Original Article

Comparing the Results of Developmental Screening of 4-60 Months Old Children in Tehran Using ASQ & PDQ

Soheila Shahshahani, MD; Roshanak Vameghi, MD; Nadia Azari, MD; Firoozeh Sajedi*, MD
Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

Anooshirvan Kazemnejad, PhD
University of Tarbiat Modaress, Tehran, Iran

Objectives: This research was performed to compare the results of two parental-based developmental questionnaires.

Methods: In this study the developmental status of 196, 4-60 months old children were screened using Ages and Stages Questionnaires (ASQ) and prescreening developmental Questionnaire (PDQ) in 4 primary health care clinics in Tehran. Convenient sampling was used. Data was analyzed by SPSS software.

Results: Using ASQ 18% of children were detected as having developmental disorders. Developmental screening with PDQ showed that developmental delay or doubtful condition was seen in 20% and 19% of children respectively. The estimated consistency coefficient between PDQ II and ASQ for fine and gross motor domains was 0.05 and 0.24, and for language and personal-social issues were 0.18 and 0.06, respectively. Based on two different categorizing possibilities for questionable scores of PDQ-II, that is, "delayed" or "normal", the total agreement coefficient between two questionnaires were determined 0.30 and 0.20, respectively

Discussion: The process of developmental screening was changed in recent years and performing a correct and useful developmental screening is easier today. Several screening tools are available now. Recent studies showed that parental information about their child's development have good accuracy. For selecting a suitable tool we must consider the validity, reliability, sensitivity, specificity and all other positive and negative points about the tool of the test.

Conclusion: This study showed that the results of developmental screening of 4-60 months old children in Tehran using ASQ and PDQ lead to different results. This is necessary that the results of screening are compared with a diagnostic gold standard test.

Key Words: Developmental screening, ASQ, PDQ

Introduction

The importance of early detection of developmental disorders in the well-being of children and their families is approved (1). Nowadays there is an increasing effort for detection of developmental disorders at an earlier age because intervention services are cost effective and when provided in early childhood, have greater efficacy (2). These services improve the developmental prognosis and have short and long term benefits (3-6). The process of developmental screening was changed in recent years and today it is easier to perform a correct and useful developmental screening. In order to detect developmental disorders at an early age, the American Academy of Pediatrics (AAP) has recommended that pediatricians use developmental screening tools at 9, 18, 24 (or 30) months' child health visits (1).

In recent years the focus of pediatric medicine in developed countries has changed from breast feeding and child health topics to child's well being and preventive medicine. In those societies early detection and intervention of developmental disorders are integrated in routine health care services. In moderate to low income countries developmental disorders occur in early childhood and are an important morbidity factor for whole life because

*All correspondence to: E-mail: fisajedi@uswr.ac.ir

still in these areas the priority of health services are preventing iron deficiency anemia, improving mother-child relationship and increasing social-emotional stimuli (7, 8). Health system is the first and in some countries the only situation that is available for service providing to children. Thus some references recommended that developmental screening be administrated to children in outpatient clinics or even for inpatient children that are hospitalized for any other reasons (9-11).

Several screening tools are available now but their approaches are different. There is no unique tool that could be useful for all population or age–ranges (1). It was suspected that, using parental report about an screening tool is incorrect but several studies showed that parental information about their child's abilities is very worthy for predicting developmental disorders (6, 12). On the other hand, it is possible that during a routine child health care visit, the child be ill, messy, hungry, sleepy or fearful and we know that these circumstances are not suitable for showing his/her abilities. Thus for preventing this problem, developmental screening tools that use parental reports are useful (13-16). Also standard objective tools are time consuming, need more payment and their providers need to have knowledge and expertise for performing them. Thus parental-based questionnaires are suitable option for developmental screening because recent studies showed that parents, regardless of their socioeconomic status, child rearing experiments or their own health status, have correct information about their child's development (2, 12, 13, 15) and their opinions have high validity and will lead to increasing rates of early detection and intervention of developmental disorders (9, 17, 18). The only barrier in this way is inability to read or understand the questionnaires. This problem can be easily relieved by orally presenting or translating them (19).

This study was performed from February 2008 to January 2009 in Tehran, Iran to compare the results of two parental-based developmental questionnaires Ages and Stages Questionnaires (ASQ) and Prescreening Developmental Questionnaire-II (PDQ II).

Materials and methods

PDQ-II is a developmental prescreening tool that is derived from Denver Developmental Screening Test-II (DDST-II). Ninety seven of 105 items of DDST-II are changed to questions that can be answered by "YES" or "NO" by the care-giver. They are categorized into 4 questionnaires for 0-9 month, 9-24 month, 2-4 year and 4-6 year old children. The 75th and 95th percentiles for each question and also the developmental domain to which it belongs are shown in front of it (20). Caregivers must continue answering questions until they arrive at 3 "NO" answers (it is not necessary that the NO answers be consecutive). The answer to each question can be: normal (which means the child is able to do the task), delayed (which means the child is not able to do the task that 90% of his/her age-matched children can do) and caution (which means the child is not able to do the task that 75% of his/her age matched children can do). For interpretation of the results, if the child has ≤1 delay or ≤2 cautions (considered as suspicious), developmental advices are given to parents and the child must return for retesting by the PDQ-II one month later. If the child is still in a 'suspicious' condition in the second visit then he/she should be referred for screening by the DDST-II. If in the first prescreening visit child has ≥2 delays or ≥3 cautions (considered as delayed), he/she should be screened by the DDST-II as soon as possible (20). Research has shown that using PDQ-II decreases the use of Denver Developmental Screening Test-II (DDST-II) that needs more time, expense and expertise to administer, by 69% (21).

The ASQ are a series of 19 questionnaires designed to be completed by parents when their infant/child is 4 to 60 months of age with a developmental quotient range of 75-100. Each questionnaire contains 30 simply-worded items written at a 4th to 6th grade reading level, equally divided across the areas of communication, fine motor, gross motor, personal-social, and problem solving skills (22). The answers to questions can be "yes," "sometimes," and "not yet." Questionnaires are scored by comparing each domain score with the screening cutoff score for that domain. If the child's score falls at or below the established cutoff score in one or more domains, it is recommended that the child be referred for further assessment. Test-retest reliability, at a two-week interval, was found to be 94%. Interobserver reliability was also 94%. Sensitivity ranged from 51% for the 4-month ASQ to 90% for the 36-month ASQ, with a 75% overall sensitivity rate. Specificity ranged from 81% for the 16-month ASQ, to 92% for the 36-month ASQ, with an overall specificity rate of 86% (23). It is used in different studies worldwide and in Iran as well (23-26).

For performing the study, 8 examiners (with a BSc degree in occupational therapy or clinical psychology) were trained in a 1 day workshop. Convenient sampling was used and 196 children aged 4-60 months, were tested in 4 primary health care centers situated in south, north, east and western regions of Tehran. The study was approved by the Research Committee and thereafter by the Ethical Committee of the University of Social Welfare and Rehabilitation Sciences. Parents were informed about the importance of developmental screening and how the test was performed. Then their written consent was acquired. The parents whose children had developmental problems were informed, guided and referred for additional evaluations and interventions. The inclusions criteria were: 1- age between 4 to 60 months 2- parental cooperation. Exclusion criteria were: 1- having obvious developmental delay or disability 2- parental refusal to attend in the study.

Results

In the present study 196 children consisting of 90 (46%) girls and 106 (54%) boys aged 4-60 months were screened using PDQ and ASQ. Maternal education of 84% of children was at high school level or higher. Ninety-six percent of cases were born term (for preterm children up to 2 years we calculated and considered corrected age). In prescreening by PDQ the 'normal', 'delayed' and 'suspect' cases were 61%, 19% and 20% respectively. In screening by ASQ 82% of children were normal and 18% of them were detected as delayed. The results of the two tests are shown in Table 1.

Table 1: Comparing the results of PDQ-II and ASQ

PDQ-II results No. (%)	**ASQ results: No. (%)**		
	Delayed	Normal	Total
Delayed	16 (8.2)	23 (11.7)	39 (19.9)
Normal	13 (6.6)	107 (54.6)	120 (61.2)
Suspect	6 (3)	31 (15.8)	37 (18.8)
Total	35 (17.8)	161 (82.2)	196 (100)

Using the PDQ-II, the number of children falling in the categories of “delayed” was higher in the gross motor and language domains, whereas with ASQ, “delays” were higher in the fine and gross motor domains.

To determine the measure of agreement between PDQ and ASQ results, considering the fact that for cross tabulating two tests, they must have similar number of answer choices, we first considered the “suspect cases” of the PDQ as “normal” and the next time, as “delayed”. When suspect cases were considered as delayed, the kappa measure of agreement was 0.20 ($P<0.001$) and when considered as normal, it was 0.30 ($P<0.001$). The estimated consistency coefficient between PDQ II and ASQ for fine and gross motor domains was 0.05 and 0.24, for language 0.18 and for personal-social 0.06 respectively.

Discussion

In the present study there was no relationship between the presence of developmental delays and factors such as sex, place of residence and maternal education. A study in an urban area of India showed that due to the low educational level of mothers in that area, PDQ could not evaluate the developmental status of children correctly (11). A study in Tehran (Iran) showed that PDQ had a good content validity and reliability and moderate sensitivity and specificity (27).

By another research team in Iran, ASQ was translated to Farsi, was standardized on 11000 Iranian children and the cut-off points for Iranian children were determined. Their results have not been published yet, but the general report exists and we have used their translated forms (26).

The present study showed that there is a relatively weak correlation between results of PDQ and ASQ in 4-60 months old children of Tehran. Another native study showed that regardless of considering suspect cases as normal or delayed, the agreement coefficients of PDQ and DDST-II were weak and the 2-4 year- old questionnaire had greatest agreement with DDST-II (27). Also a study in Tehran showed that children passed the ASQ (88%) more than DDST-II (65%) and consistency coefficient of two tests is poor (0.21) (28). A research conducted in order to determine the

agreement coefficient of PDQ, its modified version (M-PDQ) and another questionnaire named Alpern-Boil Developmental Profile-II, with DDST showed that all tools had good agreement with DDST (29). Another study in India showed that the 2-4 year-old questionnaire of PDQ had no good relationship with DDST (11). In a research, term and very low birth weight infants were screened by PDQ and the Grifffiths developmental scale at 12 months of age and researcher concluded that these two developmental screening tools had good agreement (23). Another study performed by Scices *et al* showed that questionnaires completed by parents, may not have good agreement with each other. They concluded that PEDS and ASQ developmental screening tests may not identify the same children (30).

This study has some limitations such as limitation of time and resources for re-evaluating those children who were detected as cautious or delayed. On the other hand we know that developmental screening tools are not diagnostic and their results must be followed by a more intensive evaluation. The results of developmental screening must be determined by comparison of the test results with a gold standard developmental diagnostic test. Because there was no standardized diagnostic test in Iran, we compared two screening tools, the PDQ-II and ASQ.

Early detection and intervention in developmental problems can reduce their impacts on the well-being and functioning of child and his/her family and is an important issue in Pediatrics medicine (19). AAP recommended that pediatricians use standardized developmental screening test regularly at the 9, 18 and 30 (or 24) month visits (1). It has been proved that the results of screening tools are most useful when they are repeated periodically (19, 20, 31), they are not diagnostic (32), their results should not be interpreted alone and decision should be made by considering the child's total function and environmental factors.

Different studies in Iran were made to choose a suitable tool for developmental screening in Iranian children (5, 27, 28, 33). It is suggested that the results of each of the used screening tests are compared with a standard diagnostic test in future studies.

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