

DOI [10.35630/2023/13/3.310](https://doi.org/10.35630/2023/13/3.310)

Received 14 May 2023;  
Accepted 20 June 2023,  
Published 22 June 2023

## FEATURES OF THE DEVELOPMENT AND HEALTH CONDITION OF CHILDREN CONCEIVED BY IN VITRO FERTILIZATION

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### ABSTRACT

**Aim:** To study the anamnesis, development parameters and health condition in the first year of life of the children conceived by IVF.

**Materials and Methods:** 116 children born by IVF and 46 children born in natural pregnancy were examined.

**Results:** In most cases of our study, children after IVF were born prematurely from women with a bad obstetric and gynecological history and had a low birth weight. The period of early adaptation in premature infants born after assisted reproductive technologies was complicated by respiratory distress syndrome. Most often the children after IVF had such pathologies as central nervous system damage, deficiency anemia and minor anomalies of heart development in the neonatal period. Compared with children born in natural pregnancy, infectious diseases were more often detected in newborns after IVF. The development of bronchopulmonary dysplasia was significantly more frequent in children after IVF within a month of life. At six months, most of the IVF babies had low parameters of physical development, whereas weight and growth indicators did not differ significantly from the general population indicators by the first year of life. Most of the children born after IVF had neurological outcomes, such as delayed psychomotor development, malfunctioning of the autonomic nervous system, convulsive syndrome by the year of life.

**Conclusion:** Children born after IVF have features of somatic status, neuropsychiatric and physical development, which indicates the need for targeted monitoring and continued research in this group of children to minimize health risks.

**Keywords:** in vitro fertilization, children, health condition, development.

### INTRODUCTION

In modern conditions, the method of in vitro fertilization (IVF) is one of the most promising methods of infertility treatment, [1-3] the effectiveness of which is 30-35% [4-7].

In the literature, there is evidence that pregnancy complications and adverse outcomes, such as premature birth, low birth weight, perinatal mortality, fetal growth retardation syndrome and psychomotor retardation, are the consequences of factors that led to infertility (8-10) and not the factors associated with the

implementation of reproductive technology (11-12). From a scientific point of view, these facts require confirmation by expanding the scope of research.

**Aim:** The study of the health condition in children conceived and born in the city of Astrakhan (Russia) using in vitro fertilization within the period 2016-2022.

## MATERIALS AND METHODS

There were 162 children under our supervision. The main group consisted of 116 infants conceived by IVF. The control group included 46 children born in a naturally occurring pregnancy. The data of clinical, biochemical and instrumental methods of examination were studied.

Statistical processing of the obtained results was carried out by means of the program Statistics 8.0. The level of significance of differences was determined by Student's test (t) and Pearson's chi -squared test (X<sup>2</sup>)

## RESULTS AND DISCUSSION

Our study showed that the average age of mothers in the main group was 32.6 + - 3.7 years, and in the control group - 24.8 + -2.0 years. The majority of women in the main group (92 patients) - 79% had a bad obstetric and gynecological history, which is significantly higher than in the control group (12 women) - 26%. At the same time, in the group of mothers participating in the IVF program, spontaneous miscarriages and non-developing pregnancies, as well as inflammatory and other diseases of the genitourinary system and pelvic organs, were much more common.

There were 16 cases (14%) of multiple pregnancies, which is associated with the peculiarities of IVF in the main group. All children from the control group were born from a singleton pregnancy. The majority of children in the main group (77%) were born by caesarean section, while in the control group, surgical delivery was performed only in 15% of cases.

Significant differences in anthropometric parameters among newborns of both groups were revealed (Table 1)

Table 1. Anthropometric parameters of newborns

Sampling	Indicators									
	The number of children	SEX		Weigh/gr.	Height/, CM	Head Circumference/ CM	Gestation age, person (%)			
		m	f				22-27 weeks	28-34 weeks	35-37 weeks	over 37 weeks
Main (children after IVF)	116	72	44	2707 ±824	48,3 ± 5,7	33,4 ± 3,7	8 (7%)	31 (27%)	42 (36%)	35 (30%)
Control (in natural pregnancy)	46	29	24	3350 ±443	52,3 ± 1,9	35,4 ± 0,9	3 (7%)	14 (30%)	16 (36%)	13 (30%)

Moreover, along with prematurity, 52 children of the main group (44%) were born with small birth-weight in relation to their gestational age and thus had a delay in prenatal development, while intrauterine malnutrition was observed only in 10 (5%) children (x<sup>2</sup> = 7.432, p<0.01) in the control group.

Respiratory distress syndrome was detected in the majority of children of the main group born prematurely (68 children out of 81; 84%) in the period of early adaptation, however this factor was not observed in the control group. After a month of life, 50 children born by IVF (43%) were diagnosed with bronchopulmonary dysplasia, and in the control group, bronchopulmonary dysplasia developed in 2 children (4%) (x<sup>2</sup> = 22.7, p <0.001).

Manifestations of perinatal pathology of the central nervous system were noted within the group of children born after assisted reproductive technologies, in all 100% of cases, which was confirmed by changes in neurosonography, intraventricular hemorrhages of varying degrees (49 children, 42%), cystic changes (38 children, 33%), cerebral blood flow disorders (42, 36%). The signs of perinatal damage to the nervous system were observed in 22 children (48%) (x<sup>2</sup> = 71, p<0.001) among the children of the control group.

Infectious and inflammatory diseases in the neonatal period were diagnosed in 21% of the children of the

main group and 6% of the children of the control group ( $x_2 = 4.76$ ,  $p < 0.05$ ). We detected the symptoms of intrauterine pneumonia (11 children, 9.5%), postnatal pneumonia (6 children, 5.0%), sepsis (4 children, 3.5%), meningoencephalitis (2 children, 1.7%) in the main group. 2 children developed postnatal pneumonia, 1 child had a urinary tract infection in the control; group. Congenital anomalies of development were diagnosed in 9 children (8%) of the main group, of which 5 children (4.3%) had congenital heart defects, 2 children (1.7%) had anomalies in the development of the urinary system, in 2 children (1.7%) malformations of the central nervous system were observed. Congenital anomalies were observed in 2 children (4.3%) and were represented by heart defects ( $x_2 = 0.605$ ,  $p > 0.05$ ) in the control group. According to the results of echocardiography, all children with IVF were found to have small anomalies in the development of the heart, represented by a patent foramen ovale. Minor anomalies in the development of the heart were observed in 19 children (41%) ( $x_2 = 42.128$ ,  $p < 0.001$ ) of the control group.

The majority of premature (88%, 72 children) babies born after IVF application developed retinopathy of varying severity. Among 11 preterm infants in the control group, 5 children (45%) had manifestations of retinopathy ( $x_2 = 34.622$ ,  $p < 0.001$ ).

According to the clinical examination and laboratory blood tests, 80% of the children of the main group (93 children) developed deficiency anemia by the age of 1 month of life, while 23 children (20%) with severe anemia underwent blood transfusion. In the control group, only 19% of children had manifestations of anemia ( $x_2 = 42.128$ ,  $p < 0.001$ ).

It was established that in the first six months of life, most of the observed children (30 children, 58%) had low parameters of physical development (below the 10th centile). However, by the age of one year, most children showed "catching up" growth and weight indicators. Thus, 35 children (67%) by the age of one year had an average harmonious physical development, 15 children (29%) had a physical development below the average, and only 2 children (4%) had a low physical development. At the same time, disharmonious physical development with a lack of body weight was noted in 10 children (18%). When analyzing neuropsychic development, it was found that the majority of children (61%, 32 children) in the first year of life had neurological problems in the form of delayed motor development (33%, 17 children), hydrocephalic syndrome (17%, 9 children), convulsive syndrome (2%, 1 child).

## CONCLUSION

The identified features of the health and development of children conceived by IVF require further scientific monitoring [10-12] and in-depth regular check-up, both by pediatricians and specialized doctors. United efforts in this direction will help to minimize the risks to children's health that were born due to such a precious method.

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