ORIGINAL RESEARCH

Clinical Profile of COVID-19 Positive Obstetric Patients Admitted to a Tertiary Care Hospital during the Two Waves of COVID-19

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Abstract

Background: Coronavirus disease 2019 (COVID-19), a global pandemic which undoubtedly hit the whole world so hard. There have been multiple waves across the globe of varying time, duration, and intensity, India has also witnessed two waves sweeping the entire nation. The second wave had startling intensity with massively increased oxygen requirement, intensive care unit (ICU) admissions. The effect was even more pronounced in the pregnant women as there was increased maternal morbidity and mortality. However, there are limited reports on the impact of COVID-19 during pregnancy.

Objective: This study is aimed at highlighting the variance in clinical profile of pregnant patients in first and second wave of COVID-19 in India.

Materials and methods: A retrospective observational comparative hospital-based study was conducted in a tertiary care hospital in Delhi during the two waves of COVID-19. The first wave in India lasted from May 2020 to October 2020, and the second wave lasted from April 2021 to June 2021.We obtained the medical records and compiled clinical and outcome data for all pregnant patients, who were admitted in the Department of Obstetrics and Gynaecology of our Hospital during the first and second wave of pandemic with a laboratory-confirmed report of SARS-CoV-2.

Results and conclusion: The second wave definitely saw more number of symptomatic patients, an increase in symptom of shortness of breath, increase in oxygen requirement, ICU admissions, marginally increase lower segment cesarean section (LSCS) rates and associated comorbidity such as hypertensive disease of pregnancy.

Keywords: COVID-19 pandemic, COVID-19 and pregnancy, Pregnancy, Pregnancy outcome.

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Introduction

Coronavirus disease 2019, a global pandemic, which undoubtedly hit the whole world hard, shook the health care system of even the world's superpowers. The causative organism is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Dating back to the history of COVID-19, SARS-CoV-2 was first identified in Wuhan, China in December 2019 and the first case was detected in India was on 30 January 2020 in Kerala, India.[1]

There have been multiple waves of this pandemic across the globe of varying time duration and intensity. India has also witnessed two waves sweeping the entire nation. The first wave lasted from July 2020 to December 2020 and the second wave lasted from March 2021 to May 2021.[2] The second wave of the pandemic was scarier than the first wave. As of 19 October 2021, 34.09 million cases and 4,52,485 deaths have been reported by India to World Health Organization (WHO).[2]

This disease not only had a surplus impact on healthcare but also had a dramatic effect on socio-cultural, economic, political, and personal spheres. The second wave had startling intensity with massively increased oxygen requirement and ICU admissions. The second wave had witnessed quite gross statistics in terms of fatality. Empirical data show that the characteristics of the effects of the virus do vary between the two periods, although the comparative characteristics of the two waves still remain largely unknown. The strains responsible for the both waves were different. The strain which was responsible for the wave first wave was N440K and second wave were B.1.617.2 (Delta) and B.1.617.1 (Kappa).

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Most cohort studies have focused on evaluating the effects of COVID-19 on the general population,[3,4] and there is insufficient data on its impact on vulnerable populations, such as pregnant women.

Pregnancy can compromise the immune system and potentially SARS-CoV-2 infection can increase the risk of pneumonia in pregnant women in comparison to non-pregnant women. The existing data are still insufficient.[5] However, pregnant women with COVID-19 appear more likely to develop respiratory complications requiring intensive care and more likely to be placed on a ventilator. Various studies are going on around the world to attempt and get a clearer picture of this calamity.[6]

It is the early phase of the epidemic, and even till date, only limited data are available on the effect of COVID-19 on pregnant women.[7]

This study is aimed at highlighting the variance in clinical profile of COVID-19 positive pregnant patients in first and second wave in a tertiary care hospital.

Materials and Methods

A retrospective observational comparative hospital-based study was conducted in a tertiary care hospital in Delhi during the two waves of COVID-19. The first wave in India lasted from July 2020 to December 2020 and the second wave lasted from March 2021 to May 2021.[2]

We obtained the medical records and compiled clinical and outcome data for all pregnant patients who were admitted in the Department of Obstetrics and Gynaecology of our hospital during the first and second wave of pandemic with a laboratory confirmed report of SARS-COV-2. All pregnant women, irrespective of duration of pregnancy and parity, were included in the study.

A total of 45 COVID-19 positive patients were admitted to our hospital during the first wave of COVID-19 and a total of 46 patients were admitted during the second wave of COVID-19 epidemic. The only inclusion criterion was to be a hospitalized pregnant patient with a confirmed diagnosis of SARS-CoV-2. This study excluded those with suspected SARS-CoV-2 infection without laboratory confirmation and those who came to the hospital with mild symptoms and did not require hospitalization. Moreover, SARS-CoV-2 infection was confirmed by reverse transcription-polymerase chain reaction (RT-PCR) using swab samples from the upper respiratory tract (nasopharyngeal/oropharyngeal swabs).

All patients were investigated and managed as per the hospital protocol and the advisory issued by the government of India and ICMR (Indian Medical of Medical research). The data related to the study was extracted retrospectively.

Statistical Analysis

Number and percentages were reported for categorical variables. Fischer Exact test was used to test the association between categorical study variables. Statistical tests were performed using the available version of SPSS software and values of $p < 0.05$ were considered significant.

Ethical Clearance

The study is in accordance with the ethical standards of the institution.

Results

As per the hospital protocol, all patients in both waves were observed starting from the day of admission to the day of discharge or death. We collected all data retrospectively with respect to the clinical profile and fetomaternal outcome; compiled them and analyzed. They have been compared with respect to the clinical presentation, symptoms, blood group, oxygen requirement, ICU admissions, course during pregnancy, fetomaternal outcomes, and mortality rates.

Table 1 represents the age group distribution of study subjects. Both waves had similar affection for the age group in the range of 25–30 years as the Indian population has a greater number of pregnant patients for this age group.

Table 2 represents the symptoms with which the patients presented in both waves. The major difference in both wave was that there were a greater number of asymptomatic patients in the first wave 32/45 (71.11%) as compared to the second wave 17/46 (36.95%). The statistical difference on comparing the symptomatic and asymptomatic patients in both waves is 0.0015, which is statistically significant. Cough (45.65%) and shortness of breath (23.91%) were strikingly higher in the second wave, as compared to cough (13.33%) and shortness of breath (0%) in the first wave. Fever was observed in only 2 cases out of 45 (4.44%) in the first wave as compared to second wave in which 19 cases out of 46 had fever (41.3%). A significantly higher number of patients presented with fever in second wave.

Table 3 represents the blood group distribution of patients in both waves. In the first wave, maximum number of patients affected by COVID-19 were B positive (48.88%) but in the second wave, both B positive (36.95%) and O positive (34.78%) were almost equally affected.

Table 4 represents the incidence of obstetric complications observed in both waves. The incidence of hypertensive disorder of pregnancy is 1 out of 45 (2.22%) in the first wave. On the other hand, 7 out of 46 (15.21%) had hypertension during the second wave. Hypertensive disease of pregnancy was a significant comorbidity. On calculating the *p*-value, it came out to be 0.058, which is significant.

Table 1: Age-group distribution of the study subjects

Age in years	*COVID-19 – First wave (N = 45)*		*COVID-19 – Second wave (N = 46)*		
	No	*%*	*No*	*%*	*p*
18–24	18	40	7	15.2	0.00039
25–30	22	48.8	30	65.21	0.097865
31–35	4	8.88	7	15.2	0.15121
>35	1	2.22	2	4.34	0.47084
Total	**45**	**100**	**46**	**100**	

Table 2: Symptoms of patients in both waves

Symptoms	*Cold*	*Cough*	*Fever*	*SOB*	*Diarrhea*	*Anosmia*	*Headache and malaise*	*Asymptomatic*
COVID-19 – First wave (N = 45)	5 (11.11%)	6 (13.33%)	2 (4.44%)	0 (0%)	1 (2.22%)	0 (0%)	0 (0%)	32 (71.11%)
COVID-19 – Second wave (N = 46)	4 (8.69%)	21 (45.65%)	19 (41.3%)	11 (23.91%)	3 (6.5%)	1 (2.17%)	2 (4.34%)	17 (36.95%)

SOB, shortness of breath

Table 3: The blood group distribution of patients in both waves

Blood group	*A*	*AB*	*B*	*O*	*Rh negative*
COVID-19 – First wave (N = 45)	10 (22.22%)	1 (2.22%)	22 (48.88%)	12 (26.66%)	0
COVID-19 – Second wave (N = 46)	10 (21.73%)	3 (6.52%)	17 (36.95%)	16 (34.78%)	3 (6.5%)

Table 4: The associated obstetric complications

	GDM	*HDP*	*Anemia*	*IHCP*	*Pre-LSCS*	*Hypothyroidism*	*Epliepsy*
COVID-19 – First wave (N = 45)	3 (6.66%)	1 (2.22%)	5 (11.11%)	1 (2.22%)	3 (6.66%)	3 (6.66%)	0
COVID-19 – *Second* wave (*N* = 46)	8 (17.39%)	7 (15.21%)	5 (10.86%)	3 (6.52%)	12 (26.08%)	0	1 (2.17%)
p	0.1973	**0.05855**	1	0.317	**0.012547**		

GDM, gestational diabetes mellitus; HDP, hypertensive disorder of pregnancy

Table 5: Parity distribution, symptomatology, oxygen requirement, ICU admission, and fetomaternal outcome

Factor	*Status*	*COVID-19 – First wave (N = 45)*	*COVID-19 – Second wave (N = 46)*	*p*
Parity distribution	Primigravida	21 (46.6%)	17 (36.95%)	**0.3989**
	Multigravida	24 (53.3%)	29 (63.04%)	
Symptoms	Symptomatic	13 (28.88%)	29 (63.04%)	**0.0015**
	Asymptomatic	32 (71.11%)	17 (36.95%)	
Oxygen requirement	Requiring O_2	2 (4.44%)	35 (76.08%)	**0.00001**
	Not requiring O_2	43 (95.55%)	11 (23.91%)	
ICU admission	Requiring ICU	0 (0%)	11 (23.91%)	**0.0005**
	Not requiring ICU	45 (100%)	35 (76.08%)	
Maternal outcome	Recovered	45 (100%)	36 (78.26%)	**0.0011**
	Died	0 (0%)	10 (21.7%)	
Fetal outcome	Alive	36 (80%)	36 (78.26%)	0.432616
	Dead	2 (4.44%)	4 (8.69%)	
	In utero	7 (15.56%)	6 (13.04%)	

Another finding was significantly higher cases of the previous LSCS in second wave, in which $p = 0.012547$. The other obstetric complications were almost similar in both waves such as gestational diabetes mellitus, anemia, intrahepatic cholestasis of pregnancy (IHCP), hypothyroidism, and epilepsy. The course of pregnancy in both waves had quite similar outcomes, only the LSCS rate was marginally increased in the second wave (39.13%) as compared to 33.33% during the first wave. On comparing the normal vaginal delivery and LSCS only between the two waves, it was found that $p = 0.4982$, which is not significant.

Table 5 represents the difference between the first and second waves of COVID-19 with respect to parity, symptoms, oxygen requirement, ICU admissions, and fetomaternal outcome.

In both waves, many multigravidas were affected more than primigravidas. There was not much difference, with respect to parity in both waves. The virus showed no predilection for any particular obstetric score.

The first wave had 13 (i.e., 28.88%) patients who were symptomatic vs 29 (i.e., 63.04%) who were symptomatic. On comparing the symptomatic patients in the two waves, we got $p = 0.0015$, which is significant.

Similarly on comparing the oxygen requirement in both waves, $p = 0.00001$ which is significant. The rate of ICU admission showed similar difference, with a $p = 0.0005$, which is significant. There was no mortality observed in the pregnant women admitted to our hospital during the first wave. However, we lost 10 patients out of 46 during the second wave. On comparing the mortality during both waves, we got $p = 0.0011$, which is also significant. When timing of maternal deaths was reviewed, we found that there was significantly higher mortality rate observed among the patients in second trimester, 8 out of 10 patients, that is 80% mortality was observed in the second trimester. On the contrary, only 1 (10%) observed in first and third trimester each. This data points out the specific vulnerability of second trimester patients towards the rapid disease progression and mortality during the second wave.

While comparing the fetal outcome, the outcomes were fairly equal and comparable. No statistically significant difference was observed between the two waves.

Discussion

Pregnant women may be susceptible to developing more severe symptoms after infection with respiratory viruses, due to physiological changes of the immune and cardiopulmonary systems during pregnancy.[8] Both SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV) have been associated with a higher case fatality rates and more severe complications during pregnancy.[9,10]

However, there are limited reports on the impact of COVID-19 during pregnancy. As a result, the potential effects on fetal and neonatal outcomes are unclear, and studies are urgently needed with regard to the management of pregnant women with COVID-19. There is very limited data available on the comparison of clinical profile of pregnant patients during the different waves of COVID-19.

In first wave, maximum number of patients affected by COVID-19 were B positive (48.88%), but in the second wave, both B positive (36.95%) and O positive (34.78%) were almost equally affected. This is in contrast with the study conducted by Zhao et al., 2019 in which it was found that blood group A was associated with an increased risk of infection, whereas group O was associated with a decreased risk.[11]

The case fatality rate for COVID-19 was around 4%.[12–14] In this study, the case fatality ratio in first wave was 0%.[15–17] The second wave saw steep rise in this ratio, that is, 21.7%. Furthermore, 80% of the deaths were from the second trimester, and the rest 10% were from the first and the third trimesters, respectively. We need a large-scale studies to understand the factors responsible for the difference observed in the clinical profile in both waves and the factors causing increased fatality of the patients in the second wave.

The observed increase in pregnant women with severe COVID-19 could relate to the emergence of a more pathogenic strain of SARS-CoV-2.[13] However, many studies have refuted this. For instance, preliminary analysis https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8046416/ - bib7 suggests that there is no evidence that the B.1.1.7 (alpha) strain is responsible for the deadlier second wave in the UK, and is particularly more infective or affects pregnant women more severely.[18]

The comparison between the two waves is difficult because in the first wave, it was all new for the nations and their healthcare systems, diagnostic modalities, and logistics capabilities. With the second wave, there was advent of vaccination, better understanding of the disease, better and rapid diagnostic modalities, better infrastructure and logistics, more testing facilities and availability of newer treatment options. Despite all these advancements, what was observed in the case of pregnant women, was deterioration of maternal outcome.

Conclusion

Pregnant women represent a uniquely vulnerable group in any infectious disease outbreak because of their altered physiology, susceptibility to infections, and compromised mechanical and immunological functions. The need to safeguard the fetus adds to the challenge of managing their health. Much of the obstetric management is based on consensus and best practice recommendations as clinical efficacy data regarding antiviral therapy and corticosteroid use is evolving.[13]

At present, therefore, the extent to which these factors might have contributed to the increase of severe disease in pregnant women remains unclear. Focused research is required for further clarification regarding these potential causes.[15] We need large-scale studies to understand the changing behavior of viruses causing difference in the risk factors, symptomatology, disease progression, and prognosis of the patients. To sum up, these were the salient features of both waves, from an Indian perspective. The salient features of COVID-19 first wave are listed in the following:

- The pregnant women had less morbidity and mortality.
- Maximum patients were asymptomatic and were diagnosed on the basis of routine screening at hospital or screening if they belonged to a containment zone.
- Those who were symptomatic had mild symptoms.
- Less oxygen requirement and ICU admissions.
- Less fetomaternal morbidity and mortality.

On the contrary, in the second wave, the salient features of COVID-19 second wave are distinct from the earlier wave and are listed in the following:

- More patients had symptoms and the symptoms were evident, pronounced, and varied.
- Shortness of breath was one respiratory symptom, which was observed in patients in the second wave but was absent in the first wave.
- Patients presented early during pregnancy and there was slight increase in the number of LSCS.
- Hypertensive disorders of pregnancy were a significant comorbidity.
- Patients developed severe disease early in pregnancy and had poorer outcomes.
- There was an increased oxygen requirement; mechanical and non-invasive ventilation.
- Severe disease resulting in increased ICU admissions.
- Massively increased mortality rates.

Conclusively, early data suggests that the pregnant and peripartum women have experienced more critical affections in the second wave of the COVID-19 pandemic than was observed in the first wave. However, the exact cause of this change is unclear. We need large scale studies and more focused research to have a better understanding of the correlation of COVID-19 and pregnancy.[14] As the fear of a third wave looms, we must follow COVID-19 appropriate behavior and keep ourselves and everyone around us safe. Henceforth, we need to ensure prompt vaccination of these group of patients and come up with definite treatment protocols and health policies for such patients to ensure the safety of not just one individual but two; because if you save a pregnant woman, you save two lives.

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