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Original Research Article

Effect of COVID-19 on pregnant women and its relation to pregnancy outcomes

Ekramy A. Mohamed¹, Ruqayyah Ali Ahmed², Nada Yasser Metwali²,
Jumana Hussain Timraz², Ahmed Mohamed³, Samer Ahmeed⁴,
Hossam Abdelfatah Mansour^{5*}

¹Department of Obstetrics and Gynecology, Zagazig University Hospital ZUH, Zagazig, Egypt

²Department of General Medicine and Surgery, Batterjee Medical College for Science and Technology, Jeddah, Saudi Arabia

³Faculty of Medicine, Mansoura University, Mansoura, Egypt

⁴Department of Obstetrics and Gynecology, International Medical Center IMC, Jeddah, Saudi Arabia

⁵Department of Obstetrics and Gynecology, Mansoura University Hospital MUH, Mansoura, Egypt

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*Correspondence:

Dr. Hossam Abdelfatah Mansour,

E-mail: hosam.mansour1257@gmail.com

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ABSTRACT

Background: To evaluate the pregnancy outcomes and clinical characteristics of pregnant women infected with SARS-CoV-2 and their neonates, highlighting COVID-19's potential impact on maternal and neonatal health.

Methods: A retrospective cohort study was conducted which included 50 pregnant women, aged 18-40 years, hospitalized with strongly suspected or confirmed COVID-19 based on RT-PCR or clinical/imaging findings. Data on maternal symptoms, delivery mode, laboratory findings, and neonatal outcomes were collected and then analyzed. Pregnancies complicated by cancers or inflammatory diseases were excluded. Neonatal health was assessed using the Apgar score, NICU admissions, and SARS-CoV-2 testing.

Results: The mean gestational age at diagnosis was 35.85±4 weeks, with 50% vaginal deliveries and 50% cesarean sections (30% elective, 20% emergency). Adverse outcomes included 2 preterm births (4%) and 5 cases of premature rupture of membranes (10%). Three neonates (6%) tested positive for SARS-CoV-2, with a mean birth weight of 3506 gm, and Apgar scores of 4±2.1 (1 minute) and 8±1.2 (5 minutes). NICU admission was required for 14% of newborns, with no reported neonatal deaths. The majority of women experienced mild symptoms, and no severe maternal illness or death occurred.

Conclusions: In pregnant women, COVID-19 infection was associated with mild maternal symptoms and favorable neonatal outcomes, although vertical transmission of SARS-CoV-2 was observed in 6% of cases. Further research is required in order to assess long-term effects and better understand the mechanisms behind vertical transmission.

Keywords: Pregnancy, COVID-19, Pregnancy outcomes, Maternal and neonatal health, Vertical transmission

INTRODUCTION

According to epidemiological research, COVID-19 individuals with comorbid conditions were linked to a higher risk of problems, and infections might affect anyone at any age. Individuals with pre-existing digestive disorders were also at a higher risk of infection. A weakened immune system as a result of underlying

illnesses or treatment side effects from immunosuppressive drugs, chemotherapy, and surgery is probably the reason for these individuals' increased susceptibility.¹

A unique immune adaption is developed in pregnant women, which is required to sustain the fetal semi-allograft's tolerance. Pregnant women are at risk for viral

infections due to the transitory lowered immunity that is regulated by T cell suppression. Furthermore, the respiratory and circulatory systems' physiological alterations may exacerbate clinical consequences in cases of infection might worsen clinical outcomes when infected with a virus during pregnancy.²

Compared to reproductive-age non-pregnant women, pregnant women during the 2009 H1N1 influenza pandemic were at increased risk of severe pneumonia, ARDS, mechanical ventilation, and mortality.³ Pregnant patients had a higher risk of developing organ dysfunction and dying during Middle East respiratory distress syndrome (MERS) and severe acute respiratory distress syndrome (SARS) outbreaks, according to similar findings.⁴

Though it is yet unknown if pregnant women's clinical courses and outcomes are similar to those of non-pregnant women, it appears that pregnant women have experienced fewer maternal and neonatal adverse effects during the current COVID-19 epidemic than were documented for SARS.⁵

METHODS

In this retrospective cohort analysis, 50 pregnant COVID-19 hospitalized women were enrolled from January 2021 till January 2022 at Al Safaa Hospital. An approved IRB was obtained prior from the research center (No: H-02-J-010).

Inclusion criteria

Pregnant women hospitalized with COVID-19 and aged 18-40 years old were included in the study. These included RT-PCR or nasopharyngeal swab confirmed COVID-19, or COVID-19 strongly suspected based on imaging findings, clinical history, and imaging findings even in the absence of a positive nasopharyngeal swab.

Exclusion criteria

Patients who were not infected with COVID-19 or who were pregnant were excluded from the research for any of the following reasons-Individuals who are not pregnant; patients who suffer from inflammatory diseases or cancers were also excluded.

An ethical approval was obtained and approved by the institutional review board (IRB) at international medical center's research center.

NCBE Registration No-(H-02-J-010).

Design of operations

Study type: A retrospective investigation of medical data from all pregnant women and their neonates who tested

positive for SARS-CoV-19 is known as a retrospective cohort study.

All women were evaluated by a thorough recording the past, a thorough inspection.

Looks into: After a 12-hour fast, peripheral venous blood samples were obtained from the antecubital vein in the morning for the following tests: CBC, Fasting plasma glucose (FpG), ESR, CRP, D-dimer, S-ferritin, plasma level of creatinine, and serum electrolytes (K, Ca, and Mg).

The following criteria was must to be met in order to be admitted to intermediate care: SpO₂<92% and PaO₂/FiO₂<300, and breathing rate more than thirty breaths per minute or more than 50% lung infiltrates.

Admission requirements for the intensive care unit were failure of the respiratory system, multiorgan dysfunction and/or septic shock, and fetal investigations (CT scan, ultrasonography): Trans-abdominal ultrasound evaluation for fetal viability, confirmation of gestational age, assessment of fetal abdominal circumference (AC), and computation of anticipated fetal birth weight (EFBW) prior to delivery. Doppler US was used to compute flow indices and evaluate placental vascularization.

Indication of ICU admission included respiratory failure as an ICU admission requirement and multiorgan dysfunction or septic shock.

Four fetal exams (CT scan, ultrasonography): Prenatal ultrasound examination that measures the fetal abdominal circumference (AC), confirms the gestational age, and determines the estimated fetal birth weight (EFBW) before delivery.

The Doppler US is utilized to evaluate placental vascularization and compute flow indicators.

Study outcomes

Evaluation of the delivery route in each case. Assessing any issues that arise during a vaginal or c-section birth and stands for caesarean delivery/gestational age at delivery.

Neonatal team assessment

Following delivery, every newborn delivered to a mother infected with SARS-CoV-2 is evaluated. They were admitted to a special newborn critical care unit and placed under urgent isolation. were placed in a single, negative-pressure isolation chamber, attended to by medical professionals using complete PPE, and given either artificial formula or breast milk. Every newborn underwent nasopharyngeal swab testing on day five and again on day fourteen. Assessment of the newborn's health using Apgar score at 1-and 5-minute mark following birth.

Statistical analysis

Data collected then imported into statistical package for the social sciences (SPSS version 20.0).

RESULTS

Mean age was 26.85 ± 5.8 , parity was 2 ± 1.2 , BMI 27.29 ± 4.2 , gestational age at diagnosis of COVID-19 (weeks) 35.85 ± 4 (Table 1). Most patients' complain was cough and fever (40% and 60%) respectively, mean of O_2 saturation was 93.47 ± 12.22 , and 26% of the studied group had positive x-ray findings (Table 2-4).

Table 1: Characteristics of pregnant women with confirmed COVID-19 infection, (n=50).

Variables	N
Age (mean $\pm$ SD) (in years)	26.85 $\pm$ 6
Parity (mean $\pm$ SD)	2 $\pm$ 1.2
BMI (kg/m ²)	27.29 $\pm$ 5
Gestational age at diagnosis of COVID 19 infection (weeks)	35.85 $\pm$ 4

Table 2: Distribution of symptoms of pregnant women with confirmed COVID-19 infection.

Variables		N	Percentage (%)
Fever	No	20	40
	Yes	30	60
Cough	No	30	60
	Yes	20	40
Loss of smell sore throat /rhinorrhea	No	30	60
	Yes	20	40
Malaise/fatigue chest pain/shortness of the breath	No	25	50
	Yes	25	50
Duration of symptoms before admission, (days)		(1-5)	

Table 3: General examination of studied group, (n=51).

Variables	Mean $\pm$ SD	Median (range)
HR	101.94 $\pm$ 7.7	100 (84-130)
Temperature	38.63 $\pm$ 0.56	38.5 (37.5-40)
Systolic BP	110.36 $\pm$ 20.7	120 (90-180)
Diastolic BP	70.31 $\pm$ 13.3	80 (50-100)
O_2 saturation	93.21 $\pm$ 4.6	95 (80-99)

Regarding WBCs, lymphocytes, RBS, CRP, urea, and serum creatinine in the group under study, the mean WBC count was 17.11 ± 9.38 . The 11.9% of the patients had low lymphocyte counts, the CRP level was 127.82 ± 84.37 , and D-dimer levels varied from 0 to 9 mg/l shows in the Table 5.

There were 38 weeks remaining on gestational age at birth. Pathological cardiotocography was the cause of two preterm births (4 percent) that occurred at 31 weeks. The 50 percent of newborns were delivered vaginally, the remaining 50 percent by cesarean section. Twenty percent of the cases were elective; fifteen percent were emergency; two percent were postpartum hemorrhage; two percent were preterm labor, and five percent were premature rupture of membrane (PROM).

The 3506 gm was the median birth weight, 3 (6 percent) of the newborns had positive SARS-CoV-2 test results, and the mean one-min Apgar score was $4 \pm (2.1)$. Mean five-minutes Apgar score was $8 \pm (1.2)$, NICU admission was 7 (14 percent), and there were no neonatal deaths (Table 6).

Table 4: O_2 saturation and x-ray findings of the studied group, (n=51).

Items	Mean $\pm$ SD	Studied group	
O_2 saturation	(Range)	93.47 $\pm$ 12.22	
		N	%
Chest x-ray diagnosis of pneumonia	Positive	13	26
	Negative	37	74

Table 5: Laboratory data among the studied patients.

Item (Mean $\pm$ SD)	Studied group, (n=50)
WBCs	17.11 $\pm$ 9.38
Lymphocytes	1.31 $\pm$ 0.81
RBS	116.71 $\pm$ 30.1
Hb%	10.4 $\pm$ 0.11
CRP	127.82 $\pm$ 84.37
Urea	40.15 $\pm$ 14.58
S. creatinine	0.94 $\pm$ 0.34
D-Dimer	2.97 $\pm$ 2.86

Table 6: Pregnancy outcomes of studied group.

Variables	N (%)
Mode of delivery	
C-section	25 (50)
Elective	15 (30)
Emergency	10 (20)
Vaginal delivery	25 (50)
Postpartum hemorrhage	2 (4)
Preterm labor	2 (4)
PROM	5 (10)
Birth weight (grams), median (IQR)	3586 (2850–3565)
Apgar score at 1-min	4 $\pm$ (2.1111)
Apgar score at 5-min	8 $\pm$ (2.01)
Neonatal death	0
Neonates tested SARS-CoV-2 infection positive	3 (6)
NICU admission	7 (14)

DISCUSSION

A new coronavirus, known as SARS-CoV-2, was discovered in Wuhan, China, at the end of December 2019. It was discovered amid a number of pneumonia cases. The world health organization classified the coronavirus disease outbreak (COVID-19) to be a worldwide pandemic in March 2020 after it quickly spread.⁶

Limited research indicates that pregnant women may exhibit severe symptoms such as hypoxia, hypotension, electrolyte abnormalities, and placental hypoperfusion, depending on the severity of the disease. These symptoms can lead to fetal discomfort, premature labor, miscarriage, or even fetal death.⁷

This is a descriptive research on the clinical characteristics and results of pregnancies complicated by SARS-CoV-2 infection in mothers and newborns. The age of the patients under investigation in this study was 26.85 ± 5.8 years. These results are greater than those of Yenerçag et al who discovered that the mean $\pm$ SD of the COVID-19 pregnant patients under study was 34.9 ± 8.5 .⁷ In the present investigation, the patients' mean $\pm$ standard deviation of vital signs were as follows: HR was 101.94 ± 7.7 , body temperature was 38.63 ± 0.56 , SBP was 126.36 ± 20.7 , DBP was 76.31 ± 13.3 , and O₂ saturation was 93.21 ± 4.6 .

In contrast, Ece et al reported SBP of 100.5 ± 10.9 , DBP of 62.3 ± 7.03 and O₂ saturation of 91.7 ± 6.6 for Bianco et al.^{8,9}

The 50 pregnant women with verified SARS-CoV-2 infections were found in this investigation. Fever and cough (40% and 60% respectively) were the most common complaints from patients. Fever and cough were reported to be prevalent in a prospective cohort research that used the United Kingdom obstetric surveillance system (UKOSS). in pregnant women having the diagnosis COVID-19 disease.¹⁰ According to a comprehensive analysis, fever and cough were the most common early symptoms in pregnant COVID-19 patients.¹¹

The 37 weeks was the median gestational age upon diagnosis in our research. According to a prospective cohort research, the majority of women were admitted to the hospital during the third trimester.¹⁰

The current investigation revealed elevated levels of inflammatory markers, such as ferritin, CRP, ESR, total WBCs and their differential count, and d-dimer. WBC and neutrophil values were statistically significantly higher. This was consistent with Yenerçag et al finding that patients on COVID-19 had greater WBCs and CRP levels.⁷ In addition, Petrilli et al discovered that individuals with COVID-19 exhibited hypoxia (first O₂ saturation 25th percentile 86%), as well as higher baseline levels of c-reactive protein (median 139), d-dimer (median 513).¹²

It is consistent with the early data that of our research, 26% of patients received a radiological diagnostic of

pneumonia, and only 2 needed critical care due to increasing respiratory problems. Approximately 5% of pregnant patients with SARS-CoV-2 infection required critical care, according to a case study published by New York clinicians.¹³ This is a comparably low percentage.

The study found that 37 weeks was the median gestational age at birth. Pathological cardiotocography was the cause of two preterm births (4%) that occurred at 31 weeks. 50 percent of newborns were delivered vaginally, the remaining 50% by cesarean section. Twenty percent of the cases were elective; fifteen percent were emergency; two percent were postpartum hemorrhage; two percent were preterm labor A retrospective cohort study; and five percent were PROM. Birth weight's median was 3506 gm, 3 (6%) of the neonates tested positive for SARS-CoV-2 infection, mean 1-min Apgar score, was $4 \pm (2.1)$, mean 5-min Apgar score, was $8 \pm (1.2)$, NICU admission was 7 (14%) and there was no neonatal death.

Similar results from the past, when 27% of the neonates were born preterm and 59% underwent cesarean deliveries, corroborate these findings.¹⁰

According to a different research, most pregnant women underwent scheduled cesarean sections in order to stop the virus from spreading to their unborn children.¹⁴

The majority of newborns delivered to moms infected with SARS-CoV-2 will likely not exhibit any symptoms.¹⁵ Similarly, 73.3% of the full-term newborns in our research had no symptoms at birth. According to our study's findings, newborn outcomes are encouraging and consistent with previous research.¹⁰

Nonetheless, three newborns in our research tested positive for COVID-19. Shah's categorization said that it was not possible to confirm the diagnosis of congenital or intrapartum infection.¹⁶ Prior research has documented irregularities without any indication of vertical transmission.¹⁷ However, as suggested by early research and growing data, vertically acquired infection is still plausible and cannot be completely ruled out (RCOG 2020). Additional research is required to fully understand how SARS-CoV-2 infections spread vertically.

Three COVID-19-positive newborns in our research had PROM due to prematurity. It is challenging to draw firm conclusions in this case, even though PROM and viral infection in neonates are known to be associated with neonatal sepsis and have been for a considerable amount of time.¹⁸

Limitations

While this study provides valuable insights into COVID-19 and its effects on pregnancy, certain limitations should be noted. The relatively modest sample size and single-center setting may influence the generalizability of the findings. As a retrospective analysis, data collection was

limited to available clinical records, which may not capture all relevant variables. Additionally, some cases were diagnosed based on clinical and radiologic features in the absence of PCR confirmation, which reflects real-world diagnostic variability during the pandemic. The study did not include a non-infected control group, and long-term outcomes for mothers and neonates were beyond the study scope. These aspects highlight opportunities for further research, particularly through multicenter, prospective studies.

CONCLUSION

Most pregnant SARS-CoV-2 infected women experienced very minor symptoms; none of them developed a serious sickness. Although there is a chance of vertical transmission of SARS-CoV-2 from mother to child, the effects of COVID-19 infection during pregnancy on the health of expectant mothers and newborns seem to be negative. To assess long-term effects and possible vertical SARS-CoV-2 transmission to newborns, more research is necessary.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Mao R, Liang J, Shen J, Ghosh S, Zhu LR, Yang H, et al. Implications of COVID-19 for patients with pre-existing digestive diseases. *The Lancet Gastroenterol Hepatol*. 2020;5(5):425-7.
- Rasmussen SA, Jamieson DJ. Coronavirus Disease 2019 (COVID-19) and Pregnancy: Responding to a Rapidly Evolving Situation. *Obstet Gynecol*. 2020;135(5):999-1002.
- Jamieson DJ, Honein MA, Rasmussen SA, Williams JL, Swardlow DL, Biggerstaff MS. H1N1 2009 influenza virus infection during pregnancy in the USA. *Lancet*. 2009;374 (9688):0-458.
- Wang S, Guo L, Chen L, Liu W, Cao Y, Zhang J, et al. A case report of neonatal COVID-19 infection in China. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America. Clin Infect Dis*. 2020;71(15):853-857.
- Qiao J. What are the risks of COVID-19 infection in pregnant women?. *Lancet (London, England)*. 2020;395(10226):760-2.
- Santoso A, Pranata R, Wibowo A, Al-Farabi MJ, Huang I, Antariksa B. Cardiac injury is associated with mortality and critically ill pneumonia in COVID-19: A meta-analysis. *Am J Emerg Med*. 2021;44:352-7.
- Yenerçag M, Arslan U, Doğduş M, Günel Ö, Öztürk ÇE, Aksan G, et al. Evaluation of electrocardiographic ventricular repolarization variables in patients with newly diagnosed COVID-19. *J Electrocardiol*. 2020;62:5-9.
- Ece İ, Koçoğlu M, Kavurt AV, Bağrul D, Gül AEK, Koca S, et al. Assessment of Cardiac Arrhythmic Risk in Children With COVID-19 Infection. *Pediatr Cardiol*. 2021;42(2):264-8.
- Bianco M, Biolè CA, Campagnuolo S, Pietrangelillo F, Spirito A, Galluzzo A, et al. COVID-19 therapies and their impact on QT interval prolongation: A multicentre retrospective study on 196 patients. *Int J Cardiol Heart Vasc*. 2020;30:100637.
- Knight M, Bunch K, Vousden N, Morris E, Simpson N, Gale C, et al. Characteristics and outcomes of pregnant women admitted to hospital with confirmed SARS-CoV-2 infection in UK: national population based cohort study. *BMJ*. 2020;369:m2107.
- Muhidin S, Behboodi Moghadam Z, Vizheh M. Analysis of maternal coronavirus infections and neonates born to mothers with 2019-nCoV; a systematic review. *Arch Acad Emerg Med*. 2020;8:e49.
- Petrilli CM, Jones SA, Yang J, Rajagopalan H, O'Donnell L, Chernyak Y, et al. Factors associated with hospital admission and critical illness among 5279 people with coronavirus disease 2019 in New York City: prospective cohort study. *BMJ*. 2020;369:m1966.
- Breslin N, Baptiste C, Gyamfi-Bannerman C, Miller R, Martinez R, Bernstein K, et al. COVID-19 infection among asymptomatic and symptomatic pregnant women: two weeks of confirmed presentations to an affiliated pair of New York City hospitals. *Am J Obstet Gynecol MFM*. 2020;2:100118.
- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu J, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395(10223):497-506.
- Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *New Eng J Med*. 2020;382(8):727-33.
- Shah PS, Diambomba Y, Acharya G, Morris SK, Bitnun A. Classification system and case definition for SARS-CoV-2 infection in pregnant women, fetuses, and neonates. *Acta Obstetrica et Gynecol Scandinavica*. 2020;99(5):565-8.
- Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet*. 2020;395(10226):809-15.
- Smith V, Seo D, Warty R, Payne O, Salih M, Chin KL, et al. Maternal and neonatal outcomes associated with COVID-19 infection: a systematic review. *Plos One*. 2020;15(6):e0234187.

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