repeatedly contacted. Denver Developmental Screening Test (DDST)(4) which was used as the standard for validation was admini-

TABLE I–*Test Items used in TDSC (Adapted from BSID) (Baroda norms)*

Test items	3% pass		97% pass
1. Social Smile	0.1	-	2.7
2. Eyes follow pen/pencil	1.1	-	3.9
3. Holds head steady	1.1	-	3.8
4. Rolls from back to stomach	2.7	-	10.0
5. Turns head to sound of bell/rattle	3.0	-	5.8
6. Transfer object hand to hand	4.1	-	7.0
7. Raises self to sitting position	5.8	-	11.0
8. Standing up by furniture	6.3	-	11.0
9. Fine prehension pellet	6.7	-	10.9
10. Pat a cake	6.7	-	12.7
11. Walk with help	7.7	-	13.0
12. Throws ball	9.5	-	16.7
13. Walk alone	9.9	-	17.4
14. Says two words	11.2	-	19.1
15. Walk backwards	11.2	-	19.5
16. Walk upstairs with help	12.2	-	24.4
17. Points to parts of doll (3 parts)	15.3	-	24.3

stered by an experienced observer from the Child Development Center, SAT Hospital, who was blind to the TDSC test result of the babies presented for DDST. Delay in DDST was taken as any item failed which falls completely to the left of the age line.

Similarly the TDSC test was administered to 1500 consecutive children less than 2 years of age who attended the Well Baby Clinic of SAT Hospital. All children with delay on the TDSC test and every 25th normal had their DDST done at the Child Developmental Center by an experienced observer blind to the TDSC test results of the children presented for DDST.

Results

Out of a total of 1945 children less than 2 years of age in whom the TDSC test was administered there were 49 detected to have delay (screening test positive cases). Out of total 141 children in whom the DDST was administered there were 42 cases with delay (*Table II*). The TDSC had a sensitivity of 66.7% and specificity of 78.8% in screening for developmental delays.

Discussion

A screening test should ideally be one with a high sensitivity and specificity. Unfortunately, this is frequently not possible. A screening test with high sensitivity and a gold standard test with a high specificity is what is usually accepted.

In the case of developmental delay there is no harm in missing out borderline cases particularly because large scale community intervention programs are still not available. Hence, we prefer a high specificity. In the case of developmental delay it is difficult to get an ideal gold standard.

TABLE II—*Comparison of TDSC and DDST (Figures are number of cases)*

	DDST		
TDSC	Delay	Normal	Total
Delay	28	21	49
Normal	14	78	92
Total	42	99	141

There is no meaning in selecting a sophisticated test like Bayley Scales as gold standard for a simple developmental screening chart and hence DDST was preferred. We had previously validated(5) DDST against Bayley Scales using 328 one year old at-risk children on developmental follow up at the Child Development Center.

Every possible effort was taken to avoid bias in this study. Uniform hands on training was given to all interns. The observer who administered and interpreted the DDST did not know the screening test results.

The Trivandrum Developmental Screening Chart has shown a clinically acceptable sensitivity of 66.8% and specificity of 78.8% against DDST as gold standard. Hence, this chart is being recommended to be used as a mass screening test for the detection of developmental delay in children under 2 years of age. This is a simple test, which can be done in 5 minutes, by the health worker, and requires only a pen and a bunch of keys as test items. Currently, this screening chart is being field tested for use by Anganwadi workers in a major community survey.

Acknowledgement

The authors wish to express their

gratitude to Dr. (Mrs.) Pramila Phatak for allowing them to use test norms from Bayley Scales (Baroda norms) and also to Dr. Thomas Cheriyan, intern and his colleagues who enjoyed participating in the validation study.

REFERENCES

1. Phatak AT, Khurana B. Baroda Development Screening test for Infants. Indian Pediatr 1991, 28: 31-37.
2. Report of National Seminar on "Reducing the Incidence of Cerebral Palsy in Children" January, 1989, New Delhi.
3. Phatak P. Mental and Motor Growth of Indian Babies (1 month-30 months) Final Report, Department of Child Development, MSUB, Baroda, 1973.
4. Frankenburg WK, Dodds JB. The Denver Developmental Screening Test. J Pediatr 1967, 71: 181.
5. Nair MKC. Validation of DDST against Bayley Scales. Paper presented at the International Clinical Epidemiology (INCLEN) meeting at Mombassa, Kenya 20-27 January, 1991.

NOTES AND NEWS

TUBERCULOSIS IN CHILDREN
Guest Editor : Dr. Vimlesh Seth
Publication of Indian Pediatrics

Tuberculosis remains a major health problem in the less developed nations. In contrast to adults, tuberculosis in children presents unique problems which may pose diagnostic and therapeutic challenges. Further, the past two decades have witnessed rapid advances in the diagnosis and management of this disease.

Unfortunately, the traditional Western Text Books on Pediatrics do not provide comprehensive information on this subject, particularly in the context of the developing world. Realising the paucity of a consolidated monograph in our country, the 'Indian Pediatrics' has brought out this 'State of the Art' book on' Tuberculosis in Children'. The volume is spread over 275 pages and has 13 chapters contributed by reputed International and National experts in the field. It covers all the important aspects including Epidemiology, Pharmacotherapy, Neurotuberculosis, BCG, Imaging, Tuberculins, *etc.*

As a special introductory offer, the book can be procured at a price of Rs. 125/- (including postage). The entire benefits from the sale of this book will go to the "Indian Pediatrics". Demand drafts only, should be drawn in favour of Indian Pediatrics and mailed to the Editor.