

## **Developmental Assessment Tests: Scope and Limitations**

Any write up on development cannot begin without saluting Arnold Gessel who started his studies on the development of infants at Yale University in 1920. He later continued his study up to school age and talked about "organic continuity" that links these five years(1). At about the same time, Nancy Bayley started the Berkeley study, which continued for 36 years. The mental and motor development scales of Bayley were standardized on 1400 children in the 1960's in the United States(2).

Neonatal care has made amazing advances in the last twenty years and the survival of 'high risk' infants has increased considerably. Pediatricians have now started realizing that follow up services are an integral part of this neonatal care. Hence developmental assessment is no longer the realm of developmental neurologists or psychologists, but pediatricians also need to be familiar with the common developmental tests and at least need to understand how to interpret the results of these tests.

Developmental tests in infancy are done basically for two reasons, firstly to diagnose deviant or delayed development so that early intervention can be started, and secondly for prediction of outcome. Physicians who have put in a lot of effort to save a sick neonate would like to know as early as possible whether the infant is going to be neuro-developmentally normal. One of the earliest assessments that has been used right in the Neonatal

Intensive Care Unit itself is the Brazelton Neonatal Behavior Scale(3). This testing needs patience and some training before it can be administered confidently. It can distinguish between a normal and brain damaged infant. However, the predictive value of this test has been questioned.

The younger the child, the more limited is the range of abilities available for testing. Early developmental testing primarily measures biological functions and maturation of the neuromotor system. As the child enters the second year, development becomes increasingly influenced by a broader range of factors present in the surrounding environment. Hence, the pediatrician should have a clear understanding of what is being assessed, and what decisions he or she wants to take after knowing the results of this evaluation.

The Denver Development Screening Test (DDST) is the most widely used test all over the world. It has been translated in 7 languages. This was first described by Frankenburg and Dodd in 1967 and has had several revisions. The DDST was primarily designed by doctors to be used in a medical setting. It can be given by persons unfamiliar with psychological testing; even a nurse can be trained to give it. The test is mainly concerned with attainment of various skills and many of these items are passed by the parents' report. All of us who deal with parents everyday know how parents tend to overrate the performance of their children. The test tends to miss children with mild developmental delay and it is said that a case of left hemiplegia can be easily missed on DDST. The validity of this

test in children below 30 months has been questioned.

The other popularly used test in infancy is the one that originated in France. This has been put in a structured, tabulated form my Amiel-Tison (5). The test is mainly based on the study of tone- active tone, passive tone and resting posture. It also includes neurosensory evaluation, head growth and neurobehavior. However, this is a pure neuromotor test and does not take into consideration the mental development of the child at all. So if you need to assess the mental development, you have to take the help of some other method and this is the major limitation of this test.

We have used this test in over 600 high risk children. The technique is easy to learn since pediatricians are familiar with most of the manoeuvres used in this test. The only area where some practice is required is the determination of angles which measure passive tone. Strong, young doctors tend to apply too much force while determining the angles. The angle measurement at various stages also needs to be standardized for Indian infants. One of the main advantages of this test is that tone abnormalities can be diagnosed early, so that intervention can be started as soon as possible. The best time to do the first formal assessment is about 3 months. Just like the child who has suffered from a physical ailment like pneumonia, needs a period of convalescence, a neonate with a major insult to the brain also needs a period of convalescence (6).

Many of the tone abnormalities are transient and disappear by the time the child is 12-18 months old (7). In our experience, generalized tone abnormalities are less likely to disappear (unpublished observations). It is difficult to predict which tone abnormalities are transient and which ones will persist. Hence it is important to start early intervention.

Are these abnormalities really transient or is it likely that the clinical expression mild or moderated insults of topographical locations change with growth? Is it the ability of the active toddler to defy assessment which makes us feel that these abnormalities are transient and that they become apparent later on as learning problems? These questions remain answered.

The development of early intervention programmes in human beings is based on three separate types of observations (8): (a) All intelligence is not genetically fixed; (b) Animals, either environmentally deprived or organically impaired recover more rapidly, if stimulated; and (c) Plasticity is the capacity of the developing organism to find pathways around a deficit. Children with known insults to the Central Nervous System seem to be able to compensate for these defects over a period of time.

The Indian adaptation of Bayley Scales or Infant Development (Baroda Norms) is widely used by psychologists. The test can be given up to 30 months and assess both mental and motor development. In the early part of infancy, there are very few mental items and these depend largely on motor development. In a comparison of Bayley Scales (BSID) and Amiel Tison's (AT) method in the same group of high risk infants, we have shown (9) that AT is more sensitive in picking up abnormalities than BSID, till the age of 9 months, but loses this advantage at 12 months. The BSID needs a special kit, a well trained psychologist and preferably a sound proof room. It must be emphasized here that this test cannot be administered by untrained personnel.

One shortcoming of global BSIA or DDST is that they do not provide any information about the sequential patterns of development. Instead of comparing the

performance of these infants with that of normal infants, the aim should be: (i) to judge the progress in acquisition of good functional quality, and (ii) to look for disappearance of 'alarm signs.' In a young infant who is in a dynamic state of development, any stagnation or slowness in acquisition of new skills should alert the physician.

Many have questioned the cost-effectiveness of repeated assessments. All developmental tests have been standardized on normal children and hence include only items of normal development. There is no inclusion of aberrant or deviant signs like fistings or asymmetry. Only the protocol described by Dargassies (10) picks these up. While assessing development, some features are far more important than others. However, these features like alertness, responsiveness, interest in surroundings mother-child interaction cannot be quantified. These features have also been termed as "insurance factors", and it is these very qualitative items which fail to get incorporated in any assessment because of subjectivity and difficulty in scoring them. No-two children develop alike. What is important is not mere acquisition of skills, but the rapidity or maturity of these skills.

There are two screening tests developed for assessment in the community, based on Baroda norms(11). Phatak developed a screening test for a door to door survey in the Baroda slums by community workers(12). He chose 22 motor and 31 mental items from Baroda norms for this test, for children under 30 months. The Trivandrum Development Screening Chart(13) has been devised for children under 2 years by selecting 17 items from Baroda norms. The "gold standard" used for calculating the sensitivity (66%) and specificity (78%) was the Denver Development Screening Test.

The DDST itself has a low sensitivity and any screening test with a sensitivity less than 80% may result in under referral(14).

The Portage Early Education Program which can be used in children from 0-6 years, originated in USA(15). The field worker assesses the child at home and trains the mother to teach the skills that the child does not know. The field worker then monitors the progress of the child by weekly visits.

Various tests have been used at different ages in infancy to predict outcome. However, clinical predictions are inherently probabilistic and can never be certain. No predictions regarding the diagnosis of cerebral palsy should be made on the basis of a single examination in view of the transience of tone abnormalities. Cautious optimism may be exercised in predicting outcome in high risk infants. Although structural recovery never occurs, functional recovery can occur due to early intervention. We have shown that a normal neurological examination by Amiel Tison method at 3 months is an excellent predictor of normal outcome at 12 months(16).

As the child gets older and reaches school age, tests for intelligence come into the picture. The two tests that are commonly used for measuring IQ in India(17) are the Kamath's (Gujarati) or Kulshreshtha's (Hindi) adaptation of Stanford Binet Test of Intelligence or the Revised Weschler's Intelligence Scales (WISC-R) adapted by Bhat. The main drawback of Stanford Binet is that it relies too heavily on verbal items. This drawback is overcome in WISC-R. It is a good test and has a separate verbal and performance IQ. It is long and generally needs two sittings, but assesses the child's intelligence in a more complete manner. It is also recommended that the child's behavior in

the test situation should be carefully observed. Is he co-operative? Confident? Fearful? Negative? These clinical observations may yield more information than the actual scores. The new Stanford Binet (IV) is a tremendous improvement over the previous version and has many subsets. It is a bit lengthy, and is not available in India.

Controversy has always surrounded the theory and practice of intelligence testings. Is the performance done in a forbidding hospital surrounding with a stranger watching over your shoulder, truly representative of your ability? What I strongly object to, is the effect a detrimental labelling of a borderline or low IQ figure can have. In a country, where there is no mainstreaming of borderline children, the parents may be pressurized to remove the child from a particular good school.

Caution must be exercised in interpreting IQ scores. An IQ is not immutable; it just shows the current capacity of the child or the potential of the child in current conditions(4). If one wants to assess the potential intellectual abilities of the child, other data like the social, emotional maturity level, the amount of schooling, home environment, cultural and language background must be taken into consideration.

Longitudinal follow up studies on normal population indicated little consistency in DQs obtained in infancy and IQs obtained later on. Even at 2 years, a DQ on BSID had little correlation with IQ at 8 years (18). If so, then why do we need these assessment tests in infancy? This is because developmental remediation is most effective when provided as early as possible. They also provide an accurate measure of the child's current level of functioning and provide an effective way of communicating with parents about their child's strengths and weaknesses. The actual test score figures should not be used while talking to

parents, but developmental age ranges can be used. Identification of the positive and negative aspects of an infant's home environment should not be forgotten during prediction. For example, a mildly delayed infant placed in a stimulating and optimum environment, may function as a normal child. Likewise, an infant who develops normally in the first year, but grows up in an extremely deficient environment may not optimize his or her developmental potential(19).

The exposure that the child of the nineties gets is so very different than that of the child in the sixties. Even the objects that the child uses in every day life are changing. For instance, tying shoe-laces is a common item given for testing fine motor co-ordination. In India, children from the lower socio-economic group do not get to use closed shoes and the children from the upper class wear shoes with velcro! So assessment tests need to get updated from time to time.

Despite all the limitations and controversies surrounding present infant assessment tests, they do form an effective means of identifying infants with delayed development, so that early intervention can be started. Corrected age must be used for assessing preterm infants. It must be emphasized that infant assessors should be well trained professionals with a sound background in child development and should be capable of understanding the strengths and limitations of the tests, they are using.

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