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Effects of Educating Mothers about the National Child Development Screening Plan on Detecting Abnormal Child Development

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Abstract

Background

The early diagnosis of developmental disorders and timely interventions profoundly affect the health of children and their families; however, the detection rate of these disorders is much lower than the actual one. The present study aimed to explore effects of educating mothers about the national child development screening plan on detecting abnormal child development.

Materials and Methods: This experimental study was a pretest-posttest intervention. Sample size was 100 mothers with a one-year-old child having attended healthcare centers in Najafabad (one of Isfahan's township, Iran). The Ages and Stages Questionnaire (ASQ) was used for gathering data. Three educational sessions (each one 45 minutes) were held for mothers of the experimental group. The questionnaires were completed both before and one month after the intervention. Data was analyzed using the SPSS program, version 20.0 software.

Results: There wasn't any significant difference in terms of child's gender, mother's occupation and educational status (P>0.05). The mean score of child development from the mothers' perspective in all domains in the experimental group after the intervention was significantly lower than that before the intervention (P < 0.05). Thus, in the experimental group, after the intervention, the mothers could recognize their children's problem better.

Conclusion

In order that mothers could fill out the ASQ correctly and children with abnormal development could be detected, it is better to provide training in the importance of developmental screening and the early diagnosis of developmental disorders. Moreover, mothers with a one-year-old child should be educated about how to complete the questionnaire.

Key Words: ASQ, Child, Development, Education, Screening.

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1- INTRODUCTION

The majority of researchers believe that the quality of life during infancy and early childhood have significant effects on the child's subsequent development (1-3). In the entire life of a human, 60% of brain development occurs up to the age of one; therefore, the early years of life are very important to the child, family, and community. The maximum investment in the child is made by the family and community after the commencement of the school age, adolescence, and middle age; however, this situation must be rectified and the maximum investment should be made during the early years of life (4, 5). The early identification of developmental disorders and timely interventions considerably affect the health of children and their families (6-10).

In the current study, developmental disorders refer to illnesses in one of the following domains: communication (such as cooing and gurgling, listening, and understanding the meaning of words), gross motor (such as crawling), fine motor (such as painting and drawing), personal-social (such as doing individual and group play activities and playing with toys), and problem-solving (such as learning and playing with toys) (11-14). Approximately one-third of children with developmental or behavioral disorders remain undetected before entering the education system (15).

The American Academy of Pediatrics reported that 12-16% of children in the United States of America have at least one developmental disorder (16). Prevalence estimates on suspected developmental delays (SDD) in young infants are scarce and a necessary first step for planning an early intervention (17). Early identification of motor skill delays is important in order to intervene and hopefully prevent the associated negative health consequences (18). Developmental delay is a delay in areas of speech, language, motor, social and cognitive development. Because of the negative impact of intellectual and learning disabilities, early identification of children with developmental and behavioral problems using appropriate screening tests is crucial (19). Developmental screening is used for identifying children at risk of developmental disorders (20). The standardized diagnostic tool helps to detect children who need a more comprehensive assessment (6, 17). Hence, many tests and questionnaires have been carefully and systematically designed and validated for diagnosing developmental delays in children (21-24). Nevertheless, there is no tool which could be universally applicable to all communities and ages (2, 6).

From among tests, the Ages and Stages Questionnaire (ASQ) is already utilized extensively (8, 23, 25, 26). Currently, the national child development screening program is being carried out for children aged 12 months old using the ASQ in most cities of Iran. In Najafabad, it has been being conducted for one year; however, in spite of statistics released by the WHO and the Ministry of Health and Medical Education in Iran, the prevalence of developmental disorders in children from Najafabad has been reported to be around 2-3%, exhibiting a profound difference with statistics released by the two organizations (22, 26,27).

It could be said that since child development screening has newly begun and families and health staff are not familiar with stages of the program, the questionnaires are not completed accurately, which is likely to result from the following: 1) parents cannot duly acknowledge the importance of properly responding to questions in the questionnaire; 2) fearing that their children will be labeled as patients with developmental disorders, parents answer yes in reply to all questions; and 3) parents are negligent in filling out the questionnaire and have a limited

knowledge of doing it correctly. The present study aimed to remind mothers of the importance of the early diagnosis of child development disorders by performing a structured educational program and also evaluate effects of this education on the real identification of children with abnormal development.

2- MATERIALS AND METHODS

2-1. Study design and population

The current study is pretest-posttest experimental research. To carry out this prospective study, 100 mothers with a one-year-old child who had attended healthcare centers in Najafabad city, Isfahan province, Iran, were selected as population sample.

2-2. Methods

The sampling method was multistage random sampling. In fact, from among 12 urban healthcare centers in Najafabad (which were similar in terms of characteristics of patients who had referred to them), four centers were randomly selected. Two of them were randomly selected for choosing members of the experimental group and the other two centers were used for choosing members of the control group. From each of the four centers, 25 mothers who had attended there for the developmental screening of their one-year-old children were selected using convenience sampling so that totally 100 mothers entered the study. According to the following formula:

$$n = \frac{(Z1+Z2)^2 (2s^2)}{d^2}$$

Where, the total sample size (n) was calculated at 98 minimum. In the present study, it was set at 100 and each of the two groups had 50 members. In the above equation, z_1 (95% confidence level) = 1.96, z_2 (80% test power) = 0.84%, s (the standard deviation of the scores of developmental disorders in each group) = 0.4, and d (the least difference in the mean scores of developmental disorders between the two groups) was significant. The inclusion criteria were having a one-year-old child and intending to participate in the study. The exclusion criteria were a diagnosis of congenital diseases such as hypothyroidism and phenylketonuria, as made by a doctor, in the child and the subjects' unwillingness to take part in the study.

2-3. Measuring tools: Validity and Reliability

In order to collect data, the ASQ was used which is completed in Iran's health centers from 2013. The main goal of completion of this questionnaire is early detection of developmental disorders in children. It is composed of 19 separate questionnaires for 19 different age groups, which are completed by parents. In the present study, the 12th-month questionnaire was applied. Each questionnaire had 30 questions on child development, arranged from easier activities to more difficult ones. Questions of each questionnaire were designed according to five developmental domains of communication, gross motor, fine motor, personal-social, and problem-solving (8, 11-14).

Each domain consisted of six questions. Parents were asked to mark "Yes" if their child was able to perform the activity in each question; "Sometimes" was marked if the child sometimes performed the activity or had just been able to perform it; and "Not yet" meant that the child had not performed or displayed that behavior or activity yet. Answers were scored as follows: "Yes" = 10, "Sometimes" = 5, and "Not yet" = zero, scores in all the domains ranged between 0 and 60. The questionnaire had been validated in Vameghi et al. study in 2013. The reliability determined by Cronbach's alpha ranged between 0.76 and 0.86 and the inter-rater reliability was 0.93 (28).

2-4. Intervention

After completing the baseline questionnaire, mothers of the experimental group participated in three training sessions on behavioral objectives and educational methods **(Table1)**. The educational sessions were held by a health education specialist (first author of this article) in Najafabad health center. Each session lasted 45 minutes. In the educational sessions, mothers have trained about the objective of developmental screening, importance of early detection of developmental disorders and sound method of completing the development screening questionnaire. One month after the last session, the questionnaires were recompleted by mothers of the experimental and control groups. Control group has only received routine education from health center's staff.

2-5. Ethical consideration

At first, coordination and permission letter from Isfahan University of Medical Sciences (Deputy of research) was taken. It should be mentioned that before the start of the study, the aim of the study was demonstrated and the target group were ensured about the confidentiality of their data.

2-6.Data analyses

The questionnaires were fed into the Statistical Package for the Social Sciences program, version 20.0 software. A frequency distribution test was used to assess the status of disorders in the domains before and after the intervention in each group. Chi-square and Mann-Whitney tests were used for demographic data. Finally, a paired t-test was carried out to compare the child development scores in the domains before and after the intervention in each group. Significant level was considered as $P<0.05$.

3- RESULTS

In the current research, 100 mothers who had a one-year-old child participated. This study aimed to explore effects of educating mothers about the national child development screening plan on detecting abnormal child development which was done in Najafabad, Iran. The frequency distribution of the children's gender and the mothers' occupation and educational status revealed that no significant difference was existed between experimental and control groups ($P>0.05$) **(Table.2)**. Results demonstrated that the mean score of child development from the mothers' perspective in all the domains in the experimental group after the intervention was significantly lower than that before the experiment ($P < 0.05$) **(Figure.1)**. In other words, in the experimental group, after the intervention, the mothers could recognize their children's problem better. The relevant data are shown in **(Table.3)**. Furthermore, the results of the present study indicated that, concerning some domains of development, the actual diagnosis rate of disorders in the experimental group had increased so that it increased by 2% in the domain of communication and by 6% in the domain of problem-solving, and by 4% in the personal-social domain **(Table.4)**.

Table-1: A summary of educational programs offered to the mothers with regard to behavioral objectives and educational methods

Educational behavioral objectives	Educational field	Educational method	Tools	Time period	Assessment
Mothers can define developmental screening.	Cognitive	Lecture	PowerPoint Whiteboard	5	-

Mothers can name children eligible for screening.	Cognitive	Interactive lecture	PowerPoint Whiteboard	10	-
Mothers can discuss the importance of performing developmental screening at 12 months old.	Cognitive-emotional	Lecture and question-and-answer	PowerPoint Whiteboard	10	-
Mothers can discuss the importance of diagnosing developmental disorders early.	Cognitive-emotional	Lecture and question-and-answer	PowerPoint Whiteboard	10	-
Mothers can explain referral and follow-up stages for children with developmental problems.	Cognitive-emotional	Question-and-answer	PowerPoint Whiteboard	10	-
Mothers can mention the five assessment domains of development.	Cognitive	Lecture	Questionnaire Whiteboard	5	Questionnaire
Mothers can discuss the importance of each domain briefly.	Cognitive	Lecture	PowerPoint Whiteboard	25	-
Mothers are familiar with each of the questions about the domains and their importance.	Cognitive-emotional	Lecture and question-and-answer	Questionnaire Whiteboard	10	Questionnaire
Mothers can explain how a child is assessed in each domain.	Cognitive-emotional	Lecture and question-and-answer	Questionnaire Whiteboard	20	-
Mothers practice completing the development screening questionnaire.	Psychomotor	Questionnaire completion	Questionnaire	20	Questionnaire

Table-2: Demographic characteristics of mothers and Childs

Variable	Sub-group	Experimental group		Control group		P-value
		Number	%	Number	%	
Child's gender	Male	24	48	30	60	0.23 *
	Female	26	52	20	40	
Mother's occupation	Housewife	45	90	41	82	0.25 *
	Employed	5	10	9	18	
Educational status	Elementary	1	2	1	2	0.33 **
	Junior high and high education	11	22	6	12	
	Diploma and associate's degree	20	38	21	42	
	Bachelor of Science	19	38	22	44	

* Chi-square; ** Mann-Whitney.

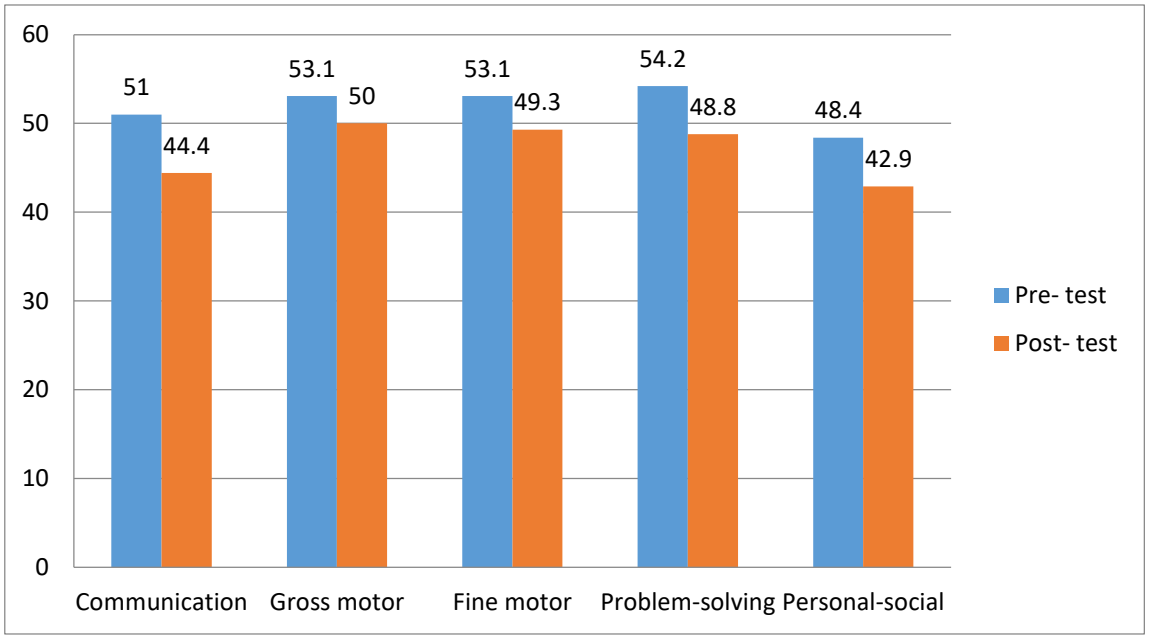

Fig.1: Identification of five domains of developmental disorders from mother's perspective, before and one month after education in experimental group.

Table-3: The mean (SD) score of child development in the five domains from the mothers' perspective before and one month after the intervention in the experimental and control groups

Domain	Experimental Pre-intervention	Post-intervention	P-value*	Control Pre-intervention	Post-intervention	P-value*
	Mean(SD)	Mean(SD)		Mean(SD)	Mean(SD)	
Communication	51(11.7)	44.4(11.2)	<0.001	54.9(6.3)	54.7(6.1)	0.42
Gross motor	53.1(10.04)	50(8.9)	<0.001	56(5.7)	56.1(5.2)	0.78
Fine motor	53.1(8.1)	49.3(7.6)	<0.001	54.3(9.7)	55.2(7.4)	0.34
Problem-solving	54.2(9.3)	48.8(11.9)	0.002	55.3(4.9)	54.3(8.1)	0.32
Personal-social	48.4(12.01)	42.9(12.2)	<0.001	53.2(9.8)	53.1(9.7)	0.57

*Paired T test; SD: Standard deviation.

Table-4: The frequency distribution of the child development disorder status from the mothers' perspective before and one month after the intervention in the experimental and control groups

Domains	Disorder status	Experimental group		P-value*	Control group		P-value*
		Pre-intervention	Post-intervention		Pre-intervention	Post-intervention	
		Number	%		Number	%	
Communication	Disorder	2 (4%)	3 (6%)	0.09	0 (0%)	0 (0%)	1.0
	At risk of disorder	0 (0%)	1 (2%)		0 (0%)	0 (0%)	
	Normal	48 (96%)	46 (92%)		50 (100%)	50 (100%)	
Gross motor	Disorder	1 (2%)	1 (2%)	1.0	0 (0%)	0 (0%)	1.0
	At risk of disorder	2 (4%)	2 (4%)		1 (2%)	1 (2%)	
	Normal	47 (94%)	47 (94%)		49 (98%)	49 (98%)	
Fine motor	Disorder	1 (2%)	1 (2%)	0.53	3 (6%)	2 (4%)	0.31
	At risk of disorder	6 (12%)	8 (16%)		1 (2%)	1 (2%)	
	Normal	43 (86%)	41 (82%)		46 (92%)	47 (94%)	
Problem-solving	Disorder	2 (4%)	5 (10%)	0.04	0 (0%)	1 (2%)	0.31
	At risk of disorder	6 (12%)	6 (12%)		1 (2%)	1 (2%)	
	Normal	42 (84%)	39 (78%)		49 (98%)	48 (96%)	
Personal-social	Disorder	0 (0%)	2 (4%)	0.08	2 (4%)	2 (4%)	1.0
	At risk of disorder	7 (14%)	7 (14%)		0 (0%)	0 (0%)	
	Normal	43 (86%)	41 (82%)		48 (96%)	48 (96%)	

*Wilcoxon test.

4- DISCUSSION

The present study was conducted to explore effects of educating mothers about the national child development screening plan on detecting abnormal development in children from Najafabad in 2017. Results of the study showed that there was no significant difference in the frequency distribution of the children's gender and the mothers' occupation between the experimental and control groups. Furthermore, there was no significant difference between the two groups in the mothers' educational status, their age, and the number of their children. Therefore, it could be said that the mothers' occupation, education, and age had no contribution to the detection of developmental disorders in their children. As a result, regardless of these, it is better to educate all mothers who have a one-year-old child and are going to complete the ASQ about the importance of developmental screening and the early diagnosis of the disorders. Moreover, they should be educated about the way a child is assessed and the questionnaire is filled out. In line with the present study, a study by Flamant et al. indicates that the ASQ is an easy and reliable tool, regardless of the socio-economic status of the family, to predict the neurologic outcome in infants up to the age of 2 years old. The ASQ can be beneficial with a low-cost impact to some follow-up programs and contribute to the establishment of a genuine sense of parental involvement. This study shows that parents, particularly mothers, completed this questionnaire and should have sufficient knowledge of ASQ completion (12). Additionally, the results of the current study revealed that the mean score of child development from the

mothers' perspective in all the domains in the experimental group after the intervention was significantly lower than that before the intervention ($p < 0.05$). In other words, in the experimental group, after the intervention, the mothers could recognize their children's problems better. Considering this, it could be concluded that training mothers made them more sensitive and precise about questionnaire completion. They also learnt not to mark "Yes" unless they were sure that their child performed the particular activity. Moreover, they were no longer worried that their child would be labeled as a patient with developmental disorders. Consistent with the current study, a study by Sidor et al. indicates that improving mothers' knowledge of child development relieves their anxiety and stress and improves the mother-child interaction (29).

The result of Bornstein and Cote's study showed that approximately 70% of mothers had no sufficient knowledge of the different child development domains so that they did not know the correct answer to 25% of questions and their incorrect answers were mostly about normal child development (30). Hence, it could be said that acquainting mothers with child development, different development domains, and the significance of each domain could be helpful in completing the questionnaire and identifying children with abnormal development. Inconsistent with the current one, a study by Steenis et al. in 2015 demonstrated that parents could be valid and reliable sources of information for the development of their children and screening tools may be useful for improving parents' knowledge of child development assessment (31). Nevertheless, in the present study, in the control group, the mean score of child development from the mothers' perspective was not significantly different in any of the domains between the two time points ($p > 0.05$). The conclusion is that we should not rely on parents' knowledge only. Furthermore, it is necessary to provide training in developmental screening, perform screening at 12 months old, diagnose disorders in a timely manner, and go through referral and follow-up stages on time. Rydz et al. conducted a study which is in line with the present one. They drew three conclusions in this regard: 1) this type of questionnaire could be easily used in all kinds of pediatric clinics; 2) pediatricians' attitudes have negligible effects on increasing the precision of these questionnaires but parents' opinions have profound effects on increasing their precision; and 3) this questionnaire raises important questions about the way to perform developmental screening (7).

Considering the third conclusion of the study, mothers require training in it so as to find answers to their questions about how developmental screening is performed. In line with the present study, a study by Piek et al. considers the training of mothers in completing the ASQ correctly to be of great importance (32). In the current study, the frequency distribution of the child development disorder status from the mothers' perspective in the control group showed that, after the intervention, the percentage of children with disorders grew from 4% to 6% in the communication domain, underwent no noticeable change in the domains of fine motor and gross motor and remained the same 2% as it was before the intervention, rose from 4% to 10% in the problem-solving domain, and increased from 0% to 4% in the personal-social domain. This shows positive effects of educating mothers about the identification of child development disorders using the ASQ. Considering these results, it could be said that, since activities of fine motor and gross motor are more objective for mothers, they made fewer mistakes while

answering questions of the two domains and their answers to most of the questions were correct. However, the communication, problem-solving, and personal-social domains are more subjective and, in order to answer questions of the domains, they required to practice with their children. In a study carried out by Yaghini et al. in Isfahan, 680 children were examined and 11.8% of them had a suspected disorder in one domain, 1.3% of them had a suspected disorder in two, and 1.2% of them had a suspected disorder in three. The disorders were mainly as follows: 2.2% in the personal-social domain, 5% in problem-solving, 4.9% in fine motor, 3.2% in gross motor, and 1.2% in communication (33).

The results of the study demonstrated that most of the children had a problem in the problem-solving domain. These are consistent with results of the present study. Nevertheless, in the other domains, differences lie between the two studies, which must be due to differences between their study populations. A study was carried out by Kyerematen et al. on the application of the ASQ child development test in a low-income Peruvian shantytown population in 2014. The study yielded results different from those in the present study. It had been performed on 129 children, 50 out of whom had suspect results for at least one of the five scales of communication, gross motor, fine motor, problem-solving, and personal-social (34). According to these results, it could be said that, since the study population comprised low-income shantytown Peruvians, there were more statistics on developmental disorders in their children.

5- CONCLUSION

Although the ASQ is used for providing an early diagnosis of developmental disorders in children, the detection of abnormal development in some cities of Iran isn’t satisfactory. The results of the present study demonstrated that educating mothers about how to complete questionnaires and assuring them that identifying developmental problems in children, could be effective in preventing more serious problems in the future. Hence, it appears that designing such educational interventions in different cities of the country will provide mothers with the opportunity of completing ASQ correctly and will accordingly contribute to the diagnosis of child development disorders in a timely fashion. Given that most pregnancy training is related to women's breastfeeding skills, it seems that training on the development of children and the importance of early detection of developmental abnormalities in the first months of the baby's birth should be held for mothers.

5-1. Limitation of study

The most important limitation of this study was the subjective nature of questions in ASQ so that, some of which were not comprehensible to the mothers. However, this problem was minimized by the investigator's explanations.

6- CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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