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Original Research Article

COVID-19 and pregnancy outcomes: a retrospective study from a tertiary health care center of Uttarakhand, India

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ABSTRACT

Background: Information regarding the effects of COVID-19 on pregnancy outcomes evolved rapidly in the recent years. This study aims to present the outcomes in COVID-19 positive pregnant women.
Methods: This retrospective cohort study was conducted in a tertiary health care center of Uttarakhand, India from April 2021 to June 2021. The maternal and neonatal data for the included cases were extracted from hospital records and appropriately analysed.
Results: The positivity rate of COVID-19 among obstetric population was 7.9% by universal screening protocol. 55.2% participants were in the age group of 25-30 years. Gestation age at presentation ranged from 6 weeks to 41 weeks. 47.3% participants had pre-existing comorbidities. 26.4% study subjects had pregnancy related comorbidities, the most common being gestational diabetes mellitus (14.7%), followed by pre-eclampsia (8.8%). Only 21.1% participants were symptomatic at presentation. Most common presenting symptom was fever (87.5%) followed by breathlessness (62.5%). 7.5% required invasive ventilation and 10.5% cases required intensive care unit (ICU) admission and 76.5% participants underwent caesarean section which was done for obstetric indications only. 3.9% participants died due to COVID-related complications. Nearly 35% neonates were preterm, 29.4% had low birth weight and 24.1% needed neonatal intensive care unit (NICU) admission. Nasopharyngeal swab for COVID reverse transcriptase-polymerase chain reaction (RT-PCR) after 24 hours of birth was negative in all neonates. There were 10 (14.7%) stillbirths.
Conclusions: COVID-19 in pregnancy was associated with higher risks of gestational diabetes mellitus, preeclampsia and higher rates of invasive ventilation, ICU admission, caesarean sections, maternal mortality specially in women with pre-existing comorbidities, stillbirths, preterm births and NICU admission.

Keywords: COVID-19, Pregnant woman, Pregnancy outcome, Mode of delivery, Vertical transmission, Premature birth

INTRODUCTION

The ongoing corona virus disease 2019 (COVID-19) caused by severe acute respiratory syndrome corona virus-2 (SARS Co-V-2) originated in Wuhan, China in December 2019. Since then, the infection has spread to different parts of the world and resulted in a global healthcare crisis. As the number of COVID-19 positive pregnant women is rising on par with the general population, information about the effects of COVID-19 during pregnancy is evolving rapidly. Earlier reports did not show any increased adverse effect of COVID-19 on pregnant women.[1,2] However, later reports suggested higher risk of severe disease, higher rates of intensive care unit admissions, invasive ventilation and mortality among pregnant patients compared to the general population.[3,4] This study aims to present the maternal and neonatal outcomes of COVID-19 positive pregnant women, who were admitted to a tertiary health care center of

Uttarakhand, India and add to the existing knowledge about the impact of COVID-19 on pregnancy outcomes.

METHODS

This retrospective descriptive study was conducted in the department of Obstetrics and Gynaecology of Himalayan Institute of Medical Sciences, Jolly Grant, Uttarakhand, India, over a period of three months from 01 April 2021 to 30 June 2021.

Inclusion criteria

All pregnant women who were tested positive for SARS-CoV-2 infection and admitted to the department of Obstetrics and Gynaecology of our facility during the study period and gave consent to participate in the study.

Exclusion criteria

Pregnant women who had equivocal or negative testing results, pregnant women with a history of SARS-CoV-2 infection before index pregnancy, and women who did not give consent for participation in the study were excluded.

Data collection

The relevant maternal and neonatal data were extracted from the hospital medical records of the stipulated study period. A predesigned format was used to record data pertaining to maternal demographic and clinical profiles. The characteristics included maternal age, gravidity, registration status, history of SARS-CoV-2 infection before index pregnancy, pre-existing comorbidities, presenting symptoms, the primary indication for hospitalization, severity of disease and its progression, treatment given for COVID-19 infection, gestational age (weeks) at the time of presentation and delivery, mode of delivery, antepartum, intrapartum and postpartum complications and final maternal outcome. Neonatal data regarding gestational age at delivery, birth weight, 1- and 5-minute Apgar score, NICU admission, and the results of Polymerase Chain Reaction (RT-PCR) of nasopharyngeal swabs at 24 hours of birth were collected.

The collected data were entered in Microsoft excel sheet and tables were generated.

Statistical analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 21. Categorical variables were presented as number and percentage (%) and continuous variables as mean±standard deviation.

RESULTS

A total of 957 pregnant women were admitted between 01 April 2021 and 30 June 2021 at our center. Since the universal SARS-CoV-2 testing protocol was adopted in our facility, all 957 cases were subjected to both Rapid Antigen Testing (RAT) as well as Reverse Transcription–Polymerase Chain Reaction (RT-PCR) for COVID-19 at presentation, out of which 76 cases were tested positive. So, the positivity rate at our facility was 7.94%.

Maternal profile

Maternal age in our cohort ranged from 21 years to 36 years with the mean age of 27.92±3.77 years. 4 (5.2%) cases were of advanced maternal age (>35 years). More than half (65.8%) were unbooked cases. 28 (36.8%) were primigravida, while 3 (3.9%) were grand multipara (Table 1).

Table 1: Profile of the study subjects (N=76).

Characteristics	Number	Percentage
Age (years)		
21-25	14	18.4
25-30	42	55.2
30-35	16	21.1
≥35	4	5.3
Gravida		
G1	28	36.8
G2	28	36.8
G3	16	21.1
G4	1	1.3
≥G5	3	3.9
Booking status		
Booked	26	34.2
Unbooked	50	65.8

63.2% of study subjects had pre-existing comorbidities. The most common was anaemia (28.9%) followed by high body mass index (BMI) (15.8%) (Table 2).

Table 2: Distribution of study subjects according to pre-existing comorbidities (N=76).

Characteristics	Number	Percentage
Anaemia	22	28.9
Mild	7	9,2
Moderate	9	11.8
Severe	6	7.9
High BMI	12	15.8
25-29.9	8	10.5
≥30	4	5.3
Hypothyroidism	6	7.8
Heart disease	4	5.2
Systemic lupus erythematosis	2	2.6
Pre gestational diabetes	2	2.6

Gestational age at diagnosis

Gestation age at presentation ranged from 6 weeks to 41 weeks with a mean gestational age of 34.23±8.47 weeks.

Out of 76 cases, 68 (89.4%) were diagnosed positive for SARS-CoV-2 infection in the third trimester and 4 (5.3%) each in the first trimester and second trimester (Table 3).

Primary indication for hospitalization

Out of 76 participants with COVID positive reports, 60 (78.9%) were admitted for obstetric (non-COVID) indications. Only 16 (21.1%) SARS-CoV-2 positive pregnant women were hospitalized for management of COVID-19.

COVID-related presenting symptoms

Majority 60 (78.9%) of COVID positive women were asymptomatic. Only 16 (21.1%) were symptomatic. The most common COVID-related symptom was fever with breathlessness (62.5%) (Table 4).

Severity of SARS-CoV-2 infection at presentation and its clinical progression

Among the symptomatic women, six (7.9%) had mild, eight (10.6%) had moderate and two (2.6%) had a severe illness at the time of presentation. None of the symptomatic woman was critically ill at the initial presentation. After progression, eight (10.5%) of the cases had mild, six (7.9%) had moderate and two (2.6%) had severe illness. Six (7.9%) of the cases became critically ill. However, 54 (71.1%) of the cases remained asymptomatic. (Table 5).

COVID-related treatment

14 (18.4%) cases required antiviral therapy (intravenous remdesivir) and steroid (methylprednisolone). Dexamethasone was used for foetal lung maturity if indicated. Prophylactic low molecular weight heparin (low dose for moderately ill and intermediate-dose for severely and critically ill) was given to 14 cases. One case with deep vein thrombosis was treated with a therapeutic dose of low molecular weight heparin. None of the study subjects was given convalescent plasma or immunomodulatory therapy.

All 14 (18.4%) moderately/severely/critically ill cases received intravenous antibiotics.

A total of 10 (13.2%) cases required oxygen at presentation. After the progression of the disease, a total of 14 (18.4%) required oxygen therapy. A total of eight (10.5%) cases who were severely or critically ill required ICU admission (Table 6).

Pregnancy outcomes

Two (2.6%) participants had ectopic pregnancy and underwent emergency laparotomy. Total five (6.6%) subjects had spontaneous abortion for which suction evacuation was done in view of incomplete abortion. One participant died in antenatal period. Remaining 68 (89.4%) who were diagnosed positive for COVID-19 in the third trimester delivered during the study period (Table 3).

Twenty (29.4%) cases had pregnancy-related comorbidities. The most common pregnancy-related comorbidity was gestational diabetes mellitus (14.7%) followed by pre-eclampsia (8.8%). The most common antepartum complication was premature rupture of membranes (10.5%). Six (8.8%) of the participants had intra uterine foetal demise. The most common intrapartum complication was meconium-stained liquor (14.7%). Only 2.9% of study subjects had a postpartum haemorrhage (Table 7).

Mode of delivery

More than one-third (35.3%) of study participants delivered before 37 weeks of gestation. Induction of labour was done in six (17.6%) study subjects. The most common indication for induction of labour was premature rupture of membranes.

76.5% of participants had caesarean section which was done for obstetric indications only. The most common indication for caesarean section was a previous caesarean section in labour followed by foetal distress and failed induction of labour (Table 8).

Table 3: Distribution of study subjects according to trimester of diagnosis and pregnancy outcome (N=76).

Time of diagnosis	n (%)	Pregnancy outcome n (%)		
		Ectopic pregnancy	Spontaneous abortion	Delivery
First trimester	4 (5.3)	2 (2.6)	2 (2.6)	NA
Second trimester[a]	4 (5.3)		3 (3.9)	NA
Third trimester	68 (89.4)			68 (89.4)
Total	76 (100)	2 (2.6)	5 (6.6)	68 (89.4)

a-One study subject died in the antenatal period

Table 4: Distribution of study subjects according to clinical symptoms at presentation (N=76).

Characteristics	Number	Percentage
Asymptomatic	60	78.9
Symptomatic	16	21.1

Continued.

Characteristics	Number	Percentage
Fever alone	2	12.5
Fever + cough	2	12.5
Fever + breathlessness	10	62.5
GIT symptoms	2	12.5

Table 5: Distribution of study subjects according to the severity of SARS-CoV-2 infection at presentation and its clinical progression (N=76)[b].

Parameters	Total n (%)	Clinical progression among pregnant women diagnosed with SARS-CoV-2 infection n (%)				
		Asymptomatic	Mild	Moderate	Severe	Critical
Severity at initial presentation						
Asymptomatic	60 (78.9)	54 (90)	4 (6.7)	2 (3.3)		
Symptomatic	16 (21.1)					
Mild	6 (7.9)		4 (66.7)	2 (33.3)		
Moderate	8 (10.6)			2 (25)	2 (25)	4 (50)
Severe	2 (2.6)					2 (100)
Critical	0					
Total	76 (100)	54 (71.1)	8 (10.5)	6 (7.9)	2 (2.6)	6 (7.9)

[b]As per clinical spectrum of SARS-CoV-2 infection- COVID-19 treatment guidelines, National Institutes of Health[32]

Table 6: Distribution of study subjects according to COVID-19 treatment (N=76).

COVID-19 treatment	Required					Not required n (%)
Oxygen therapy		Face mask	Nasal Prong	BIPAP	Intubation	
At presentation	10 (13.2)	6 (7.9)	2 (2.6)	2 (2.6)	0	66 (86.8)
After progression	14 (18.4)	0	6 (7.9)	2 (2.6)	6 (7.9)	62 (81.6)
Steroid	14 (18.4)					62 (86.8)
Remdesvir	14 (18.4)					62 (86.8)
Anticoagulant	14 (18.4)					62 (86.8)
Antibiotics	14 (18.4)					62 (78.9)
ICU admission	8 (10.5)					68 (89.5)

Table 7: Distribution of study subjects according to pregnancy complications (N=68)[c].

Characteristics	Number	Percentage
Pregnancy-related comorbidities		
Gestational diabetes mellitus	10	14.7
Pre-eclampsia	6	8.8
Intrahepatic cholestasis of pregnancy	4	5.8
Antepartum complications		
Antepartum haemorrhage	6	8.8
Placenta praevia	2	2.9
Abruptio placentae	4	5.8
Fetal distress	6	8.8
Intrauterine fetal demise	6	8.8
Premature rupture of membranes	4	10.5
Oligohydramnios	3	8.8
Chorioamnionitis	2	2.9
Intrapartum complications		
Meconium-stained liquor	10	14.7
Non-progress of labour	6	8.8
Second stage arrest	2	2.9

Continued.

Characteristics	Number	Percentage
Postpartum complications		
Postpartum haemorrhage	2	2.9

(N=68)[c] 2 cases had an ectopic pregnancy; 5 cases had a spontaneous abortion and 1 case died in the antenatal period. So only 68 cases were considered for analysis

Table 8: Distribution of study subjects according to the mode of delivery (N=68).

Characteristics	Number	Percentage	Number	Percentage		
POG (weeks)						
<37	24	35.3				
≥37	44	64.7				
Mode of delivery	**Vaginal delivery**		**Caesarean section**		**Total**	
Induction of labour	6	50.0	3	50.0	6	17.6
Without induction of labour	10	17.9	23	82.1	28	82.4
Total	16	23.5	26	76.5	34	100

Maternal morbidity and mortality

In the present study, six (7.9%) participants developed pneumonia. One (1.3%) each had septic shock, deep vein thrombosis, acute kidney injury and mucormycosis. Three (3.9%) participants died due to COVID-related complications (Table 9).

Table 9: Distribution of study subjects according to maternal morbidity and mortality (N=76).

Maternal morbidity and mortality	Number	Percentage
Deep vein thrombosis	1	2.6
Mucormycosis	1	2.6
Acute kidney injury	1	2.6
Septic shock	2	5.3
Pneumonia	6	7.9
Maternal death	3	3.9

Table 10: Neonatal outcome (N=68).

Characteristics	Number	Percentage
POG (weeks)		
<37	24	35.3
≥37	44	64.7
Live birth	58	85.3
Still birth	10	14.7
Birth weight (kg)		
>2.5	48	70.6
<2.5	20	29.4
<1	4	5.9
1-1.5	2	2.9
1.5-2.5	14	20.6
Apgar[d]		
<7 at 5 minutes	4	6.9
NICU admission[d]	14	24.1

(N=58)[d] Only live births were considered for analysis

Neonatal outcomes

Nearly 35% of neonates were born before 37 weeks of pregnancy. The mean birth weight was 2488.43±761.32 grams. 29.4% of neonates had a birth weight of less than 2500 grams. Four (6.9%) neonates had Apgar less than 7 at 5 minutes. Nearly one-fourth (24.1%) of neonates needed NICU admission. The main indications for NICU admission were prematurity and low birth weight. Nasopharyngeal swab for COVID RT-PCR after 24 hours of birth was negative in all neonates. There were 10 (14.7%) stillbirths (Table 10).

DISCUSSION

In our study, the positivity rate of SARS-CoV-2 infection among the obstetric population was 7.9% by universal screening which is lower than that reported by Nayak et al in a study from India (14.4%).[5]

The positivity rates reported in other studies are 29 % by Antoun et al, 15.3% by Sutton et al, 10.4% by Prabhu et al and 4.83% by Singh et al.[6-9] Difference in the rates may be due to sampling strategy: women sampled by universal screening or on the basis of symptoms. In a meta-analysis, 7% (5% to 8%) women were diagnosed COVID-19 positive by universal screening compared to 28% (15% to 43%) of women screened on the basis of symptoms with an overall rate of 10%.[3]

All pregnant women were subjected to both RAT as well as RT-PCR. RAT provided results within 15 minutes which helped in the rapid triage of the patients. Women with positive RAT were admitted in the designated COVID unit. Those with negative RAT were admitted in isolation ward. Later on, depending on their RT-PCR report, women with positive RT-PCR were shifted to the designated COVID unit and those with negative RT-PCR were transferred to the general maternity ward.

In our study, 78.9% of COVID-19 positive pregnant women were asymptomatic. Our finding is in concordance with a meta-analysis where 73% of the COVID-19 positive pregnant women by universal screening strategy were asymptomatic.[3] A high rate of asymptomatic COVID-19 positive pregnant women was documented in other studies as well.[5,7,9-11] On the contrary, at presentation 18.8% patients were asymptomatic in a study from Singapore, and 7.5% women in a systematic scoping review.[12,13]

As COVID-19 positive asymptomatic individuals pose a great risk for spreading the virus to other patients and healthcare providers, therefore universal screening protocol was adopted in our facility to isolate COVID-19 positive cases irrespective of presence or absence of symptoms.

In our study, case severity was moderate in 50% of participants, mild in 37.5 % and severe in 12.5% at presentation. None of the symptomatic participant was critically ill at admission. In a systematic scoping review, case severity was mild in 95.6%, severe in 3.6%, and critical in 0.8%.[13] In a study by Antoun et al, case severity was mild in 57 %, moderate in 8.7 % and severe in 21.7 %.[6]

In our study, the most common presenting symptom was fever (87.5%) followed by breathlessness (62.5%) and cough (12.5%). The most frequent symptoms were fever, cough and breathlessness in some other studies also.[3,6,13] In our study, gastrointestinal symptoms were present in 12.5% of symptomatic women. In some studies, GIT symptoms were present in less than 10% cases.[13-15]

In present study, maternal age ranged from 21–37 years with majority (55.2%) of the study subjects in the age group of 25-30 years. Our finding is comparable to other studies.[12,14]

Gestation age at presentation ranged from 6 weeks to 41 weeks in present study which is similar to that reported in systematic scoping review.[13] Gestation age at diagnosis ranged from 4 weeks to 36 weeks in a study from Singapore.[9] The gestation age at admission varied from 31.3 to 37.3 weeks in a review by Yee et al and from 29 weeks 3 days up to 40 weeks 2 days in a study by Antoun et al.[6,14]

Maximum number (89.4%) of participants presented in the third trimester. Our finding is similar to that of other studies where maximum number of participants were diagnosed positive in third trimester.[6,10,11,14]

In our study, 5.2% study subjects had spontaneous abortion which is comparable to that (4.3%) reported by Nayak et al and Antoun et al, but higher than that (2.3%) reported by Singh et al and Chen et al.[5,6,9,16] In present study, 2.5% of subjects had laparotomy for ruptured ectopic pregnancy which is higher than that reported in other studies.[5,9,16]

76.5% participants had caesarean section in present study. Caesarean section was done for obstetric indications only and not because of COVID positive status. The most common indication for caesarean section was previous caesarean section in labour followed by foetal distress and failed induction of labour.

Ours is a tertiary care hospital and receives mostly referred high risk cases. So, the rate of caesarean section is already high (46.5%) in our facility. It increased to 76.5% during COVID times. Due to limitations in the COVID unit, trial of labour was not given to the COVID-19 positive women with previous caesarean section who were the main contributors to the overall higher rate caesarean section. Antskali et al also reported rise in institutional caesarean section rate from 48% to 57.1% during COVID period.[10] In a study by Singh et al and Nayak et al, all the caesarean sections were done only for obstetric indications and reported caesarean section rate in COVID-19 positive group was 63.9% and 50% respectively.[5,9]

Caesarean section rates were higher than ours in a study by Antoun et al (84 %), Chen (93%) and Chen (100%) where mostly caesarean sections were done due to COVID positive status.[6,16,17] Several other studies have also reported higher caesarean section rates among COVID positive women.[3,11,18-20] On the contrary, in Ferrazzi et al's study, elective caesarean sections were performed in 43% of cases.[21]

In our study, total 10.5% of cases required ICU admission and 7.5% required invasive ventilation which is higher than that reported in umbrella review, systematic scoping review but lower than that reported by Antoun et al.[6,13,20]

Higher admissions to the ICU, or invasive ventilation in our study can be explained by severity of disease at presentation and its progression in due course of time. Out of eight women with initial moderate illness, two (25%) developed severe illness and four (50%) progressed to critical illness and two admitted with severe illness progressed to critical illness. Some other studies also suggested more ICU admissions and higher rates of invasive ventilation in pregnant women than non-pregnant women.[4,22]

In present study, three (3.9%) participants died due to COVID related complications. All three cases presented with fever, cough and breathlessness and required ICU admission and invasive ventilation due to worsening respiratory function. Out of these three, one had uncontrolled overt diabetes, presented in the second trimester and died of respiratory failure in the antenatal period. Out of the remaining two, one woman had pre-existing heart disease and anaemia. She presented in the third trimester, and had spontaneous vaginal delivery and stillbirth. She developed deep vein thrombosis after delivery and died of pulmonary embolism. The remaining one had pre-existing anaemia and presented in the third trimester. She had spontaneous vaginal delivery and

stillbirth. She developed mucormycosis and septic shock after delivery and died of multiorgan failure.

Risk factors associated with these critically ill cases were uncontrolled overt diabetes, pre-existing cardiac disease and anaemia. Pre-existing comorbidities seem to be risk factors for severity of COVID-19 in pregnancy.[23] Chronic hypertension and pre-existing diabetes were associated with maternal death in pregnant women with COVID-19. The mortality rate in COVID-19 patients was high in older individuals and those patients with at least one comorbidity.[28]

The maternal mortality in our study was higher than that reported by Nayak et al (2.12%), but lower than that reported by Antoun et al (4.3 %) and Takemoto et al (12.7%).[5,6,24] In an inter-COVID multinational cohort study, the risk of maternal mortality was 1.6%, i.e., 22 times higher in COVID-19 positive women with comorbidities such as severe pre-eclampsia superimposed on chronic hypertension and cardiomyopathy.[11]

In our study, 15.8% of study participants had high BMI (overweight or obese) and 47.4 % had other pre-existing comorbidities, the most common being anaemia (28.9%). Data from UKOSS showed that 69% of the study subjects were overweight or obese and 34 % had pre-existing comorbidities.[19]

In the present study, 26.4% of study subjects had pregnancy related comorbidities ,the most common being gestational diabetes mellites (14.7%) followed by pre-eclampsia (8.8%) In a study by Antoun et al, 47.8% of participants had comorbidities (diabetes mellitus 17.4%, asthma 8.7%, pre-eclampsia 8.7 %).[6] In a study by Villar et al, the rate of pre-eclampsia was 8.4% and anaemia 18.4%.[11] Some other studies also reported hypertensive and diabetic disorders as the most commonly associated comorbidities in COVID-19 positive pregnant women.[5,9,25,26] Advance maternal age, high body mass index, chronic hypertension and pre-existing diabetes, pre-eclampsia and eclampsia, gestational diabetes were the risk factors associated with severe COVID-19 and ICU admission.[3,24]

Various studies support an association between COVID-19 and higher rates of pre-eclampsia/eclampsia/HELLP syndrome.[27,29] High expression of the placental Angiotensin-Converting Enzyme 2 (ACE 2) at the maternal-foetal interface and its dysregulation by SARS-CoV-2 might be a cause for the high rates of pre-eclampsia associated with severe and critical COVID-19-positive pregnant women.[30]

In our study, the rate of pre labour rupture of membranes was 10.5% which was comparable to that reported by Singh et al (8.4%).[9] However, it is quite higher than reported by Anarkali et al and Vee et al, but lower than reported by Villar et al.[10,11,14]

In present study, induction of labour was done in 17.6% of study subjects which was lower than that (22,3%) reported by Villar et al.[11] The most common indication for induction of labour was premature rupture of membranes.

In our study, nearly 35% of neonates were born before 37 weeks of pregnancy which is almost similar to that reported by Antoun et al.[6] Other studies also reported higher rate of preterm delivery.[9,11,14] However, the rate of preterm birth was 17% in umbrella review 20 and 15% in a study by Anarkali et al.[10] At present, there is insufficient evidence to determine any correlation between spontaneous preterm labour and COVID-19 infection in pregnancy.

In present study, 29.4% neonates had low birth weight. Some other studies also reported a higher low birth weight rate among COVID-19 positive women.[5,9,11]

24.1% of neonates needed NICU admission in our study which is nearly similar to that (25%) reported in umbrella review.[20] Some other studies have also reported high incidence of admission to neonatal intensive care unit (NICU).[3,5,9,31]

We found intrauterine death in 8.8% of COVID-19-positive women which is 4 times higher than that reported by some other studies.[5,14]

All neonates born to COVID-19 positive women tested negative for SARS-CoV-2 via RT-PCR. Our finding is in accordance with the study by Antoun et al.[6] However, different studies have reported different rates of positivity among neonates born to COVID positive mothers suggesting that vertical transmission of SARS-CoV-2 infection is possible.[5,9,11,14]

Limitations

This is a retrospective single centric study with small number of cases. So, the result of the study cannot be generalised. This study has no control group. Therefore, it cannot be commented upon whether the results of the present study are statistically significant or not.

CONCLUSION

The positivity rate of SARS-Cov-2 infection among the obstetric population was 7.9% by universal screening protocol. COVID-19 in pregnancy was associated with higher risks of gestational diabetes mellitus, pre-eclampsia and higher rates of invasive ventilation, ICU admission, caesarean sections, maternal mortality specially in women with pre-existing comorbidities, stillbirths, preterm births and NICU admission.

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