

## Original Research Article

# Study neonate's complications in COVID-19 infected pregnant women in early period of pandemic in Ardabil province, Iran

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## ABSTRACT

**Background:** Pregnant women and neonates are considered as high-risk groups of population. Due to higher risk of COVID-19 in pregnant women, the aim of this study was to determine neonates' complications in COVID-19 infected pregnant women in early period of pandemic in Ardabil province.

**Methods:** This prospective cross-sectional study was conducted on 21 infected pregnant women and their neonates from Feb to June 2020 in Alavi Hospital, Ardabil. Mother's clinical and laboratory findings and their neonates were registered in a checklist. Neonates' complications were assessed and infants' growth and developmental disorders followed up at 28 days, 6 months, and 12 months. Collected data were analysed by statistical methods in SPSS version 24.

**Results:** In terms of clinical symptoms, the most prevalence symptoms were shortness of breath, fever, chills and dry cough. 15 infected mothers had a cesarean section and there was no maternal and neonatal mortality in this study. Of the 21 neonates, 13 were boys and 8 girls. Five neonates had respiratory distress and were admitted to the intensive care unit for 1 week. In these 5 neonates, arterial pH was low and neonatal CRP was high and the blood culture was negative for them. Also, all neonates were negative for COVID-19. None of the newborns had problems with feeding and poor reflexes and other symptoms. All newborns had negative PCR. 19 neonates were born over 2500 grams.

**Conclusions:** Results showed that suffering to COVID-19 had not relation with growth disorder in neonates and mother's clinical symptoms had not different with other symptoms. So we can use similar investigations to control of COVID-19 in all pregnant women. Also, COVID-19 infection in newborns was not associated with growth and developmental disorders in 1 year follow up.

**Keywords:** Newborn, Pregnant woman, Clinical and laboratory symptoms, COVID-19

## INTRODUCTION

In the epidemic of infectious diseases, pregnant women and their fetuses are considered high-risk populations.<sup>1</sup>

Pregnant women are more susceptible to infectious diseases than the general population and are particularly vulnerable to severe respiratory illness and pneumonia due to their low immune systems. Also, physiological

adaptation during pregnancy, such as diaphragm elevation, increased oxygen consumption, and edema of the respiratory mucosa, cause intolerance to hypoxia.<sup>1-3</sup> Also, in the epidemic of infectious diseases, special attention should be paid to infants born of infected mothers, as infants with infections may be asymptomatic or show mild to severe symptoms.<sup>4</sup>

Human coronavirus is one of the most common pathogens causing respiratory infections.<sup>2</sup> COVID-19 pneumonia is a highly contagious infectious disease. The disease affects all age groups, especially pregnant women. It should be noted that COVID-19 may alter immune responses in the mother-fetus relationship and affect maternal and neonatal health.<sup>3</sup> Studies have shown that pregnant women who experienced SARS have worse performance than non-pregnant women of the same age. Spontaneous abortion has been reported in women infected with SARS and MERS in the first trimester of pregnancy. Also, intrauterine growth restriction and preterm delivery have been observed in the second and third trimesters of pregnancies with SARS and MERS. Mother with SARS have more complications in the second trimester of pregnancy than mother with MERS. In infants of affected mothers, in addition to the need for intensive care for infants and endotracheal intubation, renal failure and mortality have been reported.<sup>5-7</sup> However, no confirmation of vertical transmission of mother-to-fetus SARS and MERS has been reported.<sup>8-9</sup>

On the other hand, on February, 2020, in Lancet magazine, it was recommended that infants born to women with suspected or confirmed COVID-19 infection must be separated from the mother for at least two weeks after birth and not breastfed and should not be in close contact with the mother. Avoid as long as COVID-19 is suspected or infected.<sup>10</sup> In two reports involving 18 pregnant women with suspected or confirmed COVID-19 pneumonia, there was no laboratory evidence that the virus was transmitted to the baby. However, two cases of infection have been reported in infants. In addition, the American College of Obstetricians and Gynecologists (ACOG) states that infants born to mothers with COVID-19-positive mothers should be screened as patients and properly isolated and evaluated.<sup>11,12</sup> Due to insufficient knowledge about COVID-19 during pregnancy and its intrauterine or prenatal transmission and lack of sufficient evidence for clinical symptoms and vertical transmission of COVID-19 during pregnancy-childbirth and necessity of information sharing during the pandemic, this study was conducted to determine neonates's complications in COVID-19 infected pregnant women in early period of pandemic in Ardabil province, Iran.

## METHODS

This prospective cross-sectional study was approved by the ethics committee of Ardabil University of Medical Sciences (The ethics code IR.ARUMS.REC.1399.279). All mothers who gave birth with positive PCR test and

definitively diagnostic COVID-19 from Feb to June 2020 were included in the study. 21 infected mothers and their neonates were studied. Mother's findings including maternal age, gestational age, type of delivery, clinical findings (shortness of breath, weakness and lethargy, dry cough, fever), laboratory findings (lymphopenia, C-reactive protein (CPR), Lactate Dehydrogenase (LDH), Liver function test (LFT)), and lung CT scan were collected through patient files, questions from the treating physician and questions from the patient herself.

Apgar score (Appearance, Pulse, Grimace, Activity and Respiration) was determined. Infants born to mothers with 19-Covid infection were monitored for complications at birth, growth, and developmental disorders for 12 months. Infants were evaluated at birth and at intervals of 28 days, 6 months, and 12 months. At birth, the infants were evaluated for signs of COVID-19 infection and routine examinations. At 28 days of age, infants were assessed for weight, height, head circumference, routine examinations and reflexes, at 6 months, infants were assessed for weight, height, head circumference, nutrition, and at 12 months for weight, height, head circumference and developmental criteria.

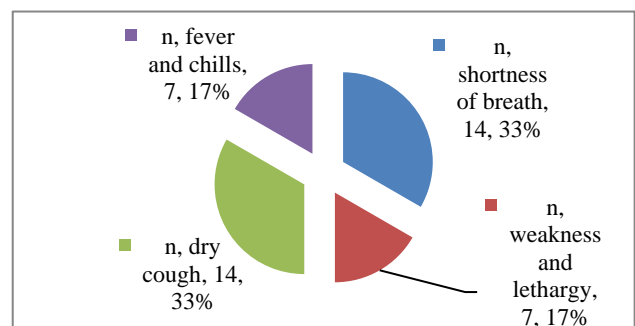
## Statistical analysis

After coding, the data were entered into EXCEL and SPSS software version 24. The results were expressed as mean and standard deviation for quantitative variables and as a percentage for stratified qualitative variables. Fisher's exact test was used to compare the means.

## RESULTS

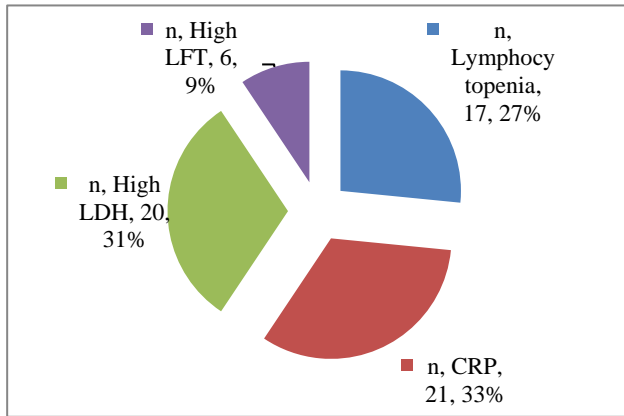
The mean age of mothers was 29.52±5.81 years. Of all women, 16 (76.2%) education of under diploma and 5 (23.8%) mothers had higher education. 14 (66.7%) mothers were housewife, 7 (33.3%) were employee. The mean gestational age was 39±2 weeks.

In terms of clinical symptoms of COVID-19 infected pregnant women, the most prevalent symptom were the shortness of breath and dry cough each were observed in 14 women (66.7%) (Figure 1).



**Figure 1: Frequency of clinical symptoms of pregnant women with 19-covid infection.**

There was no significant relationship between clinical and laboratory findings of maternal age in the present study.



**Figure 2: Frequency of positive cases pregnant women with 19-covid infection.**

Of all laboratory finding, most of cases were positive CRP (Figure 2).

Of the 21 pregnant studied women, 15 had cesarean section and 6 women had normal delivery. There was no maternal and neonatal mortality. Of the 21 live births 8 infants (38.1%) were girls and 13 infants (61.9%) were boys. Apgar score was 8 in 9 neonates (42.9%) and 9 in 12 infants (57.1%). 5 neonates had respiratory distress and were admitted to the neonatal intensive care unit (NICU) for 1 week. In these 5 neonates, arterial pH was low and neonatal CRP test was high (35-16-47-42-37 mg) and blood culture was negative. Also, all neonates were negative for COVID-19 and had negative PCR. None of the newborns had problems with feeding and poor reflexes and other symptoms. The weight of 19 neonates were over 2500 gr and 2 of the neonates were under 2500 gr. Growth and developmental disorders of neonates were evaluated at intervals of 28 days, 6 and 12 months was shown in Table 1.

**Table 1: Growth and developmental characteristic in studied neonates.**

Variables	Growth			Development	
	Weight (gr) Mean ± SD	Height (cm) Mean ± SD	head circumference (cm) Mean ± SD	Normal No (%)	Abnormal No (%)
At birth	3052 ± 5.81	49.8 ± 0.8	34.6 ± 1.2	21 (100)	0 (0)
28 days	4031 ± 0.21	50.62 ± 1.0	36.72 ± 0.5	21 (100)	0 (0)
6 months	74632 ± 1.88	65.59 ± 1.5	40.01 ± 0.2	21 (100)	0 (0)
12 months	11322 ± 3.19	73.02 ± 1.81	44.04 ± 0.6	21 (100)	0 (0)

According to Table 1, none of the neonates had developmental abnormalities in the studied periods.

**DISCUSSION**

The most clinical symptoms of mothers in this study were shortness of breath, fever, chills and dry cough which was seen in 14 patients (66.7%) and weakness and lethargy were present in 7 patients (33.3%). In the study of Chen et al, which was performed retrospectively on nine mothers with COVID-19 in Wuhan, China, 78% of patients had fever, which was higher than that of our study. Also 44% had cough, which was lower than the present study (66.7%). It should be noted that shortness of breath in the study of Chen et al. was about 30% lower than the present study, which showed the higher severity of disease in Ardabil pregnant women compared to pregnant women of Wuhan, China.<sup>13</sup> Liu et al. conducted a study in Anion China Hospital on 15 pregnant women and found that 86.7% of patients had fever, which was higher than our study. They observed that 60% of patients had cough, which is consistent with the results of the present study. They also reported 26.7% weakness and lethargy, which is slightly lower than our results.<sup>14</sup> In the study of Yu et al, in China fever also was the most common clinical symptom of COVID-19 infected

pregnant women.<sup>15</sup> In the study that conducted by Salehzadeh et al, on non-pregnant women with COVID in Ardabil province, 50% of patients had fever.<sup>16</sup> Our study showed higher prevalence of fever in COVID-19 infected pregnant women compared to the non-pregnant population in Ardabil province. Kazemi et al, in a study that conducted in Rasht, reported fever was the most common symptom (77%) found in pregnant women that is in agreement of present study.<sup>17</sup>

In terms of laboratory signs, 17 patients (81%) had lymphopenia, 20 patients (95.2%) had CRP positive, 20 patients (95.2%) had high LDH and 6 patients (28.6%) had high LFT. In the study of Kazemi et al. in Rasht, 83% of patients had lymphopenia, increase in LDH in 90% of patients, which are in consistent with the present study.<sup>17</sup> They found that 12% of patients had high and impaired LFT, which was lower than our results.

CT scan of patients in terms of Grand Glass view showed that, 17 patients (81%) had a Grand Glass view on chest CT scan and 4 patients (0.19%) did not have it. In the study of Kazemi et al, in Rasht reported the presence of grand glass in 86% of pregnant patients, which is in agreement to the present study.<sup>17</sup>

From 21 studied women 15 mothers delivered with Cesarean Section (CS) that was higher than the normal rate of CS in normal population of the province. Gurol-Urganci et al, pointed out that COVID-19 infection increases the rate of CS caused by higher rate of obstetrics interventions.<sup>18</sup>

In this study all newborn were live. This finding is opposition of Guan et al study that reported intrauterine fetal demise occurred in third trimester of pregnancy.<sup>19</sup>

From 21 live newborn, 8 infants (38.1%) were girls and 13 (61.9%) were boys. Nine infants (42.9%) had an Apgar score of 8 and 12 infants (57.1%) had an Apgar score of 9. The mean Apgar score was 8.57 and the standard deviation was 0.51. In terms of Apgar score, all infants had a score above 7 and were healthy. In the study by Chen et al, all 9 infants born of infected mothers with COVID-19 in Wuhan had an Apgar score above 8, and none of the infants developed neonatal asphyxia and mortality, which is firmly in accordance to our study results.<sup>13</sup> In the study of Yu et al, reported a similar result.<sup>15</sup> It seems that maternal infection with COVID-19 does not obvious effect on delivery and fetal health.

None of the infants had growth and developmental delays in the studied time periods (28 days, 6 months and 12 months). This finding probably showed that infection of mothers with COVID-19 will not affect the growth and development of their babies. Previous studies have shown that SARS during pregnancy is associated with a high prevalence of maternal and neonatal adverse events including, spontaneous abortion, preterm delivery, intrauterine growth restriction, endotracheal intubation, intensive care unit, renal failure and intravascular coagulation disorder is associated.<sup>19</sup> The clinical signs reported in pregnant women with confirmed Covid 19 infection is similar to that of other adults with COVID-19 infection in the general population and indicates a relatively optimistic clinical course, outcomes and consequences of viral infection compared to SARS infection.

This study showed that unlike SARS and MERS infections in pregnant women, maternal and neonatal death was not reported in 21 pregnant women with COVID-19.

It seems that the maternal symptoms, clinical and laboratory findings and neonatal complications are slightly variable among different regions and between pregnant and non-pregnant women.

From the point of view of ethical considerations, all the information related to the patients' personal files remained confidential with the doctor and the executor of the project, and the patients' names and surnames were not mentioned in the study. The strength of this study was follow-up and monitoring of mothers and infants for one year. The most important limitation of the study was its

time limit which caused a small number of samples to be included in the study. Examining more samples and allocating longer time in future studies and comparing the results with the present study were recommended.

## CONCLUSION

Results showed that suffering to COVID-19 had not relation with growth disorder in neonates and mother's clinical symptoms had not different with other symptoms. So, we can use similar investigations to control of COVID-19 in all pregnant women. Also, COVID-19 infection in newborns was not associated with growth and developmental disorders in 1 year follow-up.

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