

Comparative Study of Maternal Mortality in SARS-CoV-2 Infected Pregnant Women in the First and Second Waves of COVID-19 Pandemic in Tertiary Care at Madhya Pradesh, India

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ABSTRACT

Objectives: To evaluate the obstetrics outcome in terms of maternal mortality in severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infected pregnant women in both the waves of coronavirus disease 2019 (COVID-19) pandemic.

Design, settings, and participants: This is a prospective cohort study of obstetrics outcomes in SARS-CoV-2 infected pregnant women in both the waves of COVID-19 pandemic from 1 April 2020 to 30 May 2021 at Sri Aurobindo Institute of Medical Sciences with wide spread access to SARS-CoV-2 testing in outpatients, emergency department, and inpatient settings.

Result: The primary outcome composed of maternal mortality in SARS-CoV-2 infected females during both waves of COVID-19 pandemic. Study shows that the second wave was more intense and fatal as compared to the first wave of COVID-19 pandemic in India with higher maternal mortality rate in the second wave than the first wave. Study also showed that an overall higher mortality with cesarean section was noted. Thus, our study concluded that the cesarean section is not the preferred mode of delivery in COVID-19 females suffering from respiratory distress.

Conclusion: Our study concluded that cesarean section is not the preferred mode of delivery in COVID-19 with females suffering from respiratory distress. The SARS-CoV-2 infection during pregnancy was associated with adverse maternal outcomes post-delivery.

Keywords: COVID-19, Maternal mortality, Pandemic, Pregnant women, Severe acute respiratory syndrome coronavirus 2.

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INTRODUCTION

Coronavirus disease 19 (COVID-19), which is caused by the same coronavirus that causes SARS-CoV-2, has spread over the world, posing a serious health threat. A two-wave pattern of reported cases has been observed in several countries, with the first wave occurring in the spring and the second in the late summer.¹⁻⁴ As of May 2021, both waves of the COVID-19 pandemic in India had resulted in more than 25 million illnesses and approximately 0.3 million deaths.⁵ In comparison to the first wave, the second wave is moving at a rapid speed. The higher number of cases in the second wave could be due to a variety of reasons. It has been discovered that the mutant virus is more effective at transmitting and has a shorter incubation period.⁶ There are several obvious differences in the first and the second wave.

Furthermore, pediatric and younger people, as well as elderly people, are infected in the second wave.⁷ The COVID-19 second wave symptoms are similarly varied, particularly gastrointestinal.⁸ The concern of whether pregnant women are more susceptible to SARS-CoV-2 infection or have more severe illness outcomes is particularly pressing. The pregnant women and new mothers are a special group of people who have special mental and physical health needs and are especially prone to concerns such as domestic violence. Finally, the COVID-19 pandemic's impact is expected to be context dependent, varying according to a range of country-specific circumstances. The goal of this study was to assess obstetric outcomes in terms of different modes of delivery and maternal outcomes in women with COVID-19 in Madhya Pradesh, India, during the first and second COVID-19 pandemic waves.

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PATIENTS AND METHODS

Study Design

We conducted a prospective cohort study of pregnant females with COVID-19 positive status admitted at Sri Aurobindo Institute of Medical sciences, a dedicated COVID-19 tertiary care hospital, Indore, Madhya Pradesh. The COVID-19 infection was diagnosed as per the national testing guidelines in the outpatients, emergency department, and inpatients settings.⁹

The pregnant females who were term, pre-term, or post-term with or without high-risk pregnancy status were admitted after

testing positive for SARS-CoV-2 virus during both waves of the COVID-19 pandemic. The pregnant females with moderate or severe infections were classified as per clinical management protocols for COVID-19 in adults.¹⁰

Inclusion and Exclusion Criteria

The pregnant women who tested positive for SARS-CoV-2 and delivered were included in the study. Those with a suspected SARS-CoV-2 infection, but no laboratory confirmation, were removed, as were those who reported to the hospital with symptoms comparable to COVID-19 but did not require hospitalization. The patients, who were COVID-19 positive, during their antenatal period, presented with mild symptoms and free from respiratory distress, were discharged and later their outcome as maternal mortality was followed up on phone.

Outcomes

Obstetric outcomes in terms of maternal mortality and the severity of disease were compared in women admitted during both the waves of COVID-19 pandemic. The IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. (released 2013) was used to conduct statistical analysis. The descriptive analyses were performed. Proportions are presented as percentages; $p < 0.05$ was considered statistically significant.

RESULTS

During the first ($n = 56$) and second ($n = 88$) waves of the COVID-19 pandemic, a total of 144 pregnant COVID-19 positive women were admitted according to the admission policy. Respiratory distress as an indicator for mode of delivery was studied in both the waves. During the first wave, a total of 19 females had respiratory distress, 18 of them underwent lower (uterine) segment cesarean section (LSCS) as their mode of delivery. On the other hand, in second wave total of 7 out of 25 pregnant females who underwent respiratory distress delivered through normal vaginal route details showed in Table 1.

One female out of 36 who delivered *via* normal vaginal route was certified and had respiratory distress, with zero mortality among the remaining 20 females who delivered through cesarean section during the first wave. Total of 13 females with respiratory distress were certified during the second wave-out of which 8 underwent LSCS and remaining delivered through normal vaginal route, respectively (Table 2). Study had also showed that the maternal mortality was more among multigravida females as compared to the primigravida in both waves, which are showed in Table 3.

The data collected from the both the waves showed that the second wave of the COVID-19 pandemic in India was more fatal than the first wave in terms of maternal mortality (Table 4). It also has revealed that mortality was higher among the females with respiratory distress who delivered through cesarean section as compared to normal vaginal route.

DISCUSSION

Coronavirus family comprises of the member viruses responsible for the SARS-CoV-2, known to cause severe complications during pregnancy.⁹ The novel coronavirus 2019 (2019-nCoV) is thought to have a pathogenic potential similar to SARS-CoV-2, placing pregnant women at risk of severe infections. There are no clear clinical symptoms of coronavirus infections prior to serious

Table 1: Respiratory distress as an indicator for mode of delivery

Mode of delivery	Respiratory distress		p-value
	Absent ($n = 37$) (%)	Present ($n = 19$) (%)	
First wave			
LSCS	2	18	0.001
NVD	35	1	
Second wave	Absent ($n = 53$)	Present ($n = 25$)	
LSCS	18 (34%)	18 (72%)	0.002
NVD	35 (66%)	7 (28%)	

LSCS, lower (uterine) segment cesarean section; NVD, normal vaginal delivery. Data are presented as the percentage. * $p < 0.05$

Table 2: Maternal mortality rate according to mode of delivery

Mode of delivery	MMR outcome		p-value
	Certified ($n = 1$) (%)	Discharge ($n = 55$) (%)	
First wave			
LSCS	0	20	0.452
NVD	1	35	
Second wave	Certified ($n = 13$)	Discharge ($n = 65$)	
LSCS	8 (61.5%)	28 (43.1%)	0.223
NVD	5 (38.5%)	37 (56.9%)	

LSCS, lower (uterine) segment cesarean section; MMR, maternal mortality rate; NVD, normal vaginal delivery. Data are presented as the percentage. * $p < 0.05$

Table 3: Maternal mortality rate according to gravida

Gravida	MMR outcome		p-value
	Certified ($n = 1$) (%)	Discharge ($n = 55$) (%)	
First wave			
Multigravida	0	26	0.347
Primigravida	1	29	
Second wave	Certified ($n = 13$)	Discharge ($n = 65$)	
Multigravida	9 (69.2%)	40 (61.5%)	0.600
Primigravida	4 (30.8%)	25 (38.5%)	

Data are presented as the percentage. * $p < 0.05$

Table 4: Maternal mortality in SARS-CoV-2 infected pregnant women in first and second waves

MMR outcome	First wave ($n = 56$) (%)	Second wave ($n = 78$) (%)	p-value
Certified	1	13	0.005
Discharge	55	65	

Data are presented as the percentage. * $p < 0.05$

consequences.¹⁰ The current viral epidemics have raised three crucial questions for pregnant women. First, COVID-19's first and second waves pose a risk to pregnant women; second, pregnant women are more impacted by COVID-19's first or second waves; and third, COVID-19's first and second waves pose a risk of vertical mother-to-child transmission. In the first and second waves of the COVID-19 pandemic, we aimed out whether COVID-19 was associated to maternal mortality in pregnant women infected with SARS-CoV-2. This study compared and represented the direct and indirect effects of the COVID-19 pandemic on maternal health in the first and second waves.

During the pandemic, 12 pregnant women were infected with severe acute respiratory syndrome which showed that the pregnant women infected with severe acute respiratory syndrome infection were linked to a higher rate of spontaneous miscarriage, preterm birth, and intrauterine growth restriction in infants born to infected females, despite the lack of evidence of perinatal severe acute respiratory syndrome infection.⁹

Patients during the first and second wave of COVID-19 pandemic presented with similar predominant symptoms (fever, dyspnea, and cough) of the infection, while patients with renal (acute kidney failure) and gastrointestinal (vomiting and abdomen pain) symptoms were more common during the second wave of infection. Indeed, the Spanish Ministry of Health has already emphasized the greater occurrence of the latter in the second wave in a document published on 2 October 2021.⁸ Study conducted in India revealed that the most of pregnant women are asymptomatic or have a mild form of the illness. The COVID-19 infection during the third trimester has no effect on the pregnancy's outcome or on the health of the mother or the baby. COVID-19 vertical transmission was not observed in this research.¹¹

Literature has documented that the pregnant females infected with the SARS-CoV-2 had mortality rates as high as 25% compared to 10% in ordinary infected patients.^{12,13} It was also seen that the maternal mortality was higher in cesarean sections than in vaginal deliveries.¹⁴ Multidisciplinary treatment was required for COVID-infected pregnant women in their third trimester for better maternal outcomes.^{15,16} A second wave in the UK, which began in September 2020, appears to have had a greater impact on pregnant women. In contrast to a study finding low severity of COVID-19 during the second wave in Spain,¹⁷ the observed increase in pregnant women with severe COVID-19 could be related to the introduction of a more pathogenic strain of SARS-CoV-2.¹⁶

As a result, the fact that some women with asymptomatic COVID-19 may have gone unreported has no influence on the COVID-19 diagnosis-maternal morbidity relationship. Furthermore, women admitted to the hospital with COVID-19 at 38 weeks or later may not be at risk of premature birth, and term babies born early in the pandemic may not have been exposed to COVID-19 at all.

Additionally, these factors have no impact on our findings, which reveal a correlation between the diagnosis of COVID-19 and maternal morbidity. Despite the fact that we have data on maternal ICU hospitalizations and deaths, we did not have any more information on symptomatology of COVID-19. Moreover, the start of the infection's commencement remained unknown. On the contrary, the potential that COVID-19 can be seen in asymptomatic women, precludes the formulation of any hypothesis about the prevalence and severity of the obstetric disorders described, as well as the severity of COVID-19-related symptoms. Furthermore, we were unable to connect maternal data with newborn data from a separate register. Finally, this research does not include data on early pregnancy complications including miscarriage or medical terminations.

CONCLUSION

According to the findings from this study, the second wave of the COVID-19 pandemic in India was more severe and lethal than the first wave with higher maternal mortality rate showing that coronavirus in the second wave was more potent and virulent than in the first wave. The reason for increased severity and high

mortality during the second wave is still unknown, possibility due to higher virulence of the evolving COVID-19 virus. Also, it showed that a need for the vaccination of pregnant females in the future. A higher mortality with LSCS showed that it is needed not the preferred mode of delivery COVID-19 positive pregnant females suffering from respiratory distress.

Through our study, we would also like to suggest continuous monitoring of nature of the disease to promote the safe maternal health. In the future, more research is needed; this study is a single-center based study, delayed presentation of pregnant female to our COVID-19 pandemic devoted centers with more case rates seeking health care could be a leading cause of higher MMR in the second wave at our center.

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