Investigating the Factors Related to the Development of Children in Southern Iran

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ABSTRACT

Background: Given that the evolution of various mental aspects includes physical, mental, emotional and social changes. Screening for the developmental status of children can prevent significant complications and disorders. Therefore, the developmental status of children in Hormozgan province was examined based on the ages and stages of questionnaire age and stages questionnaire (ASQ).

Methods: This was an analytical study performed by a cross-sectional method in December 1997 in health units of Hormozgan province. Based on the cluster random sampling, the names of 2260 children aged 60 months (3 to 5) were extracted through the integrated health system. Data collection tool was age and stages questionnaire (ASQ) used to assess the development of children in five areas of communication, large movements, fine movements, problem solving and socio-personal skills. The collected data were analyzed using SPSS software version 22 and statistical tests, ANOVA, Chi-square, mean standard deviation and frequency percentage (P<0.05).

Results: The mean age of the children in the study was 3.14 ± 2.3. From 2260 children, 1036 (45.8%) were girls and 1224 (54.2%) were boys. In terms of communication, 1.5% cases, fine movements 2%, 4.5% large movements, 3% problem solving and socio-personal skills, 4% children were abnormal.

Conclusion: The results showed that despite the normal development in most children, a number of children had developmental disorders in at least one area. Therefore, the need for programs to deal with related risk factors and continuous follow-up in terms of the development of these areas is essential to prevent future complications.

Keywords: Development, Child, ASQ, Children, Iran.

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Introduction

Evolution is the aspects of growth that involves physical, mental, emotional and social changes (1). The most important aspect of evaluating children's development is early diagnosis and timely mental, motor, vision and hearing disorders which can be treated through a timely intervention; otherwise, it can cause significant neurological complications and disorders (2). Early diagnosis of developmental disorders is important in the health of children and their families. This is an essential part of primary health measures (3). Different studies have shown that 16-18% of children in different communities have speech and language disabilities, mental retardation, learning disorders and emotional and behavioral disorders. However, if specialists only use their clinical judgment to diagnose these cases, just 20%-30% of these children will be diagnosed before school age (4-6). Various studies have demonstrated that underweight children suffer from disability and short-term and long-term physical, mental and social problems more than other children. At school age, these infants have less physical growth, cognitive function and efficiency, and it seems that these complications continue until puberty (7). Approximately 15 to 20 % of children in the United States have developmental or behavioral disorders (8). This rate is 15% in Jamaica, 8% in Bangladesh, 15% in Pakistan, 1.5% in India in children under two years of age, 3.3% in Iraq, 12.5% in Brazil, and 12.5% in the Netherlands (9-12). In Iran, this rate has been reported from 18.7% to 22.5% in different cities (13-16). Most Iranian children have not been screened developmentally for a number of reasons, including lack of available, easy, valid and standard screening tools (17). Unfortunately, half of these disorders are not identified until school age and are not treated naturally, resulting in the lack of diagnosis of several complications that threaten the health and progress of the community (5).

In 2002-2007, Dreh et al. in Arak conducted a study aimed at assessing the developmental status of 4-60 month-old children with a history of hospitalization in neonatal intensive care unit based on age and stages questionnaire (ASQ) questionnaire. In this study, 114 children with a history of hospitalization in neonatal intensive care unit were evaluated by their parents in terms of development (in five areas of communication, gross movements, fine movements, socio-personal skills, problem solving). 70.2% of the children were premature. In the field of communication, 20.2%, gross movements, 17.5%, subtle movements, 19.3%, problem solving, 8.8%, and socio-personal skills, 17.6% were abnormal. 67.5% of the studied children had a normal development, 6.1% were abnormal in all areas of development, and 26.3% were abnormal in at least one domain. There was no significant relationship between different aspects of development and sex, duration of hospitalization and birth weight. Finally, it was concluded that despite natural development in most children with a history of hospitalization in NICU, there were considerable developmental delays in at least one area. The need for continuous disease detection and follow-up programs belonged to the developmental aspect (18). In 2011, Noah Jah et al. conducted a study on the assessment of motor development of children covered by health centers in Dezful using World Health Organization (WHO) standards. In this study, 800 children of 1-5 covered by health centers in Dezful were examined. 12.4% of the children had the motor development disorder. This study showed that gestational age (peri-mesority) had a significant relationship with motor development disorder (19). Finally, researchers concluded that the prevalence of motor development disorder in children covered by health centers was high (20). Shahshahani et al. in 2010 evaluated the developmental status of 4-60 month-old children in Tehran using Denver 2 developmental screening tests (DDST-II) and ASQ, which compared the screening results and determined the agreement coefficient of two tests. In this cross-sectional study, 197 children (104 boys and 93 girls) aged 4-60 months were subjected to developmental delay. This study showed that 37% (according to DDST-II) and 18% (according to ASQ) suffered from developmental delay. which, considering the cases that despite

being normal, the screening was suspicious from the parents' point of view, this rate reached 38% and 43%, respectively. Finally, it was found that the coefficient of agreement between DDST-II and ASQ was weak. In order to select a suitable screening tool, the results of both of the golden standard diagnostic tests should be compared (21).

In 2013, Abdizdan et al. conducted a study to investigate developmental indices with normal, low and very low birth weight. In this study, 214 children with inclusion requirements were studied in three groups of normal birth weight (NBW), low birth weight (LBW) and very low birth weight (VLBW). Their developmental indices were evaluated from birth to the age of 15 months based on the information recorded in their health records through interviews with mothers. It was finally concluded that failure to achieve the motor and sensory development index was the most common in all age groups in VLBW children. There was a significant inverse relationship between lack of motor index and birth weight. However, child speech development and social perceptual development were not significantly different in the three groups. The researchers concluded that developmental disorder occurs more often in LBW children in the motor domain (22). In a study by Kazerooni et al. in Yasuj in 2011-2012, the developmental status of premature children aged 4-12 months with a history of hospitalization in neonatal intensive care unit based on ASQ was investigated. In this descriptive study, in the field of communication, 10% of the children, gross movements, 30%, subtle movements, 27.5%, problem solving domain, 23.8% and in the socio-personal skills, 23.8% were abnormal. This study showed that there was a significant difference between infants born through natural childbirth and infants born by cesarean section. The researchers concluded that despite normal development of most children with a history of preterm birth and intensive care unit hospitalization, a significant number have developmental disorders and need early intervention to prevent future complications (2).

In Rasht in 2013, Khabazkar et al. examined the correlation between domestic violence during pregnancy and after childbirth and the developmental status of 8-12 months old infants. In this cross-sectional study, 400 mothers and children 8-12 months old referred to selected health centers in Rasht went through a multistage method. Domestic violence was measured in three areas of physical, emotional (control, neglect) and sexual abuse, and developmental questionnaire of ages and stages was designed in five domains of communication, gross movements, fine movements, problem solving ability and socio-personal skills. Domestic violence had a significant correlation with children's developmental status in the areas of fine movements, problem solving and socio-personal skills, and the most harm inflicted on infants belonged to cognitive behavioral domains. Therefore, solutions should be considered to reduce domestic violence and factors affecting the development of children in order to reduce developmental disorders and their consequences. (23)

In 2008, Dr. Jurina Elbra et al. in Canada examined the use of the ASQ as a tool for evaluating Canadian children. The study was conducted over 3 years on 43 children with an open heart problem and 68 children between the ages of 4 and 36 months. 4 children going through open heart surgery had developmental problems, and the same number of children was evaluated by neurologists, of whom 2 had definite developmental problems. ASQ was particularly effective in 95%, and 100% of families were satisfied with performing and completing this questionnaire. Finally, it was concluded that ASQ is cheap. It is a convenient and special tool which families complete with full satisfaction to prevent developmental problems in children, but ultimately this method should not be replaced by clinical evaluation (16). From February 2009 to January 2010, Monica Junija et al. examined the delayed stages of developmental progression among Indian children using ASQ. This cross-sectional study was conducted on 200 children referred to the third clinic of children's development center in northern India. 102 children (51%) were excluded in the

developmental stage assessment (ASQ). And 90 patients (45%) were excluded in testing and evaluation of developmental stages (DASII). Regarding 24-month-old children, 94.7% showed the highest sensitivity, and for 4-month-old children, it had the highest Specificity (86.4%). The researchers concluded that the ASQ at different ages is the best and strongest method for determining the rate of developmental delay among Indian children (24). In a study, Jourijan Hornman et al. assessed the validity of the ASQ 60 by three scoring methods. This study was conducted on 1457 60-month-old children with 394 term children and 1063 preterm children in schools who had problems. It revealed that gender, prematurity, low education rate, low family income, and pregnancy at an early age are involved in ASQ validation format. It was concluded that the ASQ 60-month-old questionnaire is valid for observing the progression of problems in children in general. It is recommended in cases where more consideration is a priority (24).

Considering the importance of the subject, the authors decided to investigate the developmental status of children (before entering school) based on the ASQ in Hormozgan province.

The purpose of this study was to evaluate the developmental screening program of children in healthcare units and identify children with developmental disorders before entering school.

Method

This was an analytical and cross-sectional study conducted in December 1997 in assigned health units (health centers and comprehensive urban health centers) in Hormozgan province. The studied population was 60-month-old children (3-5 years old). Based on random cluster sampling, the names of 2260 children aged 60 months (3-5 years old) were extracted from the electronic files through the integrated health system (SIB) and phone numbers for parents to contact. In the next step, the health personnel contacted the family and asked them to visit the health unit if they wished to participate in the study. Sufficient information was provided to the parents regarding the importance of the issue. Then, the ASQ was completed by them. The sample size was calculated based on the following formula: determining the sample size to estimate the qualitative variables or the proportion of a disease in the community: in the above formula, n is the required sample size and z, the confidence coefficient obtained from the standard normal distribution table, p, an estimate of the proportion of people in the community who had the required characteristics, and d is the acceptable error value in estimating the proportion of the community. N is the total number of people in the community and q=p-1. In the present study, α = 0.05, and according to Shahshahi et al.'s article, the percentage of developmental disorders is 10.3%; so, it was decided that p = 0.103 and d = 1%, that is, d = 0.01, N = 40,000 (the total number of 60-month-old children in the province). The calculation was done by inserting the values in the formula of the sample size equal to 2260 people. After that, the researchers prepared a list of health centers and 60-month population in each city, and the required sample of each center was selected using the list of 5-year-old children in a systematic way. In this method, the first subject was selected by simple random sampling and the rest were selected by K interval. Among 15 cities of Hormozgan province, 53 health centers were randomly selected.

Data collection tool included the ASQ, which was used to measure the development of children in the 5 areas of communication, gross movements, fine movements, problem solving, and socio-personal skills. The highest possible score was 10 for each question and 60 for each developmental area, and the minimum score was zero. The ASQ screening test uses "cut-off points" to determine whether a child needs further follow-up and evaluations. The cut-off point is actually a score which shows the average performance of a large group of children in a particular age group and separately for each developmental area. They were determined after extensive studies and statistical investigations on a large number of children. The cut-off points on the cut-off point's sheet of Iranian children's ASQ

for each age, especially in the desired developmental area, were recorded in two columns: one deviation below the mean and two deviations below the mean. The scores related to each of the developmental areas were compared with the "cut-off point" declared in the ASQ sheet, for the same developmental area in the related age group. The criterion for inclusion in the study was parents with children aged 3 to 5 years. They were excluded from the study if they were not in this age range.

The collected data were analyzed using SPSS version 22 software and statistical tests, one-way ANOVA, Chi-square, standard deviation and frequency percentage.

Results

In this research, 2260 children were evaluated, with 1036 (45.8%) girls and 1224 (54.2%) boys.

1212 of these children lived in the city (55.7%) and 954 (44.3%) in the village. The mean and standard deviation of mothers and fathers' age was 32.56 ± 6.3 and 37.37 ± 7.24. 777 children (34.4%) were firstborn. 48.8% parents had a high school degree and 51.2% had a university degree. 1940 mothers (85.8%) were housewives and 250 fathers (11.1%) were unemployed. 2201 (98.4%) children were born at the right time and 28 children (1.6%) were born prematurely; 93.1% showed NBW, 5.4%, LBW, and 1.5% had HBW(a high birth weight) (Table 1).

Table 1. Demographic characteristics of the studied children

Variable	levels	Frequency (%)
Gender	Girl	1036 (45.8)
	Boy	1224 (54.2)
Address	City	1212 (55.7)
	Village	954 (44.3)
Parents' age	Mean and standard deviation of mothers' age	6.3± 32.56
	Mean and standard deviation of fathers' age	7.24± 37.37
Parents' education	Mothers' high school and university education	1077 (48.6)
	Fathers' high school and university education	1180 (52.2)
Birth rank	1	777 (34.4)
	2	652 (28.8)
	3	409 (18.1)
	4 Above*	422 (18.67)
Mother's job	Housewife	1940 (85.8)
	Employee	184 (8.1)
	Free	40 (1.8)
Father's job	Unemployed	250 (11.1)
	Employee	653 (28.9)
	Self-employed	1303 (57.7)
A child's maturity	Mature (37 weeks and above at the time of delivery (	2201(98.4)
	Premature (before 37 weeks at the time of delivery (	28 (1.6)
Child's weight	Low weight	122 (5.4)
	Normal weight	2103 (93.1)
	Overweight	3 (1.5)

*Birth rank of child more than 4

1.5% of the children were abnormal regarding communication, 2% in fine movements, 4.5% in coarse movements, 3% in problem solving and 4% had problems regarding socio-personal skills (Table 2).

In the field of communication, 98.5% were normal and 1.5% were abnormal; Regarding gross movements, 95.5% were normal and 4.5% were abnormal; in the area of fine movements, 98% were normal and 2% were abnormal; 97% were normal and 3% were abnormal in problem solving;

In the socio-personal skills, 96% were normal and 4% were abnormal; and respecting general movements, 98.6% were normal and 1.4% were abnormal.

Table 2. Five developmental areas of the children under study

Developmental areas	Normal%	Abnormal%
Communication	98.5%	1.5%
Gross movements	95.5%	4.5%
Fine movements	98%	2%
Problem Solving	97%	3%
Socio-personal skills	96%	4%
General movements	98.6%	1.4%

The results of Chi-square analysis in different areas were as follows:

There was a significant relationship between the demographic variables of mother's and mother's education, father's employment, place of residence, mother's stay at home, and child's maturity and the domains of communication, subtle movements, problem solving, socio-personal skills, and general domain(p<0.05).

No significant relationship was found between the place of residence, mother's stay at home and the child's maturity, and the range of gross movements. (p>0.05)

There was no significant relationship between different areas of development and gender (p>0.05) (Table 3).

Table 3. Chi-square analysis results regarding communication, fine and gross movements, problem solving, socio-personal skills, and general aspects

Demographic variables	Areas of communication, fine movements, problem solving, socio-personal skills, general area (p-value)	Gross range of movement (P-value)
Mother's education	<0.001	<0.001
Father's education	<0.001	<0.001
Father's employment	<0.001	<0.001
Address	<0.001	0.325
Being a housewife mother	<0.001	0.308
A child's ……	<0.001	0.172

The results of one-way analysis of variance also confirmed that regarding communication, the variables of birth rank, father's age and child's birth weight were significant, and the variable of mother's age was not significant(p>0.05). In the field of gross movements, mother's age, father's age, and birth weight were significant and the birth rank was not significant. In addition, regarding fine movements, birth rank and mother's age were significant, while father's age and birth weight were not significant. in the field of problem solving; Birth rank, mother's age and birth weight were significant, but father's age was not significant, all variables (mother's age, father's age, birth weight, birth rank) were significant (Table 4).

Table 4. The results of one-way analysis of variance in different areas

Range of general movement	Socio-personal skills	Problem solving	Range of fine movements	Range of gross movement	Communication	
p<0.0001	0.005	p<0.0001	p<0.0001	0.43	0.02	Birth rank
p<0.0001	0.02	0.06	0.819	0.01	0.016	Father's age
p<0.0001	p<0.0001	0.019	0.316	p<0.0001	p<0.0001	Birth weight
p<0.0001	0.008	0.007	p<0.0001	p<0.0001	0.295	Mother's age

Discussion

Findings suggested that there was a significant relationship between the demographic variables of mother's and father's education, father's employment, place of residence, mother's stay at home, child's maturity, and the areas of effective communication, fine movements, problem solving, socio-personal skills, and general aspect.

The study of Khabazkar et al. also confirmed these findings. (23) In fact, the higher the education level of the mother and father, the more child will be taken care of, and the child grows and functions better (19, 25). However, in Akbarshahi's study, no significant relationship was found between parents' education and performance in different fields (26). Moreover, the child's maturity had a positive and significant effect on his/her future communication ability. Khorrami et al., Nouh Jah et al. also confirmed these findings (19, 27).

The results of the current article indicated that mother's stay at home had a significant and positive effect on the process of the child's performance in different areas (communication, fine movements, problem solving, socio-personal skills, and general area). In fact, a housewife spends most of her time with her child, which will help the child's developmental performance. Uma and Kapur's research were also in line with these findings (25).

There was no significant relationship between the place of residence, mother's stay at home and child's maturity in terms of gross movements. Noah Jah's study also had a finding similar to this article (19).

There was no significant relationship between different areas of development and gender. No results were found in this regard.

1.5% of the children were abnormal in communication, 2%, fine movements, 4.5%, in gross movements, 3%, in problem solving, and 4% in socio-personal skills. The studies by Khorrami et al. and Karimi et al., Abdizdan, Kazrooni et al. in Kerman confirmed the findings of this research (22). Compared to the researches of Shahshahani et al., as well as Dare et al.'s research, there was less developmental disorders (21, 18). Perhaps the reason for this was the customs and traditions that exist among families in this part of the country regarding child care.

In the current study, the highest prevalence of abnormal communication was related to the area of gross movements. In Khorrami's study, the biggest difference was observed between gross movements (23, 27). LBW was one of the reasons causing differences in children's developmental movements. Ali Abadi's study showed that children with LBW were more prone to motor and developmental disorders than term children (24). Khorrami et al.'s research and Nouh Jah also confirmed this finding (28).

The results of the analysis of variance confirmed that in the field of communication, the variables of birth rank, father's age and child's birth weight were significant and the variable of mother's age was not significant. Noh Jah's studies did not show a significant relationship between birth rank and different functional areas. But, the results of the studies by Dare et al., Hedigar and Aliabadi were in line with this research (18, 19, 28, 29).

Regarding gross movements, the variables of mother's age, father's age, and birth weight were significant, and the birth rank variable was not significant. Nouh Jah et al. as well as Dare et al. confirmed these results (18, 19).

With regard to fine movements, birth rank and mother's age were significant, and father's age and birth weight were not significant. The results of the research by Kazaroni's were similar to the results of this study (2), but, compared with Noh Jah's study, no significant relationship was observed (19).

Birth rank, mother's age, birth weight, and father's age were not significant regarding problem solving. Similar results were obtained by Khorrami et al. In fact, with the increase of mother's age, the prevalence of chromosomal disorders, and then, children's developmental disorders increases (27).

For socio-personal skills, all variables (mother's age, father's age, birth weight, birth rank) were significant, being in line with the results of the study by Ali Abadi, Dara. (18, 28)

Research limitations and suggestions

Due to the cross-sectional nature of the study, it is suggested that other researchers conduct a longitudinal study with a control group.

Due to the number of questions in the questionnaire, it is recommended that the instructions and guidelines of the questionnaire be periodically reminded and taught. Furthermore, it is necessary to provide practical and detailed training to parents on children's developmental care from birth.

It is better to use indices and analytical analyzes such as regression in future studies.

Perhaps the reason for some of the differences between this study and others is culture and customs, which is suggested to be addressed in the future by other researchers and a comparison, should be made between different ethnicities and customs.

Strengths of the study

The present study was conducted with a higher sample size than other studies, which can be generalized to the target population more accurately.

Conclusion

Despite the favorable results regarding the developmental status of children, which shows good education and also the families' enjoyment of proper primary health care; In some areas, a number of children had abnormal development, which should be addressed and solved by the relevant authorities.

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Conflicts of interest

The authors declared no conflict of interest.

Authors' contribution

Sh. S., collected and entered information into the software; A. M. and S. K., did statistical analysis; A. J., Wrote the initial manuscript; Sh. S., Z.M., A. J. did the general reviewing of the article and final corrections; A. M., Sh. S. and A. J. submitted the article; A. J.

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