

FEATURES OF PHYSICAL DEVELOPMENT OF NEWBORN CHILDREN BORN TO MOTHERS WITH COVID

*Inakova B.B.,
Nuritdinova G.T.,
Atabekova M.U.*

Department of Pediatrics and Neonatology of the Faculty, ASMI

Abstract. The relationship between the incidence of COVID-19 in pregnant women who have had the coronavirus infection at different stages of gestation and the health of their children is of great interest. There is insufficient convincing data that fully reflects the characteristics of the neonatal period, the state of the immune system, which affect the characteristics of the postnatal period in this category of children. Based on the above, the relevance of the study becomes obvious, the purpose of which was to study the characteristics of the clinical and immunological health of newborns in mothers who had the new coronavirus infection COVID-19 at different stages of gestation. The prospective study included 131 women and 132 children.

Keywords: lymphocyte subpopulations, newborns, NK cells, pregnancy, SARS-CoV-2, COVID-19.

INTRODUCTION

The lack of sufficient knowledge about the pathogenesis of the disease and specific treatment methods, the heterogeneity of the results of many studies and, as a rule, the preliminary nature of the conclusions made in these studies suggest caution in drawing final conclusions about the impact of COVID-19 on pregnancy outcomes and the health of newborns [1, 10].

As published data indicate, 85% of women infected with SARS-CoV-2 have a mild form of the disease. The rates of severe disease vary from 9.3 to 11.1%, and the rates of critical disease vary from 2 to 6.9%, which is also close to the rates for the general population [2].

The relationship between the incidence of COVID-19 in pregnant women and the health of their children is of great interest. The early neonatal period is the first of the critical periods of postnatal development, and its course determines the child's future health.

MATERIALS AND METHODS

Of particular interest at present is the category of children born to women who have had coronavirus infection at different stages of gestation. There is insufficient convincing data that fully reflects the characteristics of the course of the neonatal period, the state of the immune system, which affect the characteristics of the postnatal period in this category of children. Based on the above, the relevance of the study becomes obvious, the purpose of which was to study the characteristics of the clinical and immunological health of newborns from mothers who have had the new coronavirus infection COVID-19 at different stages of gestation. The patients were divided into 2 groups: the main group, which consisted of women ($n = 61$) who had COVID-19 during pregnancy and their newborn children ($n = 62$) of gestational age (GA) 37–41 weeks, and the comparison group - women without laboratory-confirmed COVID-19 during pregnancy ($n = 70$) and their newborn children ($n = 70$) of the same GA. Depending on the duration of the new coronavirus infection, children in the main group were divided into 3 subgroups: Subgroup 1 - children whose mothers had COVID-19 in the 1st trimester ($n = 19$), Subgroup 2 - children whose mothers had COVID-19 in the 2nd trimester ($n = 19$), Subgroup 3 - children whose mothers had COVID-19 in the 3rd trimester ($n = 24$).

RESULTS AND DISCUSSION

As can be seen from the data, women in the main and control groups were comparable in age ($p > 0.05$). When analyzing the patient history, no significant differences in somatic and obstetric-gynecological diseases were noted. Analysis of the course of the current pregnancy revealed that low-molecular-weight heparin therapy was statistically significantly more often administered in the main group.

The timing and frequency of delivery by cesarean section in pregnant women in the main group did not have statistically significant differences compared to the control group. Spontaneous vaginal delivery occurred in 77% (47/61) of women with COVID-19 and in 81% in the comparison group (57/70), $p > 0.05$, and the frequency of delivery by cesarean section was 23% (14/61) in the main group and 19% (13/70) in the comparison group, $p > 0.05$.

When analyzing anthropometric data, gestational age and assessment according to the Apgar scale, statistically significant differences in the study groups could not be found.

Signs of intrauterine growth retardation (physical development indicators less than the 10th percentile according to the Intergrowth-21 curves) among newborns born to mothers who had a new coronavirus infection during pregnancy were 2% (1/62); in the comparison group, physical development indicators less than the 10th percentile according to the Intergrowth-21 curves among newborns occurred with a frequency of 4% (3/70); the differences are not significant ($p > 0.05$).

One child from the main group (2% (1/62)) required specialized medical care in the neonatal intensive care unit (NICU), while children from the control group did not require resuscitation care (0/70), the differences are not significant ($p > 0.05$). Observation and treatment in the Department of Pathology of Newborns and Premature Infants (DPNPI) was carried out for 10% (6/62) of newborns in the main group; in the comparison group, 1 child (1%, 1/70) required assistance in the DPNPI ($p = 0.03$).

The causes that determined the severity of the condition of children in the main group who required inpatient treatment were: perinatal infections (pneumonia, rhinitis, otitis), hyperbilirubinemia of newborns, congenital heart defects (CHD), namely: ventricular septal defect (VSD), interatrial communication (IAC more than 5 mm). However, the incidence of these conditions in children in the main and control groups were comparable ($p > 0.05$), while the incidence of grade 1 intraventricular hemorrhage (IVH) in newborns of the main group was significantly higher than in children in the comparison group (8% (5/62) and 0% (0/70), $p = 0.02$).

The figure shows a comparative characteristic of the subpopulation composition of lymphocytes in children born to mothers who had COVID-19 and children in the comparison group. The data in the figure are presented as the ratio of the median content of the indicator in the group of newborns from mothers who had COVID-19 during pregnancy to the median content of the indicator in the comparison group. P-values are indicated for the medians of the studied indicators. Of the indicators presented in the figure, attention is drawn to the lower content of leukocytes and lymphocytes in the main group, an increased content of T-lymphocytes, low B-lymphocytes, NK cells and an equal content of neutrophils with the control with reduced phagocytic activity. However, it should be noted that the values of the content of subpopulations of T- and B-lymphocytes, the phagocytic activity of neutrophils, although they differ between groups, remain within the reference values, and the content of NK cells in the main group is 2 times lower than the level of reference values.

Currently, there are many publications in the literature indicating a reduced number of killer cells in patients with COVID-19 of varying severity, along with a decrease in lymphocytes of other subpopulations (in addition, general lymphopenia is a laboratory indicator characteristic of moderate

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to severe coronavirus infection). A decrease in killer cells during a viral infection is of scientific interest, since these are the cells of the first line of innate defense, carried out directly by eliminating virus-infected cells. It was found that a decrease in the content of NK cells may be associated with direct infection of killer cells. This phenomenon has been shown for infection with a number of enveloped viruses, which include SARS-CoV-2 [7].

CONCLUSION

Based on the latest epidemiological data on COVID-19 and pregnancy during infection, there is insufficient evidence of increased risk to the mother and fetus, and there is no confirmed evidence of an association in the occurrence of fetal malformations associated with this infection. It is important to consider that the COVID-19 pandemic can cause psychological stress and anxiety in pregnant women, which may have an adverse effect on both the course of pregnancy and the immune system of their newborns.

REFERENCES

1. Kosolapova Yu.A., Boris D.A., Poludenko N.D., Makieva M.I., Nikitina I.V., Inviyaeva E.V., Vtorushina V.V., Krechetova L.V., Mikhanoshina N.V., Zubkov V.V., Degtyarev D.N. The impact of the new coronavirus infection COVID-19 suffered by women during pregnancy on the health of newborns // *Obstetrics and Gynecology*. 2022. No. 11. P. 90–98.
2. Api O., Sen C., Debska M., Saccone G., D'Antonio F., Volpe N., Yayla M., Esin S., Turan S., Kurjak A., Chervenak F. Clinical management of coronavirus disease 2019 (COVID-19) in pregnancy: recommendations of WAPM - World Association of Perinatal Medicine. *J. Perinat. Med.*, 2020, vol. 48, no. 9, pp. 857–866. doi: 10.1515/jpm-2020-0265
3. Heltzer M.L., Coffin S.E., Maurer K., Bagashev A., Zhang Z., Orange J.S., Sullivan K.E. Immune dysregulation in severe influenza. *J. Leukoc. Biol.*, 2019, vol. 85, no. 6, pp. 1036–1043. doi: 10.1189/jlb.1108710
4. Karre K. NK cells. MHC class I molecules and the missing self. *Scand. J. Immunol.*, 2012, vol. 55, no. 3, pp. 221–228. doi: 10.1046/j.1365-3083.2002.01053.x
5. Lanier L.L. Up on the tightrope: natural killer cell activation and inhibition. *Nat. Immunol.*, 2018, vol. 9, no. 5, pp. 495–502. doi: 10.1038/ni1581