

PREGNANCY OUTCOMES OF COVID-19 POSITIVE PREGNANT WOMEN AT THE HUE CENTRAL HOSPITAL

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ABSTRACT

Aim: To investigate some clinical and paraclinical characteristics and pregnant outcomes of pregnant women with COVID-19 at COVID-19 Research and Treatment Central of Hue.

Methods: This retrospective observational study included all identified COVID-19-positive pregnant women admitted to the Hue Central Hospital – Branch 2 at labour from September 2021 to March 2022. Maternity and newborns were followed until discharge from the hospital.

Results: Eighty-three pregnant women were positive for COVID-19. There were 32.5 % asymptomatic cases, 43.4 % had mild symptoms, while 21,1 % had more severe forms of the disease. The main follow-up morbidities were high BMI 24,1 %, anaemia 22.9 %, hypertensive disorders 4.8% and diabetes 2.4 %. The rate of premature births was 12.3%. There are 3/83 pregnant women with twins (3.6 %). Caesarean section was done for 63.9 % of women while 36.1 % delivered vaginally. Previous caesarean section (30.2%) was the most common indication for operative completion of labour. Eighty-five (98.8%) live babies were born, of which 11 (13.3%) were admitted to the neonatal intensive care unit. One baby (1.2%) died shortly after birth due to multiple malformations. Two infants (2.3 %) had a positive PCR test for COVID-19.

Conclusion: Most pregnant women infected with COVID-19 are asymptomatic and mild. Almost pregnant women recovered well after giving birth, but 2 mothers died due to severe development of COVID-19 (their children's lives were saved). 11 babies needed care in the NICU, one baby (1.2%) died soon after birth due to multiple malformations/prematurity. Two infants (2.3 %) had a positive PCR test for COVID-19.

Key words: COVID-19, pregnancy, pregnancy outcome, SARS-CoV-2, vertical infection transmission.

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I. INTRODUCTION

COVID-19 is an infectious disease pandemic caused by the SAR-CoV-2 virus and its variants [1]. This global health crisis has been the greatest challenge ever since the Second World War. Since the end of December 2019, with the first outbreak in Wuhan, China, the virus has spread to every continent except Antarctica. The number of infected cases is increasing daily in Africa, America and Europe [2].

According to the Portal of the Ministry of Health on the COVID-19 pandemic, up to May 1st, 2022, Vietnam has confirmed a total of 10,653,526

infections, 9,264,366 recovered and discharged patients, 43,042 deaths from the pandemic.

High-risk groups include the elderly and frail, patients with underlying medical conditions, pregnant women [1,2]. Up to this point, many studies have shown that the possibility of transmission of SARS-CoV-2 virus through the placenta during pregnancy is very low [1]. Studies from China and the US show that most samples of amniotic fluid, umbilical cord blood, placenta, vaginal discharge and breast milk of pregnant women infected COVID-19 have negative results with SARS-CoV-2 virus. At the same time, most of the test

results of nasopharyngeal/ nasopharynx fluid taken immediately after birth in babies born to mothers infected with COVID-19 also showed negative for the virus [3].

However, people who get COVID-19 during pregnancy are more likely to experience complications that can affect pregnancy and fetal development than people without COVID-19 during pregnancy, such as an increased risk of preterm birth (<37 weeks) or stillbirth. People who contract COVID-19 during pregnancy may also be more likely to experience other pregnancy complications [4,5].

In an effort to join hands with the whole country to stamp out the epidemic, Hue Central Hospital's Covid-19 Research and Treatment Center Located in Hue Central Hospital – Branch 2 has received and treated pregnant women infected with COVID-19. To assess the overall pregnancy outcomes of positive COVID-19 pregnant women, we carried out this study to investigate some clinical and paraclinical characteristics of pregnant women infected with COVID-19 at Hue Central COVID-19 Research and Treatment Center; and evaluate pregnancy outcomes in pregnant women with COVID-19 infection.

II. MATERIALS AND METHODS

2.1. Research design

Retrospective cross-sectional descriptive study.

2.2. Subjects

- Pregnant women with COVID-19 infection, had gestational age > 28 weeks were diagnosed positive confirmed by the time of the study according to the decision of the Ministry of Health [6] at Hue Central Hospital 2 from September 2021 to March 2022:

a) Having a positive test result for SARS-CoV-2 virus was found on Realtime Polymerase Chain Reaction (RT-PCR) Method.

b) Closely contacting and having a positive antigen rapid test result for SARS-CoV-2 virus

c) Existing epidemiological factors, having clinical symptoms suspected of having COVID-19 and having a positive antigen rapid test result for SARS-CoV-2 virus.

d) Existing epidemiological factors and having positive antigen rapid test result 2 times sequentially (the 2nd test was performed within 8 hours after the 1st test result) with SARS-CoV-2 virus. In case the second antigen rapid test is negative, a Real-time RT-PCR test is required for confirmation.

- Biological rapid tests for antigens with SARS-CoV-2 virus must be on the list licensed by the Ministry of Health. Rapid antigen testing must be performed by healthcare providers or by suspected Covid-19 persons under healthcare providers by at least one of the following methods:

2.3. Steps proceed

- Refer to the medical record of the study subjects.

- Assess the level of infection according to Decision 250/QĐ-BYT [6]:

Asymptomatic infected people: F0 without clinical symptoms, respiratory rate < 20 breaths/minute, SpO₂ > 96% when breathing pure air.

Mild level: F0 has non-specific clinical symptoms such as fever, dry cough, sore throat, stuffy nose, fatigue, headache, muscle pain, loss of taste, smell, diarrhea... breathing < 20 times /min, SpO₂ > 96% when breathing pure air, awake, self-service; Chest X-ray is normal or present with minimal damage.

Moderate level: have symptoms such as mild, rapid breathing 20-25 times/min, lung crackles, no sign of severe respiratory failure, SpO₂ 94-96% when breathing room air, may have difficulty breathing on exertion (walking around the house, going upstairs), fast or slow pulse, dry skin, tachycardia, normal blood pressure, alert consciousness. Chest X-rays and computed tomography of the chest detected lesions, less than 50%. Ultrasound shows B wave, arterial blood gas: PaO₂/FiO₂ > 300.

Severe Level: signs of pneumonia accompanied by any of the following: respiratory rate > 25 breaths/minute; severe shortness of breath, contraction of accessory respiratory muscles; SpO₂ < 94% when breathing room air. Fast or slow heart rate, normal or elevated blood pressure, jittery or lethargic, fatigue. Chest X-ray and chest computed tomography: there are lesions, and lesions are more than 50%. Ultrasound shows many B waves, arterial blood gas: PaO₂/FiO₂ about 200-300.

Critical level: tachypnea > 30 breaths/min or < 10 breaths/min, signs of severe respiratory distress, hyperventilation, abnormal breathing or need for respiratory support with high flow nasal cannula oxygen (HFNC), mechanical ventilation, consciousness decreased or comatose, the patient's heart rate is fast or slow, blood pressure is low, urine is little or anuria. Chest X-rays and computed tomography of the chest detected lesions over 50%. Ultrasound shows many B waves, arterial blood gases: PaO₂/FiO₂ < 200, respiratory acidosis, blood lactate > 2 mmol/L.

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- Fill in the research form, the missing information we contact the patient via the phone number provided in the medical record to supplement.

2.4. Data processing

Data entry and processing were performed using SPSS 20.0 medical statistical software (SPSS Inc, Chicago III). Categorical variables are expressed as the number of cases and percentages, and normally distributed continuous variables are expressed as mean \pm standard deviation. The algorithms have statistical significance with $p < 0.05$.

III. RESULTS

3.1. General characteristics of the study sample

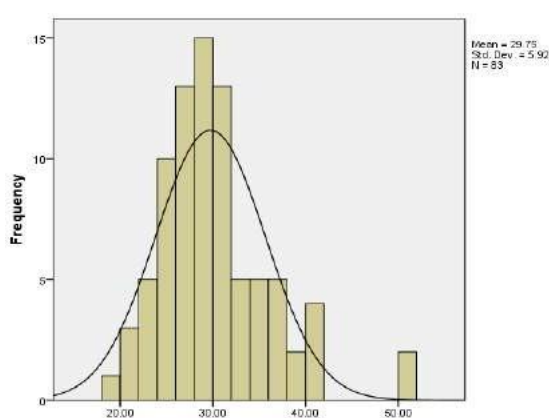


Chart 1: Distribution by the age of pregnant women infected Covid-19

The mean maternal age was 29.75 ± 5.92 years old. The age group with the highest percentage is 25-34 years old (54/83 women accounted for 65.1%). 2 pregnant women 51 years old.

53% of women are pregnant with a primigravida, 47% of women are pregnant with multigravida. 97.6% of women have no history of preterm birth. Pre-pregnancy BMI $\geq 25 \text{ kg/m}^2$ accounted for 24.1%, 1 pregnant woman had BMI > 30 (accounting for 1.2%).

Table 1: General characteristics of the study

| Parameters | | n | % |
|----------------------|----------------------------|----|------|
| BMI before pregnancy | $\leq 19,9 \text{ kg/m}^2$ | 14 | 16,9 |
| | 20 – 24,9 kg/m^2 | 49 | 59 |
| | $\geq 25 \text{ kg/m}^2$ | 20 | 24,1 |
| Pregnancy features | Primigravida | 44 | 53 |
| | Multigravida | 39 | 47 |
| | Single pregnancy | 80 | 96,4 |
| | Twins pregnancy | 3 | 3,6 |

| Parameters | | n | % |
|-------------------------|-------------------------------|----|------|
| Premature birth history | Yes | 2 | 2,4 |
| | No | 81 | 97,6 |
| Co-morbid disease | Basedow | 1 | 1,2 |
| | Chronic kidney failure | 1 | 1,2 |
| | Gestational diabetes mellitus | 2 | 2,4 |
| | Asthma | 2 | 2,4 |
| | Hepatitis B Virus infection | 3 | 3,6 |
| | Preeclampsia–eclampsia | 4 | 4,8 |
| | Anemia | 19 | 22,9 |

85.5% of women have no associated underlying medical condition. 22.9% of pregnant women infected with COVID-19 have anemia. There were 4 cases of preeclampsia (accounting for 4.8%), especially 1 case of eclampsia.

3.2. Characteristics related to Covid-19 infection status

Cough in 75% of pregnant women with COVID-19. Nasal congestion/runny nose, sore throat in 39/56 women (69.6%), fever in 53.6% and headache in 50% of women. The lowest gastrointestinal symptoms were abdominal pain (3.6%) and diarrhea (7.1%).

There were 22 women with lesions on chest X-ray film (accounting for 26.5%), present in all mothers with moderate, severe and critical Covid infection. There were 2 pregnant women with mild COVID-19 infection recorded with lesions on chest X-ray film.

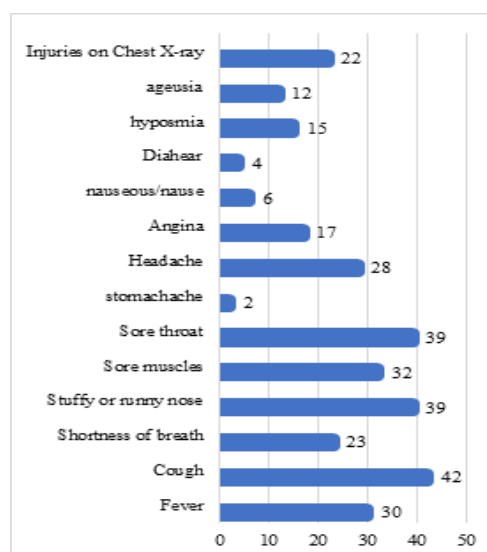


Chart 2: Clinical, subclinical symptoms

Table 2: Level, treatment and progression of Covid-19 infection

| Parameters | | n | % |
|----------------------------------|---|----|------|
| Level of Covid-19 infection | Asymptomatic | 27 | 32,5 |
| | Mild | 36 | 43,4 |
| | Moderate | 8 | 9,6 |
| | Severe | 8 | 9,6 |
| | Critical | 4 | 4,8 |
| Intervention to treat Covid - 19 | HFNC | 24 | 28,9 |
| | Ventilator | 8 | 9,6 |
| | Dialysis | 10 | 12 |
| | ECMO | 4 | 4,8 |
| Covid-19 disease progression | Discharge | 72 | 86,7 |
| | ARDS | 11 | 13,3 |
| | Cytokine storm | 6 | 7,2 |
| | Death | 2 | 2,4 |
| Hospital stay | $\bar{X} \pm SD = 6,63 \pm 5,86$ days (1 day – 32 days) | | |

27 pregnant women infected with Covid-19 have no symptoms (accounting for 32.5%). Regarding the degree of COVID-19 infection: 43.4% were mildly infected with Covid 19, 9.6% with moderate and severe COVID-19 infection. Especially, there are 4 pregnant women infected with COVID-19 at a critical level (accounting for 4.8%).

During this treatment period, 9.6% of women required mechanical ventilation, 12% required sequent dialysis. Especially 4 pregnant women have to use ECMO (accounting for 4.8%). 2 deaths are due to severe progression of COVID-19. 97.6% of pregnant women recovered after treatment and were discharged from the hospital.

The mean hospital stay was 6.63 ± 5.86 days.

3.3. Characteristics of pregnancy outcomes

Table 3: Parameters of pregnancy outcomes

| Parameters | | n | % |
|-----------------------------|---|----|------|
| Mode of delivery | Vaginal delivery | 30 | 36,1 |
| | Cesarean section | 53 | 63,9 |
| Reason for Cesarean section | Previous cesarean scar | 16 | 30,2 |
| | Fetal distress | 12 | 22,6 |
| | Appendage of fetus | 1 | 1,2 |
| | Obstetric indications of Cesarean section | 15 | 28,3 |
| | Progressive internal disease | 9 | 17,0 |

| Parameters | | n | % |
|---|--------------------------------------|-------|------|
| Gestational age at birth | < 37 weeks | 12 | 12,3 |
| | ≥ 37 weeks | 71 | 87,7 |
| Birth weight | < 2500 grams | 10/86 | 11,6 |
| | ≥ 2500 grams | 76/86 | 88,4 |
| Maternal complications related directly to obstetric causes | No complication | 80 | 96,4 |
| | Wound infection | 1 | 1,2 |
| | Haemorrhage | 2 | 2,4 |
| Infant's health status after birth | Normal | 71 | 85,5 |
| | Requiring intensive care in the NICU | 11 | 13,3 |
| | Covid-19 Infection | 2 | 2,4 |
| | Death | 1 | 1,2 |

Caesarean section accounted for 63.9% compared to vaginal birth, which was 36.1%. 12 women (accounting for 12.3%) gave birth prematurely before 37 weeks.

83% of women had surgery due to obstetric indications, in which previous cesarean scar was the leading cause (30.2%). Pregnant women with advanced medical conditions that threaten the life of mother-child, need cesarean section to terminate pregnancy urgently: 2/9 pregnant women ≥ 37 weeks and 7/9 pregnant women remaining pregnant < 37 weeks. In which, 2 women gave birth prematurely (32 weeks - 33 weeks and 6 days) and 1 case was extremely preterm (31 weeks 3 days).

There are 11.6% of babies born in the low birth weight group. 71 babies (accounting for 85.5%) of normal health, 1 baby died after vaginal birth due to multiple malformations at 32 weeks gestation, 11 babies (accounting for 13.3%) were intensive cared in the NICU. In these cases, the babies recovered well and were discharged from the hospital.

IV. DISCUSSION

Our study included 83 positive COVID-19 pregnant women, all in the third trimester of pregnancy. 27/83 women (32.5%) were asymptomatic, 36/83 women (43.4%) had mild COVID-19 infection, 12/83 (14.4%) women needed intensive care in the ICU. Global data indicated that a large number of pregnant women infected with Covid-19 have mild clinical manifestations of the disease [7] and may fully recover on their own [7-9]. A study of 141 women in Mumbai reported that most women (97%) were asymptomatic or had mild

symptoms [10]. The high rate of pregnant women infected with Covid-19 asymptomatic in our study and other studies account for a high rate might be because the test was performed at the end of pregnancy (last trimester) close to the date of birth delivery, when symptoms that were more obvious in the early stages of pregnancy have resolved on their own [3].

In our study, anemia accounted for 22.9%, high BMI ≥ 25 kg/m² accounted for 24.1%; Low prenatal BMI ≤ 19.9 kg/m², accounted for 16.9%. According to Savasi et al., patients in the severe group had significantly higher BMI during pregnancy [11]. According to Lokken et al., severe COVID-19 infection mainly occurs in overweight and obese women [12]. Zaigham et al. have

aggregated reports of pregnant women with severe COVID-19 infection in high BMI patients [9]. In our study, there was only 1 case with antenatal BMI > 30 kg/m² (accounting for 1.2%), probably due to Asian's physical condition. According to Anjana [13] and Shahla [14], women's BMI during the first trimester of pregnancy is associated with an increased risk of adverse pregnancy outcomes. Both poles of pre-pregnancy BMI showed strong

associations with pregnancy complications and perinatal outcomes. While obesity is associated with increased preeclampsia, gestational hypertension, macrosomia and increased cesarean delivery rates; underweight women face complications such as IUGR and anemia [13].

12/ 83 pregnant women infected with COVID-19 in the study received intensive care in the ICU, 9.6% of women required mechanical ventilation, 12% indicated dialysis and 4.8% indicated ECMO. There were 2 women with underlying medical conditions (1 case of end-stage chronic renal failure and 1 case of Basedow without treatment), who had a cesarean section and received active medical treatment with mechanical ventilation, dialysis, and ECMO. However, these patients died (accounting for 2.4%). According to the study by Mirada et al., severe illness occurred in symptomatic pregnant women who received intensive care in the ICU (16%), mechanical ventilation (8%) and death (1%) [4]. Karola et al also reported an association with higher rates of mechanical ventilation or mortality in women with comorbidities such as obesity, diabetes, kidney disease, eclampsia, and blood events mass and stillbirth [15]. Several studies have shown that pregnant women have a higher risk of serious illness and increased ICU admission than non-pregnant women [8,16-18].

83% of women gave birth by cesarean section due to obstetric indications, in which previous cesarean scar was the leading cause (30.2%). The study by Jasmin et al also recorded the indicated rate of cesarean section in the group with previous cesarean scar was 54.5% [19]. Previous studies in pregnant women with COVID-19 reported a very high rate of cesarean delivery, most of which were due to obstetric indications or indications related to maternal respiratory function [20-22]. According to Browne et al., cesarean section should not be indicated in pregnant women with acute COVID-19 in preterm labor unless maternal or fetal decompensation occurs during labor [23]. According to Walker et al., cesarean delivery should be indicated if there are obstetric indications and not because the pregnant woman is infected with COVID-19 [24]. According to the Ministry of Health's protocol, the mode of delivery will not be affected by COVID-19 infection in a pregnant woman, unless the mother's respiratory condition requires urgent childbirth [6]. In our study, there were 9 women with advanced medical conditions requiring emergency termination of pregnancy to help improve lung ventilation for women.

Cesarean section due to fetal failure accounted for 22.6%. The study by Shanes et al showed that the placenta of pregnant women infected with COVID-19 during the third trimester of pregnancy showed signs of insufficiency (vascular abnormalities and interstitial thrombosis in the placenta) [25]. Although placental pathological changes have not been definitively established, these findings suggest maternal circulatory abnormalities are associated with adverse perinatal outcomes [25]. These changes may reflect systemic inflammation or hypercoagulability affecting placental physiology [19].

Previous research has shown that viral pneumonia in pregnant women has a significantly higher risk of preterm delivery, fetal growth retardation, low birth weight and Apgar index, and significantly higher preeclampsia/eclampsia than the group with no pneumonia [26].

In our study, preterm birth accounted for 12.3%, low birth weight for 11.6%, children needing care in the NICU was 13.3%. This rate is lower than in the study report of Jasmin et al.: low birth weight (24%), newborn to NICU (34.7%). According to Nayak et al., the low birth weight babies rate is 29.77% among pregnant women who are positive for COVID-19 [10]. The multivariate analysis study by Oscar M.P and CS concluded: Pregnant women

who are positive for COVID-19 have a higher risk of preterm delivery, spontaneous premature rupture of membranes, and newborns requiring NICU treatment compared with women pregnant women who are not infected [5]. Currently, there is not enough evidence to establish any link between spontaneous preterm birth and COVID-19 infection during pregnancy.

We recorded 1 infant death after birth due to multiple malformations/ prematurity, accounting for 1.2% of total births. Allotey et al concluded that, although maternal infection with COVID-19 increases the likelihood of preterm delivery, having a low birth weight infant; however, the total rate of intrauterine fetal death and neonatal mortality was not higher than that of pregnant women without COVID-19 infection [8].

Nose swabs samples for SARS-CoV-2 screening were performed in all 86/86 infants within 24 hours of birth. The two babies tested positive but showed no symptoms, both born by caesarean section. A systematic study of 666 infants born to mothers with COVID-19 confirmed that 4.2% of infants were infected with COVID-19 after cesarean section [24]. Dong et al. reported the presence of Immunoglobulin M (IgM) antibodies in infants born to mothers infected with Covid-19. This raises concerns about the possibility of mother-child vertical transmission of the virus because IgM cannot cross the placental barrier [27]. Several recent studies have shown that COVID-19 can be transmitted through the placenta. Evidence for the presence of viral RNA and SARS-CoV-2 proteins in the placenta and evidence for the presence of virions is found in the syncytial trophoblast [27]. Based on the existing evidence reported in the study published by Lubbe et al (2020), we recommend that the benefits of breastfeeding outweigh any potential risk of virus transmission through breast milk[21].

V. CONCLUSION

The study was limited to 83 pregnant women giving birth at Hue Central COVID-19 Research and Treatment Center. Most pregnant women infected with COVID-19 are asymptomatic (32.5%), and mild (43.4%). 97.6% of pregnant women recovered well after giving birth, 2/83 women died due to severe complications of COVID-19 (accounting for 2.4%), but their children's lives were saved. 63.9% of women gave birth by caesarean section, mainly due to obstetric indications. 36.1% of pregnant women gave birth normally. There are 85/86 live

births (98.8%), 11 cases needed intensive care in the NICU, 1 child (1.2%) died soon after birth due to multiple malformations/ prematurity. 2/86 children were positive for Sar-CoV-2 after cesarean section.

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