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Research Article

CLINICAL PROFILE AND PREGNANCY OUTCOMES OF COVID POSITIVE PREGNANT WOMEN IN PHASE I ANDII INFECTION – A COMPARATIVE STUDY

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ABSTRACT

Objectives: This study aims to assess the clinical features, the impact of coronavirus disease 2019 (COVID-19) infection during pregnancy, and the perinatal and obstetric outcomes in phases I and II.

Methods: The current study was performed from January 2020 to August 2021 at the Government T D Medical College, Alappuzha. The pregnant women were registered instantly after each infected woman was known as per the inclusion and exclusion criteria. Demographic parameters, related comorbid disorders, intensive care unit admission, and complete treatment details of each woman were noted. Neonatal outcomes were documented.

Results: There were 254 women in wave 1 and 164 women in wave 2 in the obstetric admissions. Still was seen in 3 cases (wave 1) and 2 cases (wave 2). In both phases, most pregnant women fall under the age category between 21 and 30. Multi-parity was found to be 50.8% in wave 1 women and 59.2% in wave 2 women were common in both waves. The period of gestation and obstetric comorbidities were found to be statistically significant with a p=0.007 (phase I) and 0.008 (phase II).

Conclusion: Pregnancy-related COVID-19 infection may increase the threat of maternal death but has no influence on the morbidity and death of newborns. It is not possible to totally rule out the possibility of maternal-fetal transfer. Every wave of COVID-19 may have different characteristics and severity; therefore, our treatment plans must change. To confirm this transmission, more research or meta-analysis reports are needed.

Keywords: First and second phases, Antenatal complications and comorbidities, Neonatal outcome, Maternal outcome, Coronavirus disease 2019 infection.

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INTRODUCTION

The World Health Organization (WHO) classified the coronavirus disease 2019 (COVID-19) infection as a pandemic in March 2020 [1], which opened the door for new developments in medical research and perspectives. It began its voyage from Wuhan, China, in December 2019 and has since spread through the universe in multiple waves, reaching millions of people regardless of their age, gender, or social level. Pregnancy, which was formerly thought to be an immune-compromised condition [2], is really a state of immune regulation that peaked during COVID-19, increasing the risk of both maternal and fetal death [3,4]. More severe than the phase I and phase II started in March 2021 and resulted in shortages of oxygen cylinders, hospital beds, vaccines, and other medical supplies across the nation [5]. The WHO proclaimed the COVID pandemic in March 2020, which opened the door for more recent medical research. It seemed that phase II, which started in March 2021, would be more destructive. Specifically, phase II ran from March 2021 to August 2021, and phase I ran from January 2020 to January 2021, peaking in the middle of September [5]. It was determined that COVID-19 infection had no discernible impact on maternal and fetal outcomes during gestation in one of the early pandemic's 141 case trials [6]. The objective of the research was to assess the clinical traits and consequences of COVID-19 throughout the two phases of pregnancy, together with the obstetric and perinatal outcomes, emphasizing the potential reasons for variations in the same.

METHODS

A retrospective descriptive study was performed in a tertiary care center from January 2020 to August 2021 at the Department of Obstetrics and Gynecology, Government T D Medical College, Alappuzha, Kerala. We assessed the antenatal patient's age, symptoms, comorbidities, mortality, supportive treatment, medication, and result. Although the course of the infection in pregnant individuals is analogous to that in non-pregnant individuals, pregnancy presents additional challenges, including when to schedule prenatal care visits, potential pregnancy complications, when to have a labor and delivery, and postpartum care (such as breastfeeding, caring for an infant, separating from a mother during pregnancy, and postpartum depression risk).

Statistical analysis

The primary maternal features, biochemical observations, obstetric and perinatal parameters, and maternal/neonatal mortality-morbidity data were compared among two phases in an analytical analysis. The threshold for significance was $p<0.05$. Student's t-test, Chi-squared test, or Fisher's exact test were used for the univariate analysis. In the multivariate analysis, variables that showed clinical significance or were significantly different in the univariate analysis were included. On a grayscale, the variables that show a significant difference and/or clinical relevance in relation to maternal-neonatal morbidity in each of the two phases are listed.

RESULTS

The general characteristic of the study populac is depicted in Table 1. The percentage of women who were <30 was found to be 72.5% in phase I and 65.8% in phase II, and women who were between the ages of 30 and 40 years were found to be 26.5%) in phase I and 34.2%) in phase II, whereas 0.8% were seen in phase I with the age of more than 40 and in phase II, no woman were seen. Other general characteristics of pregnant women for both phase I and II namely parity, period of gestation, and obstetric complications were also studied. The period

Table 1: Demographic profiles of the study population

General characteristics	Phase I (n=254) (%)	Phase II (n=164) (%)	p-value
Age			
<30	185 (72.5)	108 (65.8)	0.124
30–40	67 (26.5)	56 (34.2)	
>40	2 (0.8)	0 (0)	
Parity			
Primi	125 (49.2)	67 (40.8)	0.094
Multi	129 (50.8)	97 (59.2)	
Period of gestation at diagnosis range			
<28	19 (7.5)	4 (2.5)	0.007**
28–37	115 (45.3)	60 (36.5)	
>37	120 (47.2)	100 (61)	
Obstetric complications			
PIH	29 (11.4)	17 (10.4)	0.008**
GDM	42 (16.5)	41 (25)	
Hypothyroidism	35 (13.8)	14 (8.5)	
Asthma	1 (0.4)	6 (3.7)	
Others	10 (3.9)	12 (7.3)	
Nil	149 (58.7)	83 (50.6)	

**Indicates statistically significant difference at 1% level of significance.
GDM: Gestational diabetes mellitus, PIH: Pregnancy-induced hypertension

of gestation was found to be statistically significant (p=0.007) and the Obstetric complications among the phases I and II were also found to be statistically significant (p=0.008).

The epidemiological characteristics of phases I and II are depicted in Table 2. Exposure to COVID-19 cases, travel abroad by self/contact, health worker, attending social gatherings, no contact or travel, and containment zone were found to be significant (p<0.001) among two phases of pregnant women. Similarly, symptoms namely respiratory symptoms, fever, asymptomatic, anosmia sore throat, cough breathlessness, and also treatment among the two phases were found to be statistically significant (p<0.001). Among the two phases, the course of disease namely resolved and discharged, required critical care and patient expired was found to be statistically significant (p=0.001). Specific treatment and abnormal investigations during the study among the two phases do not show any significant results.

In Table 3, the numbers of pregnant women delivered by lower segment cesarean section (LSCS) in phase I (35.4%) were lower in comparison to phase II (40.2%). In phase I, two cases (0.8%) and one case (0.6%) in phase II had abortions in the second trimester. 28.3% showed vaginal birth in phase I whereas 20.7% showed in phase II women. Labor-induced vaginal delivery and labor-induced-cesarean section among two phases showed non-significant (p=0.514). Similarly, preterm and instrumental deliveries among the two phases were found to be non-significant. Furthermore, hemorrhage, sepsis, and mental issues as obstetric complications (0.708) were also not comparable between the two phases of pregnancy.

Table 4 describes that the biological data recognizes the common obstetric co-morbidities. These were the high-risk gestational women who got treatment in both phases. Gestation-induced hypertension (15.6%) seems to be the most common co-morbidities in phase II and 14.4% in phase I. Mode of induction, indication of Induction of labor, and indication for CS were found to be non-significant in both phases. Gestational diabetes mellitus (GDM) was found to be 28.1% in phase II and 23.3% in phase I.

In Table 5, birth weight comparison showed similar results 79.1% in phase I and 78.6% in phase II in which the neonate's weight was in-between 2.5 and 3.5 with an insignificant p=0.745. Neo-natal outcome results revealed that both phases reported with average APGAR scores, with a non-significant p-value. Neonatal intensive care unit (NICU) admission parameter does not show any significance among the newborns with two phases. The variables, namely, babies isolated from

Table 2: Epidemiological characteristics of pregnant women among both phases

	Phase I (n=254) (%)	Phase II (n=164) (%)	p-value
Epidemiology			
Exposure to covid case	50 (19.7)	78 (47.6)	<0.001**
Travel abroad by self/contact	4 (1.6)	2 (1.2)	
Health worker	6 (2.4)	3 (1.8)	
Attended social gathering	1 (0.4)	0 (0.0)	
No contact or travel	188 (74.0)	78 (47.6)	
Containment zone	5 (2.0)	3 (1.8)	
Symptoms			
Respiratory symptoms [URTI]	9 (3.5)	0 (0.0)	<0.001**
Fever	12 (4.7)	24 (14.6)	
Asymptomatic	185 (72.8)	98 (59.8)	
Anosmia sore throat	25 (9.8)	25 (15.2)	
Cough breathlessness	8 (3.1)	7 (4.3)	
Cough fever	10 (3.9)	7 (4.3)	
Others	5 (2.0)	0 (0.0)	
Management location			
Hospital ward	251 (98.8)	154 (93.9)	0.005**
ICU	3 (1.1)	10 (6.1)	
Treatment drugs			
Oseltamivir alone	13 (5.1)	23 (14)	<0.001**
Steroids	12 (4.7)	13 (8)	
Remedesivir	0 (0)	5 (3.1)	
Azee and oseltamavir	12 (4.7)	18 (11)	
Antibiotic heparin	6 (2.4)	15 (9.1)	
None	211 (83.1)	90 (54.8)	
Abnormal investigations			
BRE	25 (9.8)	27 (16.5)	0.09
LFT	8 (3.1)	6 (3.65)	
CRP	18 (7.08)	16 (9.75)	
Obstetric USS	20 (7.87)	12 (7.3)	
Pulmonary imaging	2 (0.78)	5 (3.1)	
None	181 (71.2)	98 (59.8)	
Course of disease			
Resolved and discharged	252 (99.2)	152 (92.7)	0.001**
Required critical care	1 (0.4)	7 (4.2)	
Patient expired	1 (0.4)	5 (3.1)	
Specific treatment			
Oxygen	6 (2.3)	4 (2.4)	0.084
Ventilation	2 (0.7)	5 (3.1)	
higher antibiotic	7 (2.8)	10 (6.1)	
Blood and blood products	3 (1.2)	5 (3.1)	
Nil	236 (93)	140 (85.4)	

**Indicates a significant difference at 1% significance level. ICU: Intensive care unit, CRP: C-reactive protein, LFT: Liver function test

the mother, feeding, and neonatal testing were found to be statistically significant among the two phases and the p-value observed was <0.001.

DISCUSSION

The aim of the present study was to observe the variables linked to the variations in fetal and maternal outcomes resulting from COVID-19 infection in both phases. In both groups, the vast mainstream of pregnant women had no symptoms. However, fever, sore throat from anosmia, and cough were the primary presenting symptoms in wave 1 women. These were the typical symptoms that both pregnant and non-pregnant women through the COVID-19 period presented with, according to several researches [7,8].

Pregnancy-related comorbidities were more prevalent in both phases for the pregnant women, with first- and second-wave GDM (16.5% and 25%), as well as first- and second-wave pregnancy-induced hypertension (11.4%) and 10.4%), being the most common. Gestation-induced hypertension, observed in 31.4% of pregnant women, was the most common comorbidity in research by Mullins *et al*. [9].

Table 3: Obstetric outcomes of pregnancy

Obstetrics outcomes and complication	Phase I (n=254) (%)	Phase II (n=164) (%)	p-value
Obstetric outcome			
Abortion	2 (0.8)	1 (0.6)	0.514
Vaginal delivery	72 (28.3)	34 (20.7)	
Cesarean section	90 (35.4)	66 (40.2)	
Labor induced-vaginal delivery	44 (17.4)	31 (19)	
Labor induced-cesarean section	40 (15.7)	26 (15.8)	
Preterm delivery	3 (1.2)	5 (3)	
Instrumental delivery	3 (1.2)	1 (0.6)	
Obstetric complications			
Hemorrhage	7 (2.7)	7 (4.2)	0.708
Sepsis	2 (0.7)	0 (0)	
Mental issues	8 (3.1)	4 (2.4)	
Others	9 (3.7)	6 (3.7)	
None	228 (89.7)	147 (89.6)	

Table 4: Biological data and ICU scores

Mode of induction	Phase I (n=90) (%)	Phase II (n=64) (%)	p-value
PGE1	79 (87.8)	51 (79.7)	0.097
Foleys	3 (3.3)	1 (1.6)	
Pitocin	5 (5.6)	3 (4.7)	
PGE1 foleys	3 (3.3)	9 (14.1)	
Indication of Induction of labor	**Phase I (n=90)**	**Phase II (n=64)**	
PIH	13 (14.4)	10 (15.6)	0.460
GDM	21 (23.3)	18 (28.1)	
Others	15 (16.7)	4 (6.3)	
FGR	7 (7.8)	5 (7.8)	
PIH and GDM	5 (5.6)	2 (3.1)	
Near date	29 (32.2)	25 (39.1)	
Indication for CS	**Phase I (n=130)**	**Phase II (n=92)**	
Fetal distress	24 (18.5)	9 (9.8)	0.128
Failed induction	20 (15.4)	19 (20.7)	
Previous CS	64 (49.2)	38 (41.3)	
CPD	8 (6.2)	6 (6.5)	
MSAF	7 (5.4)	10 (10.9)	
Others	7 (5.4)	10 (10.9)	

ICU: Intensive care unit, GDM: Gestational diabetes mellitus, PIH: Pregnancy-induced hypertension, CS: Cesarean section, CPD: Cephalopelvic disproportion, MSAF: Meconium-stained amniotic fluid

Table 5: Delivery data with neonatal outcome

Neonatal outcomes	Phase I (n=254) (%)	Phase II (n=164) (%)	p-value
Birth weight			
<2.5	37 (14.6)	27 (16.4)	0.745
2.5–3.5	201 (79.1)	129 (78.6)	
>3.5	16 (6.3)	8 (4.8)	
Was infant stillborn			
Yes	3 (1.2)	2 (1.2)	0.972
No	251 (98.8)	162 (98.8)	
APGAR at 5 min			
<9	9 (3.5)	11 (6.7)	0.139
9	245 (96.5)	153 (93.3)	
NICU admission			
Yes	6 (2.3)	6 (3.6)	0.438
No	248 (97.6)	158 (96.3)	
Isolated from mother**			
Yes	96 (37.8)	20 (12.1)	<0.001**
No	158 (62.2)	144 (87.8)	
Feeding**			
Breastfed	155 (61)	140 (85.4)	<0.001**
Formula-fed	99 (39)	24 (14.6)	
Neonatal testing**			
Positive	5 (2)	4 (2.4)	<0.001**
Negative	205 (80.7)	160 (97.6)	
Baby not tested	44 (17.3)	0 (0)	
Severity of neonatal infection	**Phase I (n=5)**	**Phase II (n=4)**	
Infected asymptomatic	3 (60)	4 (100)	0.358
Resolved and discharged	1 (20)	0 (0)	
Expired	1 (20)	0 (0)	

**Indicates statistically significant difference at 1% level of significance.
NICU: Neo-natal intensive care unit

Similar to Fan *et al*.'s work [10], which documented two instances in the third trimester, the majority of infections in our analysis occurred during the 29–36 week gestation period (the interval between conception and delivery), with first waves accounting for 45.3% and second waves for 36.5%. According to a number of investigations by the studies documented [11,12], LSCS was performed on every patient who tested positive for COVID-19. Meconium-stained fluid, fetal distress, and other related comorbidities were the only obstetric indications in our study where LSCS was performed.

The majority of newborns in both waves had normal Apgar index scores (7–10), and the percentage of newborns admitted to the nursery and NICU was nearly identical. According to a few recent studies, there is currently no proof that women who get COVID-19 pneumonia in the latter stages of pregnancy could have an intrauterine infection brought on by vertical transmission [11,13].

Since the negative effects are linked to non-obstetric reasons namely viral pneumonia complicating pregnancy, there is little information available about the outcomes for mothers and newborns as a result of the rigorousness of COVID-19 infection during gestation [14]. Pregnant H1N1 influenza-infected women may face severe sickness and poor newborn outcomes, according to research by Creanga *et al*. [15]. Both first- and second-wave patients with acute respiratory symptoms, regardless of the severity of the disease, were included in our study. In wave 1, mild cases were treated with supportive care, whereas severe cases needed to be admitted to the intensive care unit (ICU) or hospitalized. In their investigation, Qiancheng *et al*. [13] similarly found that the clinical course and consequences of SARS-CoV-2 infection in pregnant women were similar to those in non-pregnant women. Our study's case fatality rate was 19.8%, while that of Gajbhiye *et al*. [16] was 0.8% (34/4203). Due to the continued pandemic and great rigorousness of the infection in phase II, our study found increased maternal death in phase II. This was caused by a postponement of appointments to sophisticated centers.

This disparity might possibly be exacerbated by unwell patients being referred to our tertiary care hospital at serious points in need of ICU care, coupled with a rise in the severity of COVID-19 infection in phase II. The enhanced virulence of COVID strains, which caused the abrupt exponential development of COVID-19-positive pregnant women in phase II, and the subsequent overload of healthcare facilities in our region, could also be a contributing factor to the variations in the outcomes between the waves.

Numerous studies have looked at pregnancy as a possible threat concern for morbidity-mortality proceedings after the pandemic's emergence [17]. We measured maternal morbidity in this study as a variable that combined many events. Premature birth and C-sections have shown a considerable drop in the phase II. The result of a better understanding of how to treat this illness is the distinctions between the two waves of interventionism that have been noticed. This showed that many obstetric patients recovered from the most severe phases of

COVID-19 disease through the phase II, preventing the need to end their pregnancies. As a result, this variable has a great deal of heterogeneity due to the factor C-section. Although there was a substantial correlation between the morbidity of patients in both waves and pneumonia and the mother's requirement for treatment, the effect was stronger in the second wave. Furthermore, in phase II, pneumonia was found to be thoroughly associated with perinatal morbidity. Both a decrease in the rate of C-sections and preterm births as well as an increase in the recognition of asymptomatic cases during the phase II [18], which showed that subjects with respiratory symptoms and a need for treatment were more likely to have greater morbidity, likely account for the augmented consequence of respiratory symptoms during phase II.

CONCLUSION

Our research aims to increase understanding of COVID-19 pregnancy by providing additional information about its varied consequences. Based on our findings, COVID-19 through pregnancy might be linked to severe morbidity and maternal death, and at this time, it is not entirely possible to rule out the prospect of maternal-fetal transmission. Reports from meta-analyses or larger research are needed to verify this transmission. Our study's findings suggest that each COVID wave may bring new features and severity, necessitating adjustments to our treatment plans to lower maternal morbidity and fatality rates.

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AUTHORSHIP CONTRIBUTIONS

Dr. Deepthi PS is involved in design and data processing, interpretation, literature analysis, and writing the manuscript. Dr. Sathiamma PK was involved in the analysis and editing the manuscript for the journal.

CONFLICT OF INTEREST

Nil.

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