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Original Research Article

MATERNAL AND PERINATAL OUTCOMES OF NOVEL CORONAVIRUS 19 IN PREGNANCY IN A TERTIARY CARE CENTRE – A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: COVID-19, caused by SARS-CoV-2, has significantly impacted maternal and perinatal health. Pregnant women may experience severe complications due to immunological changes. This study aimed to assess the clinical course of COVID-19 during pregnancy and its impact on maternal and neonatal outcomes at a tertiary care centre.

Materials and Methods: A prospective observational study was conducted on 1442 COVID-19-positive pregnant women at the Government Raja Mirasudhar Hospital over 12 months. Demographic details, clinical symptoms, comorbidities, obstetric complications, mode of delivery, and neonatal outcomes were also assessed. Investigations included blood tests, imaging, and foetal monitoring. Delivery outcomes, maternal morbidity, and neonatal parameters were recorded.

Results: Among the patients, 33.4% were aged 20-30 years, and 35.5% had a BMI of 30-35 kg/m². Antenatal admissions were the most common (51%). Among the deliveries, 24.76% were preterm, 27.12% were term, and 7.00% were postdated. Oxygen support was required in 10.68% of the cases. Myalgia (17.48%) and fever (16.02%) were the most commonly reported symptoms, while 53.33% of patients were asymptomatic. The maternal mortality rate was 0.69%. Low birth weight was observed in 32.66% of the cases. LSCS was performed in 74% of primi gravida and 68% of multigravida cases. Hypothyroidism (51.18%) and anaemia (36.06%) were the most common comorbidities. Antibiotics were administered to 70.94% of the patients, and 53% were unvaccinated. The most common LSCS indication was CPD in Labor (9.50%).

Conclusion: COVID-19 during pregnancy increased the rates of LSCS, preterm birth, and neonatal complications. Maternal mortality is associated with pneumonia and respiratory failure, and vaccination reduces the severity of symptoms.

Keywords: COVID-19, Pregnancy, Maternal Outcomes, Neonatal Complications, LSCS, Vaccination.

INTRODUCTION

COVID-19, caused by the novel coronavirus (SARS-CoV-2), was first identified as pneumonia of unknown cause in Wuhan, China on 31 December 2019. The World Health Organization (WHO) declared an outbreak of COVID-19 caused by SARS-COV 2 as the 6th public health emergency of international concern. Over 10 million people were infected with the novel coronavirus in India, of which more than 1.5 million died. COVID-19 has spread rapidly worldwide, and the number of pregnant women and children with covid 19 is also increasing, which is concerning.[1,2]

The Coronavirus family consists of viruses that cause the common cold but sometimes cause severe

diseases, such as severe acute respiratory syndrome. SARS-CoV2 is a new virus, and little is known about its effects on pregnant women. According to the American College of Obstetricians and Gynaecologists, there is no data to suggest that pregnant women are at a higher risk of contracting the virus than non-pregnant women. However, Siston et al, suggested that pregnant women are at a greater risk of harm if they get the virus.[3]

Redirecting health system resources towards responding to the outbreak while maintaining the delivery of essential health services not directly related to Covid 19 was a challenge facing healthcare policymakers.[4] According to the WHO operational guidance to maintain essential healthcare during an outbreak, care during pregnancy has been identified as a high-priority category. Women are at risk of exposure because they are usually the primary caregivers in their families. Furthermore, they form a substantial proportion of the frontline healthcare workers dealing with infected cases.[5] COVID-19 in pregnancy has not been associated with worse outcomes during pregnancy, and there is little evidence of vertical transmission from mother to foetus antenatally. Nevertheless, as part of the indirect impact of the pandemic, antenatal and obstetric services may be affected in several ways.[6] The adverse effects of the Covid 19 pandemic on maternal and perinatal health are not limited to the morbidity and mortality caused directly by the disease itself. Nationwide lockdowns, disruption of healthcare services, and fear of attending healthcare facilities might also have affected the well-being of pregnant women and their babies.[7] In the past, the Zika virus and H1N1 influenza virus caused significant maternal and foetal mortality. As there is a marked change in the maternal immunological response during pregnancy, antenatal women are vulnerable to infection. SARS-CoV-2, being one of the most virulent strains, has a great impact on pregnant women.[8] The present study aimed to explore the clinical course of SARS-CoV-2 in pregnancy and its impact on maternal and foetal outcomes.

MATERIALS AND METHODS

This prospective observational study was conducted in 1442 COVID-19-positive pregnant women at the Department of Obstetrics and Gynaecology, Government Raja Mirasudhar Hospital, Thanjavur, for 12 months. The Institutional Ethics Committee approved this study (IEC NO. 872/2021) before its initiation. The informed consent was obtained from all patients.

Inclusion Criteria

All pregnant women and symptomatic postnatal women who tested positive for novel COVID-19 using RT-PCR and were willing to provide informed consent were included.

Exclusion Criteria

Patients with LRI and SARI who underwent RT-PCR were excluded.

Methods

Upon admission, participants were screened for COVID-19 symptoms, and those who tested positive via swab test during the study were included (n=1442). Demographic details such as age, socioeconomic status, height, weight, and BMI were recorded, along with obstetric history, including gravida, parity, gestational age, and complications, were recorded. Patients were assessed for symptoms, including fever, headache, sore throat, myalgia, loss of taste and smell, cough, breathlessness, nausea, vomiting, loose stools, giddiness, seizures, paralysis, chest pain, and coagulopathies. Pre-existing conditions such as COPD, asthma, tuberculosis, anaemia, diabetes, hypertension, thyroid disorders, epilepsy, and cardiovascular diseases were documented. Pregnancy-related complications, including foetal distress, meconium-stained liquor, preterm birth, PROM, PPROM, intrauterine demise, preeclampsia, and gestational diabetes mellitus (GDM), were assessed.

All patients underwent comprehensive examinations, including the Glasgow Coma Scale (GCS), vital signs, and cardiovascular and respiratory system assessments. Obstetric examination assessed the fundal height, foetal heart rate, and cervical status. Laboratory investigations included complete blood count (CBC), urinalysis, renal function tests (RFT), liver function tests (LFT), D-dimer, prothrombin time (PT), international normalised ratio (INR), electrocardiogram (ECG), chest radiography (X-ray), and computed tomography (CT) of the chest. Treatments included corticosteroids, antivirals, antibiotics, immunomodulators, oxygen therapy, mechanical ventilation, and anticoagulants, based on severity. The mode of delivery (vaginal birth or caesarean section) and indications for caesarean section were also documented. Intrapartum complications such as foetal distress, atonic postpartum haemorrhage (PPH), intrapartum eclampsia, and stillbirth were recorded, along with postpartum complications including respiratory distress, blood loss, and infections. In symptomatic cases, further diagnostic tests, such as swab analysis, ECG, and chest CT, were conducted when indicated. Data are presented as frequencies and percentages.

RESULTS

Regarding age distribution, most patients belonged to the 20-30 age group (481, 33.4%), followed by those aged 30-35 (426, 29.5%). Patients between 17-20 were 383 (26.6%), while those above 35 were 152 (10.5%). Regarding BMI, 512 (35.5%) patients had a BMI between 30-35 kg/m², followed by 488

(33.8%) in the 25-29 kg/m² range and 442 (30.7%) in the 18-25 kg/m² category. Antenatal admissions were the most common (736, 51%), followed by post-LSCS (428, 29.7%) and postnatal admissions (250, 17.3%). Post-abortion and gynaecology cases were less frequent, with 21 (1.5%) and 7 (0.5%) cases, respectively. [Table 1]

Table 1: Demographic characteristics

		N (%)
Age (in years)	17-20	383(26.6%)
	20-30	481(33.4%)
	30-35	426(29.5%)
	> 35	152(10.5%)
BMI (kg/m2)	18-25	442(30.7%)
	25-29	488(33.8%)
	30-35	512(35.5%)
Admission	Antenatal	736(51%)
	Postnatal	250(17.3%)
	Post LSCS	428(29.7%)
	Post Abortion	21(1.5%)
	Gynaecology	7(0.5%)

Regarding vaccination status, 758 (53%) patients were unvaccinated, 457 (32%) had received the first dose, and 227 (16%) had completed the second dose. The highest proportion of symptomatic cases was observed among unvaccinated patients (428, 56%), followed by those who had received only the first dose (181, 39%). Patients who received both doses had the lowest proportion of symptomatic cases (64, 28%). [Table 2]

Table 2: Comparison of vaccination status and symptomatic cases

		N (%)	
		Cases vaccinated	**Symptomatic**
Vaccination	None	758(53%)	428(56%)
	1st dose	457(32%)	181(39%)
	2nd dose	227(16%)	64(28%)

Among the deliveries, 357 (24.76%) were preterm, 391 (27.12%) were term, and 101 (7.00%) were postdated. Oxygen support was required in 154 cases, with nasal oxygen being the most common mode (112, 7.77%), followed by CPAP/NIV (32, 2.22%) and ventilator support (10, 0.69%). Regarding symptoms, 769 (53.33%) patients were asymptomatic, while 252 (17.48%) experienced myalgia and 231 (16.02%) had fever. Upper respiratory infections, including cough and a running nose, were reported in 212 (14.70%) cases, whereas diarrhea and breathlessness were noted in 101 (7.00%) and 73 (5.06%) cases, respectively.

Mortality was observed in 10 cases, with the highest proportion among post-LSCS patients (5, 0.35%), followed by postnatal deaths (3, 0.21%) and antenatal deaths (2, 0.14%). Birth weight distribution showed that 316 (21.91%) newborns weighed between 2.6-4 kg, while 218 (15.12%) weighed 1.6-2.5 kg. Babies weighing 1-1.5 kg were 181 (12.55%), those <1 kg were 72 (4.99%), and 62 (4.30%) had a birth weight >4 kg.

Regarding treatment, antibiotics were administered to 1023 (70.94%) patients, followed by anticoagulants in 532 (36.89%) and steroids in 402 (27.88%). Oxygen supplementation was required in 154 (10.68%) cases, while bronchodilators were administered to 285 (19.76%) patients. Remdesivir was used in 350 (24.27%) cases. Among vaccinated patients, Covishield was administered to 372 (25.80%) and Covaxin to 312 (21.64%). [Table 3]

Table 3: Comparison of clinical outcomes and maternal-fetal parameters

		N (%)
Delivery	Preterm	357(24.76%)
	Term	391(27.12%)
	Post-dated	101(7%)
O2 requirement	Nasal o2	112(7.77%)
	CPAP/NIV	32(2.22%)
	Ventilator	10(0.69%)
Symptoms	Uri-cough, running nose	212(14.70%)
	Breathlessness	73(5.06%)
	Diarrhoea	101(7%)
	Myalgia	252(17.48%)
	Fever	231(16.02%)
	Asymptomatic	769(53.33%)
Mortality	Antenatal	2(0.14%)
	Postnatal	3(0.21%)

	Post LSCS	5(0.35%)
Birth Weight	<1 kg	72(4.99%)
	1-1.5 kg	181(12.55%)
	1.6- 2.5 kg	218(15.12%)
	2.6-4 kg	316(21.91%)
	>4kg	62(4.30%)
Treatment given	Antibiotics	1023(70.94%)
	Remdesivir	350(24.27%)
	Oxygen supplementation	154(10.68%)
	Steroids	402(27.88%)
	Bronchodilators	285(19.76%)
	Anticoagulants	532(36.89%)
Vaccination	Covishield	372(25.80%)
	Covaxin	312(21.64%)

Regarding the mode of delivery, among primi gravida patients (n=435), 112 (26%) had natural labor, while 323 (74%) underwent LSCS. In comparison, multigravida patients (n=414) had a higher proportion of natural labor at 134 (32%), with 280 (68%) requiring LSCS. [Table 4]

Table 4: Comparison of delivery mode between primi and multigravida patients

		N (%)	
		Primi gravida (n=435)	**Multigravida (n=414)**
Mode of delivery	Labor natural	112(26%)	134(32%)
	LSCS	323(74%)	280(68%)

Among the complications, low birth weight was the most common, observed in 471 (32.66%) cases, followed by intrauterine growth restriction (IUGR) in 448 (31.07%) and preterm deliveries in 357 (24.76%). Meconium-stained amniotic fluid (MSAF) was present in 150 (10.40%) cases, while consolidation and maternal mortality were noted in 103 (7.14%) and 10 (0.69%) cases, respectively. The least frequent complication was intrauterine demise (IUD), occurring in 2 (0.14%) cases.

The most prevalent comorbidity was hypothyroidism, affecting 738 (51.18%) patients, followed by anemia in 520 (36.06%) and gestational hypertension (GHTN) in 482 (33.43%). GDM managed with medical nutrition therapy (MNT) was reported in 456 (31.62%) cases, whereas GDM requiring insulin or oral hypoglycemic agents (OHA) was observed in 176 (12.21%) cases. Chronic hypertension was present in 314 (21.78%) patients, while bronchial asthma and heart disease were noted in 402 (27.88%) and 92 (6.38%) patients, respectively. Less common conditions included severe preeclampsia (67, 4.65%), postpartum eclampsia (6, 0.42%), antepartum eclampsia (3, 0.21%), rheumatoid arthritis (4, 0.28%), and liver cirrhosis/portal hypertension (1, 0.07%).

Regarding LSCS indications, cephalopelvic disproportion (CPD) in labor was the most frequent indication, observed in 137 (9.50%) cases, followed by severe oligohydramnios, fetal distress, or non-reactive non-stress test (NST) in 100 (6.93%) cases and MSAF with fetal distress in 98 (6.80%) cases. Previous LSCS or CPD in labor accounted for 75 (5.20%) cases, while premature rupture of membranes (PROM) with fetal distress and previous two LSCS in labor were recorded in 35 (2.43%) and 33 (2.29%) cases, respectively. Less common indications included abnormal Doppler findings (21, 1.46%), oblique lie (22, 1.53%), cord presentation (15, 1.04%), placenta previa during labor (4, 0.28%), and footling breech (4, 0.28%) cases. Rare indications, such as ectopic pregnancy requiring laparotomy (2, 0.14%) and antepartum eclampsia with an unfavourable cervix (2, 0.14%), were also reported. [Table 5]

Table 5: Comparison of maternal complications, comorbidities, and LSCS indications

		N (%)
Complications	Preterm deliveries	357(24.76%)
	Low birth weight	471(32.66%)
	IUGR	448(31.07%)
	Consolidation	103(7.14%)
	Maternal mortality	10(0.69%)
	MSAF	150(10.40%)
	IUD	2(0.14%)
Comorbidity	GHTN	482(33.43%)
	Chronic HTN	314(21.78%)
	Severe preeclampsia	67(4.65%)
	Postpartum eclampsia	6(0.42%)
	Antepartum eclampsia	3(0.21%)
	GDM on MNT	456(31.62%)
	GDM on insulin/OHA	176(12.21%)
	Hypothyroid	738(51.18%)
	Hyperthyroid	8(0.55%)

	Heart disease	92(6.38%)
	Seizure disorder	128(8.88%)
	Bronchial asthma	402(27.88%)
	Anaemia	520(36.06%)
	Rheumatoid arthritis	4(0.28%)
	Liver Cirrhosis/Portal HTN	1(0.07%)
LSCS indications	Previous LSCS/CPD in Labor	75(5.20%)
	Severe Oligo/Fetal Distress/Non-Reactive NST	100(6.93%)
	MSAF / Fetal Distress	98(6.80%)
	CPD in Labor	137(9.50%)
	PROM/Fetal Distress	35(2.43%)
	Previous 2 LSCS in Labor	33(2.29%)
	Brow presentation in Labor	8(0.55%)
	Previous LSCS/PROM	12(0.83%)
	IUD / Transverse LIE	5(0.35%)
	Severe Preeclampsia/Partial HELLP /Transverse LIE/Unfavourable Cervix	30(2.08%)
	Abnormal Doppler	21(1.46%)
	Oblique LIE	22(1.53%)
	Cord Presentation	15(1.04%)
	Placenta Previa in Labor	4(0.28%)
	AP eclampsia/Unfavourable Cervix	2(0.14%)
	Footling Breech	4(0.28%)
	Ectopic Pregnancy – Laparotomy	2(0.14%)

DISCUSSIONS

In our study, most patients were in the 20-30 years age group, followed by those aged 30-35 years. A higher proportion of patients had a BMI between 30-35 kg/m². Antenatal admissions were the most frequent, followed by post-LSCS and postnatal admissions. In our study, preterm births were observed in a significant proportion, followed by term and postdated deliveries. The mode of delivery showed a higher LSCS rate, particularly in primi gravida compared to multigravida women. A study by Mufti et al. reported the majority were between 26-30 years of age and most of the patients were primigravida (50%) with 31 (44.3%) patients being term pregnant while 22 (31.4%) were preterm.[9] A study by Mahajan et al. Pregnant individuals face a significantly higher risk of ICU admission due to COVID-19, with hospital data showing a statistically significant increase compared to those without COVID-19.[10]

In our study, a notable proportion of patients were asymptomatic. Myalgia and fever were the most common symptoms, followed by upper respiratory symptoms, diarrhoea, and breathlessness. Oxygen support was required in several cases, with nasal oxygen being the most frequently used mode, followed by CPAP/NIV and ventilator support in severe cases. A study by Mufti et al. reported that symptomatic patients commonly had fever (17.1%), followed by cough (10%) and shortness of breath (4.3%).[9] A cohort study by Perez reported that among 58 women, 46 were symptomatic, while 22 were asymptomatic. Fever was the most common symptom. Studies show maternal fever in the first trimester is not linked to congenital abnormalities.[11]

In our study, mortality was observed primarily in post-LSCS cases, followed by postnatal and antenatal cases. The study also noted the impact of vaccination, where vaccinated patients had lower symptom severity, and those who received both doses had the lowest proportion of symptomatic cases. Papapanou et al. found that pregnant women with COVID-19 had significantly higher rates of adverse outcomes, including maternal mortality, preeclampsia, and preterm delivery, compared to those without COVID-19.[12] A study by Martinez et al. reported among symptomatic women, 64% were unvaccinated, 26% had received only the first dose, and 10% had completed both doses.[13]

In our study, neonatal outcomes indicated a substantial proportion of low-birth-weight cases, with a significant number of neonates weighing between 1-1.5 kg. The most common maternal complications included preterm Labor, low birth weight, and IUGR, whereas MSAF, consolidation, and maternal mortality were less frequent. A study by Khalil et al. found there was no correlation between the COVID-19 status of pregnant women and the birth weight of their newborn children.[14] A study by Dileep et al. reported that only 2% of pregnancies diagnosed with COVID-19 result in a miscarriage. In comparison, 10% of these pregnancies resulted in a diagnosis of IUGR, and 39% resulted in preterm delivery.[15]

In our study, the comorbidities frequently observed in pregnant women included hypothyroidism, anaemia, GHTN, and gestational diabetes managed with MNT. Chronic hypertension, bronchial asthma, and heart disease were also reported. Severe conditions such as preeclampsia, eclampsia, and liver cirrhosis were less common. A study by Mufti et al. reported that hypertensive disorder of pregnancy was seen in the majority i.e., 15.7%, followed by anaemia (11.4%), gestational diabetes mellitus (8.5%) and hypothyroidism (7.1%).[9] A study by Boushra et al. COVID-19-positive patients had a higher prevalence of comorbidities, with preeclampsia, pregnancy-induced hypertension, and anaemia being the most common. Although initial

symptoms were mild, the risk of severe pneumonia increased.[16]

CONCLUSION

Our study concluded that the caesarean section rates increased significantly, with the common indications being CPD, MSAF, and foetal distress. Preterm delivery rates were higher. Most maternal deaths were due to COVID-19 pneumonia and respiratory failure, with findings including small bowel gangrene and necrotising Acinetobacter infections. In symptomatic patients, the prevalent manifestations included muscle pain, elevated body temperature, respiratory irritation, and nasal discharge. Vaccinated women were more likely to be asymptomatic. Pregnant women with comorbidities are at a higher risk of severe illness, and early identification of complications is necessary to prevent this. The delivery mode should be based on obstetric indications, and strict infection control measures are essential to protect healthcare providers and neonates from infection.

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