Original Research Article

Validation of track and act online developmental screening tool: a pilot study

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ABSTRACT

Background: The global prevalence of developmental delay in children is reported as 1-3% according to WHO. Early diagnosis and intervention improve the quality of life in disabled children. There is need for screening tool. So, study was started to evaluate the ability of the online screening tool in detecting the developmental delay in the Indian children.

Methods: After IRB approval, around 30 children after parental consent of either gender aged 4 months to 5 years attending the immunization outpatient department were involved in the study After a detailed history, children were screened with online screening tool 'Track and Act'. Due to the logistic reasons among them 30 were assessed in detail using Developmental Assessment Scale for Indian Infants (DASII) which is used as gold standard in this study.

Results: Study showed high sensitivity and specificity for all the four domains of the tool. It showed sensitivity and specificity in physical of 83.3% and 91.6%, in language 66.6% and 87.5%, in cognitive 66.6% and 91.6% and in socio-emotional domain 83.3% and 91.6 % respectively.

Conclusions: Track and Act screening tool has good test characteristics for detecting developmental delay among Indian children and it can be used for office practice for screening children.

Keywords: Developmental assessment scale for Indian infants, Developmental delay, Online screening tool, Track and act

INTRODUCTION

Development in children is influenced by the various interactions among the nature and nurture. The global prevalence of developmental delay in children is reported as 1-3%, while World Health Organization (WHO) estimates that 15% of the world's population lives with some form of disability.[1,2] There is a paucity of community-based data from Lower and Middle Income Countries (LMIC), but a similar or higher prevalence is expected.[3] American Academy of Pediatrics (AAP) recommends developmental surveillance at each well baby visit and administration of standardized developmental screening tool at 3 visits during first 3 years of life i.e. at 9, 18 and 30 months of age or earlier if concerns are elicited. [4]

Studies have shown that parental report of the current skills is predictive of developmental delay and parental concerns about language, fine motor, cognitive, emotional and behavioral problems are highly predictive of true problems.[5] The merits of early identification of a child with

developmental delays will always be beneficial. However in practice, Pediatricians unfortunately postpone referring eligible children and their families for early intervention services, and even more experienced clinicians have demonstrated difficulty in the identification of children with mild developmental delays, who are typically the children most amenable to early intervention.[6] Early diagnosis and intervention improves the quality of life. However most developmental screening tools are translated from developed countries and not standardized for Indian population. There are many traditional screening tools which usually diagnoses the developmental disabilities involving the direct elicitation of the child's skills being cumbersome for practical use as they are time consuming, costly and most important requiring the child's cooperation in the clinic setting stressing the importance of growing interest in parent based assessment.

In India, awareness regarding developmental surveillance and screening is limited. One of the study on perceptions and practices of 90 pediatricians was conducted in Gujarat showed 97.3% considered only history for developmental concerns whereas only 13.6% used structured tools for evaluation. Reasons cited for relying on informal assessment were time constraints (72%), non-availability of treatment or referral options (45%), and inability to use screening tools (28%). Furthermore, results from this study indicate that informal evaluation has been proved unreliable in detecting developmental delay.[7]

Hence this study was conducted with objective to evaluate the online tool Track and Act tool for screening developmental delays in Indian children.

METHODS

Hospital based cross sectional study was conducted in the tertiary care centre in Mumbai, India from February 2016 to April 2016. After IRB approval, a convenient sample of 75 children after parental consent of either gender aged 4 months to 5 years attending the Immunization Outpatient Department were involved in the study. Infants between 4 months to 30months of age who were born at term gestation were included in the study and those who are not giving consent and already diagnosed case of Developmental delay were excluded. Due to logistic reasons around 36 participants did not meet the eligibility criteria for DASII as they were more than 30 months of age who were followed up with only Track and act tool and 9 denied consent for DASII. A total of 30 children were further referred for developmental assessment by the DASII which was performed by a trained occupational therapist and also Track and act screening tool simultaneously.

The 'Track and Act' tool is Indian developmental screening tool, which is an online, simple, cost effective tool use for screening of children aged 4 months to 5 years. The 'Track and Act' screening tool is an online tool to screen children aged 4 months to 5 years of age. It contains structured 'yes' or 'no' questions based on child's age and across four developmental domains such as physical, language, cognitive and socio emotional. Certain questions are pictorial, and all are simple for the parents or the examiner to understand. It gives separate scores for all the domains in addition to total score and maximum score being 100. Score between 0-40 suggests below average, 41-60 borderline and 61-100 above average. Scores less than 40 suggests the need for detailed assessment, if scores are borderline then child is followed up monthly for 3months and if above average child continues to undergo the routine surveillance protocol. Presently in this study the gold standard tool used for assessment of developmental delay is the 'Developmental Assessment Scale for Indian Infants' (DASII). DASII is based on the Bayley Scale of Infant Development (BSID) used among children aged 0 to 30 months of age.[8,9] Results are obtained as Motor Developmental Quotient (MoDQ) and Mental Developmental Quotient (MeDQ) and either MeDQ or MoDQ below 70 are interpreted as delayed and scores between 70 and 85 as borderline scores.[9-11] All data obtained was recorded in a predesigned pro forma and was analysed with SPSSv.[22] Sensitivity, specificity, positive predictive value and negative predictive value were calculated accordingly.

RESULTS

Out of 75 participants, 41(54.6%) were girl children, 67(89.3%) belonged to Nuclear family, 36(48%) were first order birth, 39(52%) belonged to age group of 4-30 months and 7(9.3%) had NICU admissions (Table 1).

Table 1: Distribution of study participants according to socio-demographic profile.

Demographic characteristics	Study population (%)	
Gender	Male	34(45.3)
	Female	41(54.6)
Significant Antenatal, Postnatal History	Low APGAR score (5minutes)	1(3.3)
	History of neonatal seizures	1(3.3)
	History of NICU admission.	7(9.3)
	Significant ante natal history	5(6.6)
Family structure	Nuclear	67(89.3)
	Joint	8(10.7)
Age distribution	31 to 60 months	36(48)
	4 months to 30 months	39(52)
Birth order	First	36(48)
	Second	23(31)
	Third	16(21)

Sensitivity which is probability that a test will indicate 'disease' among those with the disease of the Track and

act tool compared with gold standard DASII was 83.3 % for physical and socio-emotional domain and 66.6% for language and cognitive domain. Specificity which is the probability of those without disease to have a negative test result for track and act tool was 91.6% for physical, cognitive and socio-emotional domain and 87.5% for language domain. Positive predictive value is among the people who test positive, percentage of people actually have the disease. PPV was 71.4% for physical and socio-emotional domain, 66.6% for cognitive domain and 57.1% language domain. Negative predictive value, which is for those that test negative, percentage of people do not have the disease. NPV was 95.6% for physical and socio-emotional domain and 91.3 for language and cognitive domain (Table 2).

Table 2: Track and act domains compared with DASII (n=30).

Domains measured	Sensitivity %	Specificity %	PPV %	NPV %
Physical	83.3	91.6	71.4	95.6
Language	66.6	87.5	57.1	91.3
Cognitive	66.6	91.6	66.6	91.3
Socio-emotional	83.3	91.6	71.4	95.6

DISCUSSION

The present study being a cross sectional study conducted in a tertiary care hospital, Sion Mumbai for a period of three months in immunization clinic carried on around 30 participants to compare Track and act tool with gold standard DASII showed sensitivity and specificity in physical of 83.3% and 92.6%, in language 66.6% and 87.5%, in cognitive 66.6% and 91.6% and in socio-emotional domain 83.3% and 91.6% respectively. In this study among 30 selected participants meeting the inclusion criteria who underwent both DASII and Track and act tool, 6 children were later diagnosed as a case of infantile spasm, hypoxic ischemic encephalopathy, hydrocephalus with ventriculo-peritoneal shunt in situ and two cases of Downs' syndrome,

An ideal screening tool for children should be brief, inexpensive tool with good psychometric properties, available in Indian languages, comprising of culturally-adapted items, which is validated on representative healthy Indian children and should require minimal training.[12] In a study by Juneja, et al, ASQ was validated against the DASII.[5] This version of ASQ was administered to parents by an interviewer to screen children aged 4,10,18 and 24 months with both high and low risk after being translated into Hindi and substitution of a few culturally inappropriate items. The overall sensitivity was 83.3% (higher for the high-risk children), specificity 75.4% and negative predictive value 84.6%. Other two well-known screening tools in India are Baroda Developmental Screening Test (BDST) and Trivandrum Developmental Screening Chart (TDSC).

Normative data of both BDST and TDSC are derived from BSID which has not been re-validated since its inception in 1991.[13] In the TDSC validation study, the gold standard used was Denver Developmental Screening Tool (DDST). Hence re-validation against a more robust gold standard required as it is no more considered as gold standard.[13] BDST screens between birth to 30months and provides information on motor and cognitive domains with sensitivity of 65-93%, specificity- 74.4-94.4%, PPV- 6.67-34.47%.[13,14] TDSC for birth to 24 months provides information about mental and motor domains with sensitivity of 66.8% and specificity of 78.8%.[13,15] INCLEN Diagnostic Tool for Neuromotor Impairment: INDT-NMI is validated diagnostic tool for 2-9 year old children with sensitivity of 75% and specificity of 87%.[16]

Track and Act being an online tool has advantage over other tools. Parents can use this which avoids them travelling to a place of availability and waiting time. With the scores they can approach the pediatricians. It provides the trajectory of the development as the scores and the profile of the child are saved. This improves the compliance of the parents. If the same tool is administered by the pediatrician can provide additional information or confirmation from clinical interaction and examination. Scores in different domains helps in better intervention strategy and follow up. By providing borderline scores it tries to filter even cases of mild developmental delay, which would require monthly follow up for 3 months. This study has several limitations, this was hospital-based study over a small number of study group. In spite of the age group covered under Track and Act screening tool is 4 months to 5 years, children above 30 months could not be enrolled because DASII assesses only till 30months of age and requires more time for administration which increased the dropouts. Hence large-scale community-based study is required further to evaluate this tool.

CONCLUSION

This study shows that online screening tool has the strong test characteristics of good screening tool for Indian children. As this is easily available, cost effective, online, simple tool it can be used in office practice by the paediatricians and parents for developmental surveillance and screening.

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