



# Comparison of Developmental Status of Infants Less Than 24 Months Who Were Born from Mothers in High-Risk Age Groups

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**Abstract**

**Introduction:** Development in children is a qualitative change in their abilities. When children cannot acquire developmental skills according to age, it shows delayed development. Low and high maternal age during pregnancy is a kind of risk factor for developmental disorders in children.

**Methods:** This is a cross-sectional descriptive comparative study that was performed on 400 women who had less than 19 and over 35 years old during pregnancy and now have 4-24-months infants that referred to health centers Kohgiluyeh and Boyer-Ahmad Province, Iran. Participants were selected through multi-stage random sampling. Data collection instruments were: A demographic, obstetric and the "Ages and Stages Questionnaires" for 4-24 months children. Data analysis was done by using the software SPSS 16, and independent t-test, chi-square and logistic-regression tests were used.

**Results:** The prevalence of developmental delay in infants 4-24-months of mothers fewer than 19 and older than 35 years was 7 percent and 11 percent respectively. In mothers over 35 years old, all domains were higher than the others. In both groups of maternal age, the most delayed development was gross motor; the lowest prevalence of late event in a group of mothers less than 19 years was personal-social skills and in women over 35 years was problem-solving.

**Conclusions:** Pregnancy in ages over 35 and less than 19 years are risk factors for the developmental delay of children and could be prevented by appropriate strategies and training.

## INTRODUCTION

Children are the makers of the country and the real capital of every nation [1]. According to global estimates, over 200 million children less than five years

old might never reach their developmental potential. It is necessary to pay special attention to this vulnerable group of children [1, 2].

When the child obtains the child's developmental abilities following their age very late, has developmental delays disorder [2]. Developmental delay in children is global problem health [3]. Almost 15-18 percent of children in the United States have behavioral disabilities [1]. The amount in Jamaica 15%, in Bangladesh 8% and the Netherlands 5.12%, has been reported [4-7]. Internal studies in Iran have reported a 7%-26.3% prevalence of developmental delay in Iranian cities [8-12]. A meta-analysis study conducted by Sajedi reported a 14.6% cumulative frequency in different dimensions of developmental delay in Iranian children [13]. Ahmadi et al. (2017) also reported a prevalence rate of 16.2% for developmental delay in 36-60month-old children from Tehran [14, 15].

Examines the development of children in five areas, including gross and fine motor development, communicational, problem solving or understanding speech, and personal and social development occur [1]. Any abnormality and disorder from the zygote formation to perinatal period events and the first year after birth can affect the growth and development and has irreversible effects on children's development process [16]. Risk factors that can create developmental delays are consanguineous marriage, under or overage of mothers during pregnancy, multiple pregnancies, the presence of diseases such as diabetes, high blood pressure or infections during pregnancy, using drugs or toxins and exposure to teratogens during pregnancy [12].

It is said that increasing maternal age increased chromosomal anomalies and developmental disorders in infants. Teen mothers are also at a higher risk of premature birth and low birth weight [17]. Studies have shown that mothers under 19 years old and over 35 years more than women 20-29 years breed smaller weight infants that this could

relate to developmental disorder, directly [18]. Studies show that children of young mothers achieved a higher score in social and physical development in compare with children of adolescents or older mothers [19].

To mentioned issues, in recent years due to early detection and early intervention, developmental disorders have been a great deal of new and more emphasis is on disabilities detecting during infancy; it means from birth to 2 years old [20]. Studies show that early identification and intervention in infants and children at risk prevent a lot of following consequences of developmental delay and disorders that could occur in children [6, 21].

According to disuse of reliable contraceptive methods at teenage years that lead to early pregnancy as well as noticeable in people over 35 years in Kohgiluyeh and Boyer Ahmad province, researchers described and compared the developmental status of children under

two years old between mothers in the two high-risk age groups (19 and over 35 years old during pregnancy).

## METHODS

This study is a cross-sectional descriptive comparative study that was performed on 400 women who had fewer than 19 and over 35 years old during pregnancy and now have 4-24-months child that referred to health centers affiliated to the University of Medical Sciences of Yasouj. This research was a cross-sectional conducted after the approval of the proposal at the Shahid Beheshti University of Medical Sciences in Tehran.

Inclusion criteria for this study include mothers, maternal age during pregnancy younger than 19 or more than 35 years, mother had has maternal prenatal care in health centers that have been recorded in her folder, age of infant be 4-24 months, and infants live with both parents, Apgar score was not below seven at the baby's birth, have not a history of fetal growth restriction, during the first 4-6 months are exclusively breastfed, infant has not malnutrition or anemia, infant at birth be older than 37 weeks and has more than 2500 g weight. Exclusion criteria included; mother had a history of diabetes, high blood pressure or anemia during pregnancy, a positive history of a specific disease hereditary, smoking, mental disorders, infants be the result of prolonged or premature pregnancy or even had obvious abnormal congenital at birth time. In this study, sampling was done in several stages.

First, a list of all the health centers of the Health Department Medical University of Kohgiluyeh and Boyer Ahmad was taken. Because of the province has seven cities, the sample was distributed proportional to the population of any town, from each city, clinics were randomly selected and according to this a quota was awarded to each center, and in the account of sampling based on purpose eligible mothers who have had children 4-24 months were selected. At first, gynecology and demographic questionnaire were given to them. According to this, mothers were divided into two groups: under 19 and over 35 years, then the "Ages and Stages." The questionnaire" was completed to assess the developmental status of children by their parents.

The minimum required sample size in each group by using the following equation was 185 children, due to the loss probability in each group of 200 children, in total, 400 samples were taken in two groups.

$$n = \left[ \frac{z_{1-\alpha/2} \sqrt{2\bar{\pi}(1-\bar{\pi})} + z_{1-\beta} \sqrt{\pi_1(1-\pi_1) + \pi_2(1-\pi_2)}}{\pi_1 - \pi_2} \right]^2$$

$$\pi_1 = 0.15, \pi_2 = 0.35, \alpha = 0.05 \Rightarrow z_{1-\alpha/2} = 1.96,$$

$$\beta = 0.90 \Rightarrow z_{1-\beta} = 1.28$$

In this study, all subjects with the full consent and knowledge of the objectives of the study were enrolled, and they were assured that all information would remain confidential. Demographic and Obstetrics questionnaire of mother and form data included:

demographics, socioeconomic status, history of pregnancy and childbirth of mother. The face and content validity of the survey by the obstetrics and gynecologist and pediatricians was determined, and test-retest reliability was assessed ten days after, by the mothers, the correlation coefficient ( $r=1$ ) was calculated.

ASQ questionnaire is currently the most widely used. The sensitivity of the ASQ test is 75 percent in high-risk children and 100 percent in the community group, with the specificity of 95 percent and 90 percent, respectively [22]. The questionnaire has a clear and straightforward language, and for some questions, simple images have been made. The validity of this test varies from 76% to 88%.

ASQ includes 19 different questionnaires that can screen developmental status of children from 4 to 60 months (4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 30, 33, 36, 42, 48, 54, and 60) in five domains: gross motor, fine motor, personal-social problem solving and communication skills. Each area contains six questions for each of the 30 items.

Three response options are "Yes" for when the child is now completely able to do the activity in question is, "not yet" for when the child does the business in question is not done and "sometimes" for the ability to do the activities in question in some of the times has been considered. Answer "Yes" 10 points, answered "sometimes" 5 points, and answered "no" zero scores. Then, scores of each item summed and final score in each domain is compared to cut-off marks of the ASQ standardization. 10 to 15 minutes

to complete the questionnaire and scoring it took about a minute if the child does not have enough points in each of the five domains and should be a referral for further evaluation [23-27].

ASQ is a reliable tool with Cronbach's alpha of 0.86 and a reliability of 0.93 for Iranian children [28]. In other studies, the safety of this scale was obtained as 0.88 using the test-retest method [15]. The reliability of this scale in the present survey was obtained as 0.82 using the test-retest method.

Data analysis software SPSS version 16 was used in this study. Descriptive statistics to provide information as frequency tables, percentage, mean and standard deviation, and inferential analysis for finding the relationship between variables was used. Statistical methods, including t-test, Chi-Square, and regression logistic, were used. The study Type I error test was considered 0.05, so the values were statistically less likely, to be considered significant.

## RESULTS

Comparison of the Sociodemographic and other characteristics of the 400 participants are presented in Table 1 and Comparison of individual variables in the healthy development and delay development in children born to mothers fewer than 19 and over 35 years old in Table 2. The Frequency of developmental delay in children 4-24-months of women fewer than 19 years (7 percent) and mothers more aged than 35 years was (11 percent). The highest prevalence of developmental delay in mothers over 35 years was in Problem solving and in fewer than 19 years was in personal social domains (Table 3).

**Table 1.** Comparison of the Parents' Demographic Features by Their Child's Developmental Status

	Delay Development	Normal Development	P Value
<b>Age of mother</b>			
< 19 years	17.86 ± 1.23	18.16 ± 1.31	0.382*
> 35 years	39.91 ± 2.67	39.20 ± 1.67	0.082*
<b>Age of father</b>			
< 19 years	25.50 ± 3.39	26.96 ± 3.79	0.199*
> 35 years	42.59 ± 5.47	42.57 ± 5.18	0.984*
<b>Age of mother during the pregnancy</b>			
< 19 years	16.29 ± 1.20	16.64 ± 1.22	0.261*
> 35 years	38.68 ± 2.66	37.80 ± 1.74	0.037*
<b>Level of Mother's Education</b>			
0.001**			
<b>&lt; 19 years</b>			
Primary	41 (20.5)		
High school	68 (34)		
Diploma	88 (44)		
College	3 (1.5)		
<b>&gt; 35 years</b>			
Primary	128 (64)		
High school	28 (14)		
Diploma	22 (11)		
College	22 (11)		
<b>Maternal job</b>			
< 0.001**			
<b>&lt; 19 years</b>			
housewives	200 (100)		
Employed	0 (0)		
<b>&gt; 35 years</b>			
housewives	376 (94)		
Employed	24 (6)		

\* Independent T test, \*\* Chi-square, Data are presented as Mean ± SD or Frequency (%).

**Table 2.** Comparison of Individual Variables in the Normal Development and Delay Development in Children Born to Mothers fewer than 19 and over 35 Years' Old.

Variables	Delay Development	Normal Development	P Value Independent T
<b>Child's age (months)</b>			
<19 years	4.29 ±2.89	5.18 ± 3.24	0.347
>35 years	4.32 ± 3.22	4.70 ± 2.85	0.557
<b>Child's weight (kg)</b>			
<19 years	2.878 ± 0.196	3.053 ± 0.286	0.027
>35 years	3.127±0.325	3.277 ±0.44	0.124
<b>Child's height (cm)</b>			
<19 years	49.64± 1.39	49.59± 1.99	0.917
>35 years	49.91 ±1.30	49.72± 1.88	0.656
<b>Head circumference of child(cm)</b>			
<19 years	34.71± 0.72	34.61± 1.06	0.726
>35 years	34.59± 0.908	34.82± 0.992	0.304

\*Data are presented as Mean ± SD.

**Table 3.** Children's Developmental Status by Age Group and Domain of Development

Groups	Delay Development		Normal Development		Total
<b>Maternal age (Years)</b>					
19 >	14 (7)		186 (93)		200 (100)
35 <	22 (11)		178 (89)		200 (100)
		<b>Maternal age (Years) &lt; 19</b>		<b>Maternal age (Years) &lt; 19</b>	
<b>Domains of development</b>	<b>Delay Development</b>	<b>Normal Development</b>	<b>Delay Development</b>	<b>Normal Development</b>	<b>Total</b>
<b>Communication</b>	5(2.5)	195(97.5)	7 (3.5)	193 (96.5)	N = 400
<b>Gross motor</b>	8(4)	192(96)	13 (6.5)	187(93.5)	
<b>Fine motor</b>	4(2)	196( 98)	10 (5)	190(95)	
<b>Problem solving</b>	6(3)	6(3)	194 (97)	6(3)	
<b>Personal-social</b>	3( 1.5 )	197(98.5)	192 (96)	8(4)	

\*Data is presented as Frequency (%).

Most education in the group under 19 years was a diploma (44 percent), and in mothers over 35 years was an elementary school (64 percentage). The Chi-square test showed a significant relationship between maternal education of children and maternal age ( $P=0.001$ ) (Table 2).

In women under 19 years (51.1 percent) and mothers over 35 years (48.5 percent) of the children were boys, The Chi-square test showed not a significant relationship between sex of child's and maternal age ( $P = 0.54$ )

The two age groups of mothers (fewer than 19 years and over 35 years old) were 47.8% of children less than one year of age, and 52.2% of children aged 2 to 1-year-old. The independent t-test showed no significant relationship between the mean age of children ( $P = 0.170$ ).

Birth weight of children in mothers under 19 years  $3.0480 \pm 0.2846$  and in women over 35 years old  $3.2607 \pm 0.4308$  kg were reported. In two groups, there was a significant difference in children's weight ( $P = 0.001$ ). According to this study in women under 19 years, delayed developments in children with low birth weight were more likely recorded, And the developmental delay in underweight children of mothers under 19 years old

group was significantly higher than the others ( $P = 0.027$ ).

According to the logistic regression results to examine the factors influencing developmental delays in children born to mothers aged under 19 and above 35 years, birth weight was significantly correlated with development, so that the chance of developmental delays in children reduced with maternal age, and low birth weight was more frequently observed in the children born to mothers aged under 19 years.

## DISCUSSION

In this study, we describe and compare the developmental status of children less than two years of age in two groups of high-risk mothers under the age of 19 and above 35 years of age in pregnancy. The frequency of developmental delay in mothers under 19 years of age and above 35 years old was reported to be 7% and 11%. Rydz and colleagues reported the incidence of developmental disorders 12-17% in North America and Australia [29]. In the Gyamfi study, the prevalence of developmental delay described 24% [30]. Lin et al., the prevalence of developmental disorders in children 0-2 years, 102 children per 10,000 children and in children 5-3 years, 105 children per 10,000 children in Taiwan reported [31]. The difference between the



mentioned studies with the present study can be the age range of children and the number of samples. In this study, the prevalence of developmental delay in children of mothers over 35 years old more was reported. Also, in the group of mothers over 35 years, developmental delay in mothers was older than 38 years at the time of delivery, had increased. Increasing mother age accompanies several disorders in children's growth and development such as Down syndrome, difficulty reading and writing, mental retardation and diseases caused by trinucleotide repetition [32]. Most developmental delays in both maternal ages were in gross motor, in the group of mothers under the age of 19, the least developmental delays in the personal-social domain and the group of mothers 35 and older were in the problem-solving domains. According to the previous studies, maternal age can influence developmental outcomes for children [33-35]. The study by Chittleborough et al. (2011) showed that 6.4% of children with known developmental conditions diagnosed based on the SDQ, had been born to mothers aged under 20 years [36]. This finding is consistent with those of the present study. Tearne et al. (2015) and Glasson and Petterson (2004) also had known that the age of the mother is effective in the cognitive development of children. Children born to older mothers received lower scores in the areas of cognitive development [37, 38]. Torabi et al. reported that maternal age and birth order have a significant relationship with the social and physical development. Thus, children of younger mothers scored higher in social and physical development in comparison with children of older mothers and children were next [39]. The study in the UK about developmental status in 45 teenage mothers' children had shown that eight children had suspicious delays, five children in one domain and 3 of them in several domains. And, a child in communication skills, five within the problem solving, 3 in the social – personal, 3 in gross motor and 2 in the fine motor domains had difficulty [40]. The different reasons for this study may be due to children's age and different sample sizes and different age groups and the age of the mother during pregnancy can be noted. On the other hand, Kerstjens et al., in 2009, Austin et al. (2005) showed that Mother's age does not affect the development of children [41, 42]. According to some theories on maternal age and developmental outcomes for children, younger mothers may not be mentally prepared to accept parenting duties, may not have the necessary parenting skills, or may have limited information on taking care of children or the right time to send them to kindergarten or preschool. On the other hand, advanced maternal age (above 35 years) is associated with less maternal sensitivity. In addition, maternal age may be negatively related to developmental outcomes for children. For example, older mothers have less physical ability, receive

less support from their relatives, and spend less time with their child due to the high costs of living [43]. Increasing mother age accompanies several disorders in children's growth and development such as Down syndrome, difficulty reading and writing, mental retardation and diseases caused by trinucleotide repetition [44-46], also, many studies are indicating a positive relationship between maternal age and better cognitive-behavioral outcomes for children. These results have been mainly attributed to a better home environment and older mothers' better access to stable support from their families. However, older mothers' parenting styles can lead to anxiety in their children [47]. In a study conducted in Japan, Koyama et al. found that advanced parental age not only was a risk factor for autism spectrum disorders but also led to poor social performance in children [48]. Iwayama et al. maintain that advanced maternal age can be accompanied by the impairment of the Moro reflex in one-month infants; this can be a sign of developmental disorder [49], in addition, in contrast with the study results, Torabi (2010) and Bajelan (2011) found no significant relationship between maternal age and developmental delays in children [39, 50]. Adolescent mothers' lack of accurate knowledge of children, has been mentioned as a determining factor in their children's lack of age-appropriate development [51, 52].

One of the limitations of the present study is the two groups (mothers under 19 years, mothers over 35 years during pregnancy) were not compared with the low-risk group (mothers 19-35 years). It is suggested that other studies be carried out with low risk mothers.

## CONCLUSIONS

In this study, developmental delay in children under 2 years of mothers over 35 years was more than in mothers under 19 years, and the most common delay in two groups was in the gross motor development. Low and high maternal age during pregnancy is a kind of risk factor for delay developmental in children; it can lead to various problems for the child in the future. Planning to reduce pregnancy in these age-old correlated with a reduced incidence of delay development. It is recommended that children quickly identify and therapeutic interventions, and rehabilitation is necessary.

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## ETHICAL CONSIDERATION

Shahid Beheshti University approved this study of Medical Sciences.

## FUNDING

This study Shahid Beheshti University approved this study by the research deputy of Shahid Beheshti Medical Science University.

## AUTHOR'S CONTRIBUTIONS

All authors contributed equally to the design of also study and FA and FP drafted the article. All authors read and approved the final manuscript.

## CONFLICT OF INTEREST

There was no conflict of interest to be declared.

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