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Role of Parents' Evaluation of Developmental Status in Detecting Developmental Delay in Young Children

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The importance of early identification of children with developmental delay has emerged in recent years as a matter of growing concern among pediatricians(1-3). There is, however, no consensus as to how such early identification can be optimally performed. Some of the commonly used techniques include reviewing developmental milestones with parents, relying on clinical judgement based on history, physical examination and observation(4,5). However, physicians subjective impressions and their estimates of children's developmental status is often inaccurate(6). Research reveals almost half of the children with developmental disabilities are not identified by their pediatricians(7).

Research over the last several decades has endeavoured to identify the most appropriate and cost effective method for early detection of children with developmental problems(8). One screening method developed in recent years elicits parents' concerns regarding children's development status(9). A study has documented that parents who expressed concerns about speech, language, fine motor or cognitive skills had children with an 80% chance of failing

standardized developmental screening(10). On the other hand, parents who felt that their children were developing normally or who had concerns only about behavior, self help or socio-emotional development had children with a 94% chance of passing screening. The importance of parents concerns about their children's development is unknown in our country, although it has been found to be a useful clinical tool in the West(11). In the Indian context an important question is whether a developmental concern reflects a child's true deviation or does it simply reveal parental anxiety? Moreover, does not expressing a concern mean that the child is developing normally or does it reveal that the Indian parents are not well informed about normal development or that they are hesitant to discuss non-medical concerns with the physicians?

Keeping this in view, the present study aimed at: (i) identifying the range of concerns parents have about their child's development; and (ii) evaluating the relationship between parents concerns and the child's develop-mental status.

Subjects and Methods

Subjects were 79 parent-child dyads who were seeking well-child pediatric services in the outpatient department of a tertiary care teaching hospital. Children in the age range of 24 to 60 months with no history of motor or sensory impairment, chronic illness or perinatal problems were recruited in the study.

Parental concerns were elicited using a standardized questionnaire, Parents Evalua-tion of Developmental Status (PEDS,9). The PEDS includes an open ended question which asks parents "Please tell me any concerns about your child's learning, development and behavior". The second part of the question-naire separately probes developmental concerns in each domain."Do you have any concerns about how your child understands what you say, talks, makes speech sounds, uses his hands and fingers to do things, uses arms and legs, behaves, gets along with others, is learning to do things for himself, is learning pre-school skills and any other concerns". The responses are then categorized into various developmental domains and into significant and non-significant concerns (depending on the developmental domain and age of child) as per the guidelines of PEDS.

Developmental status of the child was assessed by the Developmental Profile II(12). The DP II is an 186 items inventory which assesses child's developmental status from birth through 9½ years in five domains: physical, self help, social, academic and communication. The functioning of the child is expressed in developmental age in months for each domain. The academic age of the child can be converted into an IQ equivalent score and the score has been found to correlate with individually administered measures of intelligence(12). IQ scores less than 70 are considered as failing the screening test. In addition, children were administered the Indian adaptation of the Vineland Social Maturity Scale (VSMS)(13), which measures child's adaptive behavior and skills in communication, self help, social relations, locomotion, and self direction. The scale yields a social age which can be converted to a Social Quotient score (SQ).

Results

In the present study, parents were asked to state any concerns about the way their child was learning, developing and behaving. Parental concerns were fairly common and were expressed by 67% of all parents. Behavior concerns were most common (40.5%) followed by socio-emotional (21.5%), medical (17.7%), expressive langu-age (17.7%), and global/cognitive (6.3%).

In order to assess the accuracy of parents concerns in detecting developmental delay, children were categorized into two groups, those with IQ less than 70 and those with IQ of 70 and above. These two groups were categorized by parental concerns (Table I). Of the 79 children, 83.5% (N = 66) were found to be performing within normal limits and 16.5% (N = 13) met criteria for delayed development. In comparison to children with normal development, parents of children with delayed development were more likely to raise concerns regarding expressive language ($p < 0.01$), gross motor ($p < 0.01$), global/cognitive ($p < 0.05$) and self help ($p < 0.05$) (Table I). On the other hand, parents of children with typical development either did not raise concerns ($p < 0.05$) or raised behavior, social and self help concerns. Overall, the presence of significant parental concerns identified 61.5% of children with delayed development and 65.2% children with normal development. The positive predictive value of the PEDS was 25.8% and the negative predictive value was 89.6%.

Table II presents comparisons of parents' judgements by the characteristics of parents and children. Following Glascoe's(11) classification, parents were categorized into 4 categories depending on the accuracy of their concerns. Of the 13 children who had IQ scores lower than 70, parents of 8 (61.5%), raised one or more significant concern while 5 (38.5%) either raised no concern or raised non significant concerns such as socio-emotional (40%) and/or behavior (20%). There were no differences between the accurately concerned and inaccurately non-concerned parents on socio-demographic variables such as age and sex of the child, level of mothers' and fathers' education, birth order, income and on a combined index of socio-economic status. However, children of accurately concerned parents were more likely to show delayed development on physical and communication domains than children of inaccurately non-concerned parents. There were no differences between the two groups on IQ, SQ, self help and social skills.

Table I__ Parental Concerns by Developmental Status (%)

Concerns	Delayed (N = 13)	Not delayed (N = 66)	c2
Non significant concerns			
Behavior	30.8 (4)	42.4 (28)	0.61
Social	38.5 (5)	19.7 (13)	2.17
Self help	23.0 (3)	6.1 (4)	3.90*
Significant concerns			
Expressive language	23.0 (3)	13.6 (9)	12.11**
Receptive language	15.4 (2)	1.5 (1)	5.67*
School	7.7 (1)	4.5 (3)	0.34
Gross motor	23.0 (3)	0.0 (0)	15.85**
Fine motor	7.7 (1)	0.0 (0)	5.13*
Global/Cognitive	23.0 (3)	3.0 (2)	7.38*
Medical	30.8 (4)	6.1 (4)	5.40*
No concern	15.3 (2)	37.9 (25)	3.94*

* p <0.05; ** p < 0.01; Numbers are given in parentheses.

Table II__Comparison of Parents' Judgement by Childrens' Development

	Relationship between parents' judgement and developmental status			
Characteristics	Accurately non-concerned (N = 43)	Inaccurately concerned (N = 23)	Accurately concerned (N = 8)	Inaccurately non-concerned (N = 5)	c2

Physical (% delayed)	2.3 (1)	4.3 (1)	50 (4)	20 (1)	20.40**
Self help (% delayed)	0 (0)	0 (0)	12.5 (1)	0 (0)	1.00
Social (% delayed)	0 (0)	0 (0)	25 (2)	20 (1)	16.16**
Communication (% delayed)	2.3 (1)	13 (3)	87.5 (7)	40 (2)	27.51**

** p< 0.01; Numbers are given in parentheses.

Of the 66 parents of children with normal development, 65.1% were accurately non-concerned., i.e., had no concerns or had non-significant concerns and 34.8% were inaccurately concerned, i.e., had significant concerns about their child's development even though the child's development was typical. These two groups of parents and their children did not differ from each other on demographic and socio-economic character-isitics. However, children of inaccurately concerned parents had relatively lower IQ and SQ scores than non-concerned parents. The children of inaccurately concerned parents were also more likely to show delay in communication skills than children of accurately non-concerned parents.

Discussion

Previous research conducted in North America has documented a strong relationship between parents' concerns and children's developmental status and it is recommended that since parents' concerns in some areas of development such as fine motor, language and global/cognitive correctly identifies young children with developmental problems, the PEDS should be used as a screening test to make reasonably accurate referral decisions(11,14,15). Our results reveal that parents concerns about expressive and receptive language, gross and fine motor development were moderately sensitive predictors of developmental delay in children between 2 to 5 years. The absence of concerns or concerns in behavior, social-emotional and self help domains had moderate specificity in correctly identifying children with normal development. Since both the sensitivity and specificity of PEDS found in our study is lower than that reported earlier(9) (sensitivity = 75%, specificity = 74%) for North American children aged 0-7 years, the PEDS should not be used as an alternative to standardized developmental screening measure in our setting. However, the PEDS may be used as a prescreening instrument in a

busy outpatient setting in order to identify those children who may require a more in-depth developmental screening.

There were no demographic or socio-economic differences between parents who were concerned or not concerned about their child's development. Demographic and socio economic characteristics such as age and sex of child, educational level of parents, birth order, and income also did not influence whether parental concerns were accurate or inaccurate with respect to child's screening test performance. However, parents of children who were inaccurately concerend about their child's development did have children with relatively lower IQs and SQs as compared to the accurately non-concerned parents. Similar findings have been reported previously(11). Glascoe(11) had argued that parents of children with normal development who have significant concerns about their child's development are actually highly accurate observers of subtle developmental differences. In the light of these findings, it seems that children of parents who express several concerns even when their children have IQs above 70, may need anticipatory guidance regarding developmental promotion and these children also need to be periodically assessed.

Pediatric primary care providers have to play an important role in the early detection of children's developmental problems. Research, however, suggests that develop-mental problems, unless very severe, elude early detection(16,17). Our results reveal that parents of delayed children very often do not raise global/cognitive concerns, and are more likely to raise social, gross motor, behavior, expressive language and medical concerns (e.g., not growing well, remains sick, not eating). It is suggested that pediatricians should routinely and carefully elicit parents' opinions and concerns. Parents concerns should be viewed as helpful adjuncts to routine assessment and should be used to make appropriate referrals. More research is, however, needed to confirm and extend these findings using a larger sample and using diagnostic developmental tests to determine developmental status.

Contributors: PM co-ordinated the study, designed it, collected the data and drafted the paper and will act as the guarantor of the manuscript. PS helped in designing the study and drafting of the paper.

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Competing interests: None stated.

Key Messages

- Pediatricians should routinely and carefully elicit parents opinions and concerns regarding child's development.

- Parents' concerns are helpful adjuncts to routine developmental assessment and may be used to make appropriate referrals.

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Letters to the Editor

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Parents' Evaluation of Developmental Status (PEDS)

In their article, "Role of Parents' Evaluation of Developmental Status in Detecting Developmental Delay in Young Children"(1). Drs. Malhi and Singhi studied a test I wrote called "Parents Evaluation of Developmental Status (PEDS)." The authors raised concerns about the sensitivity and specificity of the tool when used outside the United States. I have several concerns about how PEDS was scored in the study and so send these comments in the hope that the authors will reassess their data and findings.

First, PEDS underwent significant scoring modifications before it was published commercially in 1997(2). It is not clear that the current scoring system was used in their study because PEDS identifies five, not four groups. The group not mentioned is children whose parents were identified via the professional judgement of researchers and clinicians as having difficulty expressing concerns over a complete range of concerns. Communication barriers are usually due to language differences or florid mental health problems. Others who sometimes fall into this category are parents who are not a primary caretaker (e.g., a teen mother whose own mother provides most of the care). When PEDS is used clinically, health care providers can also nominate children for whom they have suspicions not corroborated by parents. In any case, this fifth group, along with another group identified as moderate risk (children whose parents hold only a single predictive concern) are typically nominated for further screening rather than diagnostic assessments. Thus a more complete application of PEDS, might have enhanced the accuracy of the measure.

Second, the concurrent test used to assess the accuracy of PEDS is problematic. The Developmental Profile-II both under and over-detects developmental problems(3,4). It uses ratio quotients and non-normalized age equivalent scores that can lead to inflated and deflated scores. To my knowledge, the DP-II has not been normed outside of the US making generalization to other populations questionable. Nevertheless with modified scoring, the Academic Scale of the DP-II can be used for developmental screening.

Applying these results to the groups at moderate risk, should enhance the specificity of PEDS within Drs. Singhi and Malhi's study.

Finally and most importantly, it may that PEDS would benefit from an alternative scoring system for use in India. For example, Indian parents often mentioned social, self-help, and behavioral concerns. Indeed, Drs. Singhi and Malhi noted that self-help skills were a significant predictor of problems – a result not found in the four US validation studies of PEDS – but one that appeared in a predictive validity study conducted in Australia(5). Reassessing their data via logistic regression analyses broken out by age might reveal a different and more accurate set of predictive concerns.

I am happy to assist with any additional analyses and reinterpretation of data to help ensure that PEDS works effectively in India. Eliciting parents' concerns systematically is a valuable process associated with improved satisfaction with care and, more importantly, improvement in parenting skills(6). Most health care providers attempt routinely to discuss parents' concerns but often use questions that are not well understood or effective. Indeed the official Australian adaptation of PEDS, focuses on the tool as a platform for communication more than an early detection device. Even so, I'd prefer to see PEDS serve as many functions as possible, including accurate developmental and behavioral screening.

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Letters to the Editor

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Reply

We thank Dr. Glascoe for the comments on our recently published article(1) and for providing us an opportunity to clarify methodological and interpretative issues related to the Parents Evaluation of Developmental Status (PEDS) question-naire(2) and the Development Profile II (DP II(3).

1. We have utilized the latest scoring system that Glascoe(2) delineates in her manual in our study. The reason why we identify only 4 and not 5 groups of parents is because the PEDS was administered to the parents by research worker and was not self-administered as reported by Glascoe in several of her studies. Therefore, communication barriers due to not understanding of the

questions were not found in our sample. Moreover, only those children who were accompanied by their parent/s were administered the PEDS and included in the study.

2. Unlike USA where a wide variety of screening and diagnostic tests are available for use with children of all ages, there are only limited number of tests covering a limited age range available in India(4) and one has to very often use tests developed in the West. We have used the DP II extensively(5) after some modi-fications to make it relevant for use with Indian children and find it more useful than the Indian adaptation of the Vineland Social Maturity Scale (VSMS)(6) which is one of the most commonly used screening test for young children in India.

3. In the present study, we have used the DP II(3) as the gold standard as it is considered the best-standardized develop-mental screening test for use in the pediatric clinic(7). The DP II has five sub scales, namely Physical, Self-Help, Social Academic and Communication. The test can be administered in several different ways and also interpreted in at least two different ways(3). The use of different methods of administration and inter-pretation may influence the test results. The test can be administered to parents in an interview format or interview format may be combined with direct adminis-tration to the child of some of the test items, when the validity of the parental report is of concern. It is important to recognize that although the correlations between the two methods are high, literature indicates that parents may report higher functioning for their child leading to under detection of developmental problems. Glascoe in her studies has used the parental interview format for administration, whereas we have used the second method of administration.

Secondly, there are two methods of interpreting the DP II and this may also vastly influence which child is labelled normal or delayed. In the DP II, each scale produces a developmental age that is subtracted from the child's chronological age. The resulting "months differential" is compared with a cut-off that indicates whether the child is advanced, normal, borderline or delayed in their develop-ment. Glascoe(8,9) in her studies uses this method, wherein she compares the developmental age of the child on the Academic sub scale to designate the child as delayed. Using this method she reports only 4.3% of the children tested as delayed(8).

In the second method, the academic age of the child is converted to an IQ equivalent score (IQE) i.e., the ratio of the academic age to chronological age and the product multiplied by 100. Scores less than 70 are interpreted as having failed screening. The academic sub scale of DP II assesses a range of skills necessary for success in school including language, cognition and school achieve-ment. The authors of DP II have reported moderate to high correlations between IQE and measures of intelligence(3). Using IQE scores less than 70 we have found 16.5% of our sample of children aged 0-5 years attending well child clinic in the department of Pediatrics to be delayed(1). Our results are in line with previous research, which has identified about 20% of the children to be delayed using other diagnostic tests including Bayley Developmental Scales, Kaufman Assessment Battery for Children, Stanford-Binet intelligence scale(10,11). It is obvious that the method of interpretation of scores of DP II used by Glascoe(10) detects delayed children at unacceptably low rates and perhaps misses some cases. Therefore rather than dismiss the DP II as being inaccurate, it would be more meaningful to use the second method of interpreting scores on the DP II as we have done in our study.

4. Finally, we agree with Dr. Glascoe that perhaps PEDS would benefit from an alternative scoring system for use in India. We are in the process of publishing a study using PEDS on a larger sample and would look at our data via logistic regression analyses as suggested by her.

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