RESEARCH ARTICLE

Clinical characteristics, obstetric and perinatal outcome of COVID-19 infection in pregnant women

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Abstract

Objective: To determine clinical characteristics, obstetrics and perinatal outcome of coronavirus disease 2019 infection in pregnant women.

Method: The cross-sectional study was conducted at the Department of Obstetrics and Gynaecology of the Ruth Pfau Civil Hospital, Karachi, and Dow University of Health Sciences, Karachi, from August 2020 to July 2021, and comprised pregnant women with suspicion of coronavirus disease 2019 infection, who underwent recommended testing, and were found to be positive. Oral swabs for the presence of infection were also taken from the neonate within 24 hours of delivery. Data was analysed using Stata 11.

Results: There were 41 women with a mean age of 27±5 years, a mean gestational age of 35±3 weeks, and mean parity 1.2±1.01. Of them, 3(7.3%) women died. Medical complications found along with coronavirus disease 2019 infection were pregnancy-induced hypertension 2(4.8%), eclampsia 4(11%) and diabetes mellitus 2(4.8%). Fever was the most common symptom seen in 12(30%) women, followed by cough 7(20%) and shortness of breath 6(14%). Majority 32(82%) of the women underwent caesarean section. The most common maternal complication was postpartum haemorrhage 6(20%). Also, 36(86%) women required intensive care unit stay for a mean 5±9 days.

Conclusion: Fever, followed by cough and breathlessness, were the most common clinical features. Most common maternal and foetal complication was postpartum haemorrhage and low birth weight, respectively.

Keywords: COVID-19, Pregnancy, Maternal outcome, Perinatal, Outcome. (JPMA 72: 1391; 2022)

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Introduction

The novel coronavirus disease 2019 (COVID-19) infection has become a pandemic. And to date it has infected millions and millions of people, taking millions of lives across the globe.

It is not the first time that the effects of viral infection are being observed in pregnant women. Previously these effects with increased fatality rate have also been observed for severe acute respiratory syndrome (SARS), Middle East Respiratory Syndrome (MERS) and Zika virus, too.[1]

The COVID-19 infection is caused by SARS coronavirus 2 (SARS-CoV-2). Coronavirus is ribonucleic acid (2)-enveloped virus, which causes wide range of symptoms. Previously coronavirus has been responsible for SARS-Co-V and MERS-Co-V. The initial reports of COVID-19 infection in pregnant women came from China in the form of case series.[3] The incubation period varies from 2 to 12 days. The clinical signs and symptoms vary from fever, myalgia, cough and diarrhoea. These clinical signs and symptoms are also observed in non-pregnant women. There is robust evidence that pregnant women are more susceptible to COVID-19 infection though generally it is seen that pregnant women are more susceptible to pneumonia-like infections. Pneumonia has also been observed in pregnant women with COVID-19 infections.[4] Pneumonia is an important feature of COVID-19 infection in both males and females, and has been found to be associated with increased morbidity and mortality. The use of computed tomography (CT) scan and chest X-ray has identified the presence of ground glass opacity in the beginning, followed by consolidation patches. The resolution of these patches has also been identified with complete recovery in patients.[4]

In this wave of current infection, gender bias has been observed, with more men affected compared to women. The general principles of the management are same for pregnant women with or without respiratory symptoms. Women with respiratory symptoms should preferably be isolated. Oxygen therapy should be given to keep saturation above 95%, anti-bacterials may be given to avoid secondary bacterial infections, and corticosteroids may be prescribed in women with respiratory complications.[5] Foetal monitoring with cardiotocography should be carried out. There is no indication for elective caesarean section (CS) in the affected women, except for obstetric indications. Though in one of the case series, from China, all women underwent operative delivery.[6] One of the case series from China found the absence of virus in the

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vaginal secretions, meaning chances of vertical transmission are minimum after vaginal delivery.[2] In another series of 9 patients from the same Chinese province, where all women had undergone CS, there was no evidence of intrauterine infection or vertical transmission as observed on negative swabs off the newborn.[2] All these women underwent operative delivery for various obstetric indications. There are also cases reported where maternal deaths occurred in all women with respiratory complications.[3] It is recommended that in women with respiratory complications, vaginal delivery should be avoided, as physical respiratory distress is associated with maternal pushing efforts. However, safe vaginal deliveries have also been reported in literature.[4]

The current study was planned to identify the clinical characteristics, obstetric and perinatal outcome in pregnant women with COVID-19 infections.

Patients and Methods

The cross-sectional study was conducted at the Department of Obstetrics and Gynaecology units I, II and III of the Ruth Pfau Civil Hospital, Karachi (CHK), and Dow University of Health Sciences (DUHS), Karachi, from August 2020 to July 2021. The hospital has been designated as the centre for not only carrying out the diagnostic testing, but also for the provision of isolation and intensive care unit (ICU) facilities. Standard operating procedures (SOPs) were identified for pregnant women with high degree of suspicion for COVID-19 infections in accordance with guidance from the CHK Infectious Disease Department and international guidelines.[7]

After approval from the institutional review board, the sample was raised. Those included were pregnant women with a positive polymerase chain reaction (PCR) report of COVID-19 infection, or suspicion of having infection with clinical signs of fever and/or signs and symptoms of lower respiratory tract illness, like cough and shortness of breath, requiring hospitalisation, and close contact with any person who was positive for COVID-19. In the latter category, PCR sample for SARS CoV-2 testing was sent after admission to ICU. Pregnant women admitted in labour room for normal or operative delivery without any clinical signs and symptoms of acute respiratory or gastro intestinal infections were excluded from the study.

Close contact was defined as coming within 2 meters of an infected person for a prolonged period without protective equipment, like mask and eye protectors.

Severe infection was defined as shortness of breath, respiratory rate ≥30 breaths/min, oxygen saturation ≤93%, and >50% lung infiltrates within 24-48 hours on chest imaging.

These women underwent baseline investigations, like blood complete picture (CP) to rule out thrombocytopenia, lymphopenia, elevated C-reactive protein (CRP), and elevated alanine transferase (ALT). The facility for CT chest and X-ray chest is not available round-the-clock. Physical examination included chest auscultation, measurement of oxygen saturation with pulse oximeter. An oxygen saturation of <94% indicated respiratory difficulty.

Those pregnant women who met the inclusion criteria underwent SARS CoV-2 testing by oral / nasopharyngeal swab. These testing facilities have been provided by the government throughout the country, and include real-time PCR qualitative testing. Patients requiring ICU facilities for any reason also underwent testing for SARS CoV-2 infections.

Variables recorded included obstetric outcomes, mode of delivery, any obstetric complication and perinatal outcome. The latter included baby weight, Appearance-Pulse-Grimace-Activity-Respiration (APGAR) score, neonatal pneumonia, intrauterine demise, and low birth weight (LBW). Oral swabs for the presence of infection were also taken from the neonate within 24 hours of delivery.

The primary outcome was maternal and perinatal outcome of COVID-19 infection, while the secondary outcome included adverse maternal outcome of ICU stay and maternal mortality.

Preterm labour was defined as regular uterine contractions with effacement and dilatation of cervix <37 weeks of gestation. Pre-labour rupture of membranes was defined as rupture of membranes of the amniotic sac before the onset of labour.

Maternal mortality was defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to, or aggravated by, pregnancy or its management, but not from accidental causes.

Perinatal outcome included premature birth and LBW. Premature birth was defined as birth occurring <37 weeks of gestation. LBW was defined as birth weight <2.5kg. Intrauterine foetal demise was defined as death of a baby in the uterus at or after 20 weeks of gestation. Neonatal death (NND) was defined as the death of a neonate within the first 28 days of life.

The sampling technique used was non purposive consecutive sampling. The data was entered on a self-designed questionnaire and was later transferred to an

Excel sheet. Data was analysed using Stata version 11. Frequencies and percentages as well mean and standard deviation values were calculated, as appropriate. The study was approved from Institutional Review Board of University.

Results

There were 41 women with a mean age of 27±5 years, a mean gestational age of 35±3 weeks, and mean parity 1.2±1.01. Mean ICU stay duration was mean 5±9 days. (Table 1). A total of 13(36%) women were referred from the neighbouring secondary-care centres, and 2(4,87%) women gave history of coming into close contact with an infected person.

Medical complications found along with COVID-19 infection were pregnancy-induced hypertension (PIH) 2(4.87%), eclampsia 4(11%) and diabetes mellitus[8] 2(4.87%). Fever was the most common symptom seen in 12(30%) women, followed by cough 7(20%) and shortness of breath 6(14%) (Table 2).

Haematological profile of the sample was noted and CRP was markedly elevated in all women (Table 3).

Majority 32(82%) of the women underwent caesarean section. The most common indication for CS was foetal distress 3(7.3%), and eclampsia 3(7.3%). The most common maternal complication was postpartum haemorrhage 6(14.6%). Preterm labour was observed in 4(9%) and pre-labour rupture of membranes was seen in 2(4.87%). Also, 36(86%) women required ICU stay for a mean duration of 5±9 days. Of the total, 3(7.3%) women died.

There were 6(14%) foetal deaths. Live birth was seen in 35(85%). LBW was the most common complication seen in 9(21%).

Table-1: Demographic characteristics [n=41].

Demographic variables	n [%]
Gestational age [weeks]	35±3
Age [years]	27±5
Parity [0-5]	1.2±1.01
Booking status	
Booked	19 [46]
Non booked	22 [62]
Referral	11 [36]
Antibiotics	32[96]
Stay in intensive care [days]	5±9

Table-2: Clinical characteristics [n=41].

Clinical Characteristics	n [%]
Fever	
Yes	12[29]
No	26[72]
Cough	
Yes	7[20]
No	28[80]
Shortness of breath	
Yes	6[16]
No	30[83]
Diarrhoea	
Yes	2[5]
No	34[94]
Myalgia	
Yes	2[5]
No	34[94]

Discussion

More than half of pregnant women with COVID-19 required admission to ICU and 3(7.3%) women died. According to earliest reports from China and the United States, the pattern of severity of COVID-19 infection among pregnant women follows that of the general population; around 80% will have mild disease, 15% severe disease and 5% will develop critical disease.[8,9] The maternal death rate in the current study is consistent with these figures.

Among the 3 maternal deaths, one was related to a primigravida at 37 weeks of gestation who had road traffic accident (RTA) and underwent craniotomy for the drainage of haematoma. She had complaints of fever and cough for 3 days at the time of admission. She underwent emergency CS for foetal distress and delivered an alive baby with good APGAR score. She had lymphopenia and a markedly elevated CPR of 118. She received ventilator support and antibiotic cover and expired 4 days post-delivery.

The second maternal death was recorded in a woman with 37 weeks of pregnancy and previous 2 CSs. She was a non-booked woman who presented in emergency with signs and symptoms of COVID-19 infection. Ultrasound examination revealed intrauterine demise, along with thrombocytopenia, and raised CRP. After CS, she was shifted to ICU for ventilator support where she expired after 72 hours of stay.

The third patient was seen at 24 weeks of gestation with history of fever, cough and myalgia for 7 days, and shortness of breath for 3 days. Her chest radiograph showed the presence of consolidation in the lower lobes of lungs. Her haematological profile showed marked lymphopenia (08) and an elevated CRP (177).

A meta-analysis of 192 studies showed that pregnant women with COVID-19 are at an increased risk of maternal death (0.02%) and need ICU admission (4%).[10] In comparison, the current study showed a very high rate of ICU admission of 51% and maternal mortality rate of 7.3%. This may be explained by the fact that these patients were brought in a critical condition. Hantoushzadeh et al. in Iran

also reported a very high maternal mortality rate of 7 deaths out of a series 9 women diagnosed with severe COVID-19 disease.[2] There are several similarities in the Iranian maternal death report and the current study. The Iranian study was based on a small case series of severely ill patients presenting in late second and third trimesters, while the current study was also based on a small sample size of mostly serious patients admitted in emergency in late second or third trimesters of pregnancy. Both these reports should be interpreted with caution as they do not report population-based surveillance data and are also prone to adverse outcome ascertainment bias.

The most frequent symptoms of pregnant women with COVID-19 in the current study were fever, cough and shortness of breath. This has been reported by other studies, too.[11,12] However, unlike other studies which reported fever in more than 65% cases, the current study showed fever in only around 30% cases. This may be explained by the suggestion that pregnant women diagnosed in hospital with COVID-19 may be more likely to be asymptomatic and less likely to report symptoms of fever, dyspnoea and myalgia compared to non-pregnant women with COVID-19.[10]

CS was the mode of delivery in majority of cases (82%) in the current study, which has also been reported by other studies.[11,12]

A significant number of the current COVID-19-positive pregnant women were also found to have other co-morbidities, including preeclampsia, eclampsia and gestational diabetes, which might have played a role in increasing the severity of the disease and the risk of maternal mortality and morbidity. Other studies have also suggested co-morbidities, including increased maternal age, obesity, hypertension and diabetes, to be associated with disease severity and risk of maternal death among COVID-19-positive patients.[13] An observational study reported the finding of preeclampsia-like syndrome in 6 out of 8 patients who were diagnosed with COVID-19 during pregnancy and admitted to ICU with severe pneumonia.[14] This interesting finding needs to be further studied in larger studies to see whether there is a causal relationship between COVID-19 and preeclampsia.

The most common maternal complication seen in the current study was postpartum haemorrhage (PPH) in 6 women (20%). There is limited information in literature about the causal association of PPH with COVID-19. A study in Boston, USA, compared the frequency of PPH among COVID-19-positive women and those who tested COVID-19-negative, and found no increase in the risk of PPH among the positive patients.[15]

The current study showed an increased risk of adverse neonatal outcomes. There were 6(14%) cases of perinatal mortality. A similar perinatal mortality has been reported by Hessami K et al.[15] Preterm labour and LBW was seen in 3(5%) and 8(25%) of cases in the current study. Similar neonatal complication rates have been reported earlier.[16]

The most significant haematological finding observed in the current study was a raised CRP level in all COVID-19-positive patients. A meta-analysis of laboratory abnormalities among COVID-19-positive women showed that the most significant laboratory findings were elevated D-dimer, increased neutrophil count, raised CRP and decreased lymphocyte count.[17] Pereira A et al. also showed high levels of CRP and D-dimer correlated with the diagnosis of severe pneumonia.[17]

The strength of the current study is its prospective design, and the fact that the sample comprised only patients who tested COVID-19-positive on PCR testing. Hence, the clinical features and laboratory work were truly representative of COVID-19.

The current study has several limitations. First, the sample size was small and not calculated beforehand, the study only included patients who presented to the emergency room in late second or third trimesters with severe illness. Moreover, the study was conducted at only one institution. As such, the findings may not be generalisable. The study did not assess the risk of vertical transmission and did not subject the neonates to COVID-19 PCR test. Besides, some important biochemical markers for COVID-19, including D-dimer, lactate dehydrogenase (LDH) and serum ferritin levels, were not measured.

More vigorous studies with larger sample sizes to ascertain the clinical features, laboratory investigations and maternal and foetal outcomes of COVID-19 in pregnancy are recommended.

Conclusion

Majority of pregnant women with COVID-19 infection required ICU admission for monitoring. However, clinical characteristics in majority of the patients were mild. CRP was an important inflammatory marker in women with COVID-19 infection. PPH and LBW were common maternal and foetal complications. The risk of vertical transmission was uncertain as neonatal COVID-19 PCR was not performed.

Limitations: The sample size for the study was not statistically calculated before starting the research. This could be a reason for weakening the power of the study.

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Conflict of Interest: None.

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