

A Study of Clinical Characteristics of Pregnant Women with COVID-19 Infection: A Single Centre Descriptive Study

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Received: 20-03-2023 / Revised: 11-04-2023 / Accepted: 05-05-2023

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Conflict of interest: Nil

Abstract:

Background and Objectives: The aim of this study is to describe the clinical characteristics of pregnant women who developed COVID infection.

Materials and Methods: It was a cross-sectional descriptive study hospital-based assessment conducted at the Department of Obstetrics and Gynaecology at Govt Erode Medical College. All the pregnant mothers who were tested positive for covid 19 infection in the nasal and throat swab in RTPCR test admitted in the hospital between April 2020 to march 2021 were included in this study. Pregnant mothers who had symptoms like covid but who tested negative for covid 19 in RTPCR were excluded from our study. The age of participants ranged from 17 to 45 years.

Results: A total of 379 participants were studied, 1.4% had varying degree of PPH, and incidence of preterm birth was 24%. Of the 379 positive cases 91% were in third trimester. Vertical transmission was zero. No case of intrauterine death or neonatal death was noted. Out of the 379 positive pregnancies 17 patients required oxygen and had significant CT changes. There was no maternal mortality due to covid 19 during this period.

Conclusions: Inflammatory markers did not correlate with disease severity in our study population. No maternal and fetal mortality in our study. Intensive monitoring of vitals, early CT chest and oxygen therapy could be the reason for nil mortality. Relatively higher Preterm Labor is an area of concern.

Keywords: COVID-19, Pregnancy, SARS-coV-2, Novel Corona Virus; Antenatal Mothers, Post-Natal Mothers.

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Introduction

An illness induced by the new coronavirus known as SARS-coV-2 is known as covid 19. This RNA virus is very common in animals, including humans and other mammals[1]. A review of the relevant research reveals that although the majority of human coronavirus infections are relatively mild, the epidemics caused by the two beta coronaviruses – severe acute respiratory syndrome coronavirus (SARS –CoV) and middle east respiratory syndrome viruses (MERS-CoV-2) – have resulted in more than 10,000 cumulative cases in the past two decades. SARS-CoV-2 was reported to have a fatality rate of 10%, whereas MERS-CoV was reported to have a mortality rate of 37% [2]. However, information that is particular to pregnancy and infection with the Coronavirus is not readily accessible. In light of this, the purpose of our paper is to conduct an analysis of solely covid-positive pregnancies with regard to demographic pattern, clinical aspects, foetal effects, neonatal impacts, and mother outcome.

The 30th of January in the year 2020 saw the first instance of covid 19 infection being recorded in India. Since the beginning of the first wave, our hospital, which is the Government Erode Medical College Facility and is located in the west of the state of Tamil Nadu in India, has been transformed into a covid care hospital. In addition, as of right now, we have successfully handled over 382 covid positive pregnancies in the first wave, and we are now managing over 600 positive cases in the second wave[3]. Between April 2020 and March 2021, we were successful in delivering 137 pregnancies that were confirmed by a covid test.

This research main aim to analysed 379 COVID-positive pregnancies, looking at factors such as age, vulnerable gestational age group, illness severity, and associated high risk diseases, as well as mother and foetal outcome. Because the data for three

of the patients were missing or incorrect, they could not be included in this research.

In addition to this, we have performed an individual analysis on each case with a serious infection, looking at maternal features, the therapy received, the patient's reaction to treatment, and subsequent outcomes.

Methods:

A descriptive cross-sectional research deigned and was conducted in a teaching hospital in the city of Erode, which is located in the state of Tamil Nadu, India. At the beginning of the pandemic in March 2020, the hospital was transformed into an exclusive tertiary care facility for patients with COVID. Participants in the research consisted of all 379 pregnant women who had a positive RT-PCR result for COVID-19 in a nose and throat swab test. Patients who had symptoms similar to those of covid but who tested negative for RTPCR were not included in the research. The research was conducted from March of 2020 all the way through January of 2021.

The data were obtained in a backwards fashion from the department of statistics, and the ethical approval committee of the university gave their permission before doing so.

The pregnancy measures which were analysed are:

- Age of pregnant mother and severity of illness.
- Symptoms at the presentation.
- Gestational age and severity of illness.
- Inflammatory markers and their correlation with severity of covid 19 in pregnancy.
- Association of blood group and severity of covid infection.
- Maternal co-morbid condition and its relation to covid infection.
- Obstetric complications associated with covid positivity.
- Vertical transmission.

- Fetal outcome.
- Need for respiratory support in positive mothers.
- Maternal mortality in covid 19 infection.
- The classification based on severity of illness, investigations done, treatment

given were as per the WHO interim guidance of COVID 19 May 2020 [4] and NRHM protocol for covid 19 in pregnancy [5] follows.

- Management of COVID-19 in Pregnancy

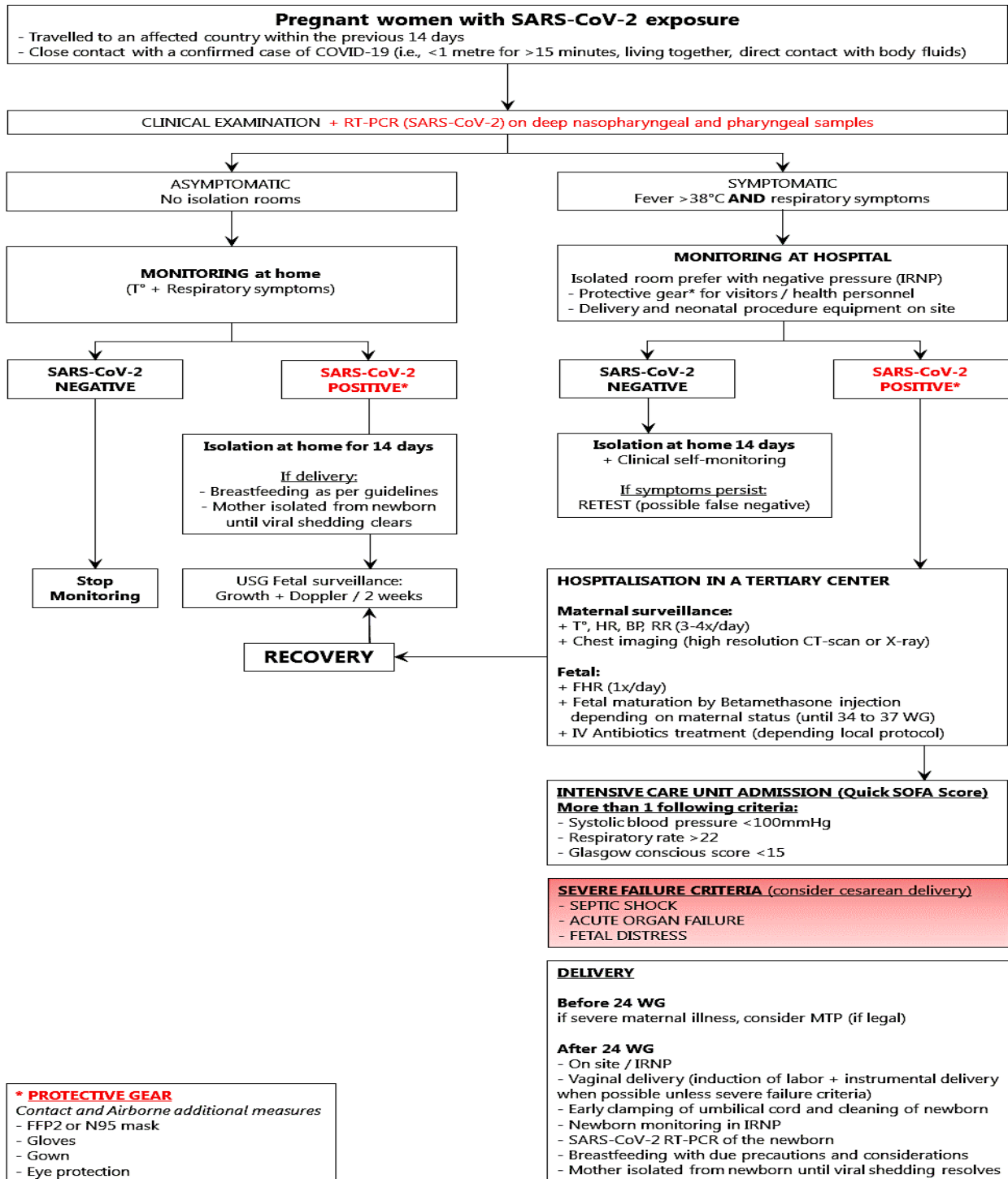


Figure 1: Flowchart for Management in Pregnant Women (Adapted from Lancet) Results

Age distribution of pregnant woman affected with covid 19. Only 16 of the 379 women who tested positive for pregnancy were older than 35 (4.3% of the total). Only two of the 16 women who were infected with COVID-19 had a serious disease that necessitated the use of oxygen. 15 of the women who had a severe

infection were younger than 35 years old. 204 were younger than or equal to 25 years old (representing 53.8% of the total), and 157 were older than 25 but younger than or equal to 34 years old (representing 41.4% of the total) Fig 2.

Gestational age and covid infection

AGE	FREQUENCY(N=379)
<18	2(0.5%)
18-25	204 (53.8%)
25-34	157 (41.4%)
≥35	16 (4.3%)

When we categorised the pregnant women who tested positive according on their gestational ages, 18 of the women were pregnant for less than 14 weeks, and 36 of the women were pregnant for between 14 and 28 weeks. The vast majority of the women were in their third trimester, with

224 of the cases falling between the ages of 28 and 40 weeks pregnant.

Less than 14 weeks 6.4%, 14 to 28 weeks 12%. 28 to 40 weeks accounted for 80.5% of the 278 instances of prenatal complications (Table 1).

Table 1: Gestational age and covid infection

Total positive mothers	379 (Throat swab RT PCR for covid 19 positive)
Antenatal mothers	297
Post-natal mothers	82
No of deliveries	137
No of mothers required oxygen	17
No of maternal death	0
No of neonatal death	0

The larger number of cases found in the third trimester may be attributed to the fact that at that time, all women who were approaching their EDD were routinely checked for covid 19. But in earlier trimesters, only women who exhibited symptoms of covid 19, had a history of contact with the virus, or had a history of international travel were tested.18

pregnant women out of a total of 379 who tested positive for pregnancy needed oxygen therapy. 16 of them were between 28 and 40 weeks along, and one of them was already a postnatal mother.

According to our research, 91% of patients with serious infections were in their third trimester.

Table 2: Gestational age and severity of illness

Gestational Age	Frequency(N=379)
<14weeks	18 (5.7%)
14-27weeks	43(13.7%)
≥28 Weeks	254 (80.6%)

Symptoms of COVID 19 in pregnancy:
According to the findings of our research,

319 out of 379 women (that's 85%) exhibited no symptoms; the RTPCR test

for covid 19 was the only one that came back positive. Fever was the most prevalent symptom among those who were symptomatic, occurring in 60 instances (16%), followed by cough in 47 cases (12%).

Only 16 women reported feeling short of breath, which represented 4.2% of the total number of women who tested positive. In a small number of instances, myalgia, diarrhoea, and anosmia were also recorded.

Table 3: Symptom of covid 19

Symptoms	% of Present	% of Absent
fever	15.8%(60)	84.2%(319)
Cough	12.4%(47)	87.6%(332)
Breathlessness	4.2 %(16)	95.8%(363)

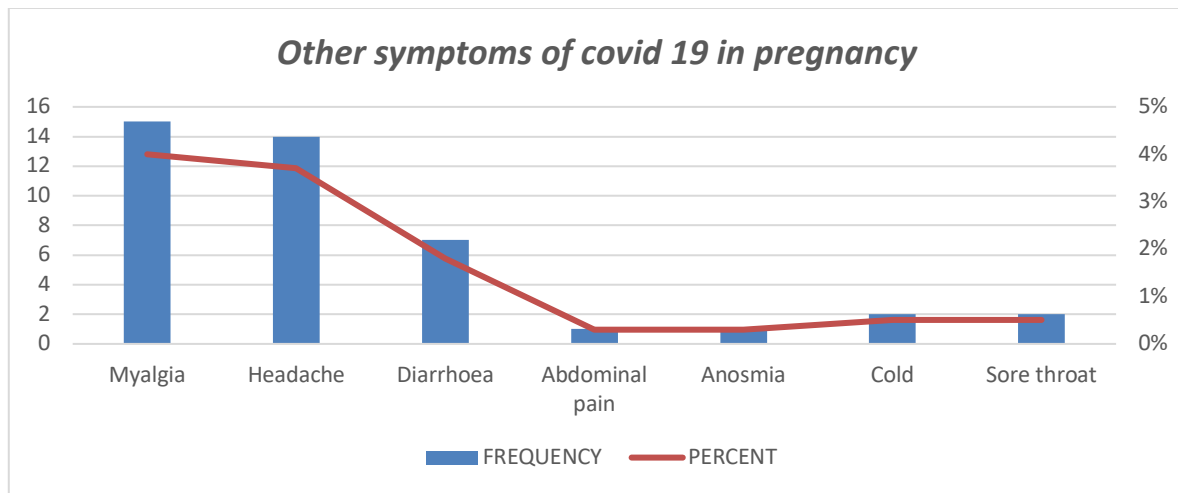


Figure: 4 Other Symptoms

Co- morbid condition and COVID 19 infection in pregnancy: Out of the 379 women only 6 had bronchial asthma there were 2cases of pulmonary TB (Table 4)

Table 4: Co- morbid condition and covid 19 infection in pregnancy:

Co- Morbid Condition	% of Present	% of Absent
Bronchial Asthma	1.6%(6)	98.4%(373)
Tuberculosis	0.5%(2)	99.5%(377)

Pregnancy specific high risk condition and covid: As per our study pre-eclampsia was found in 42 cases (11.1%), GDM in 30 cases, (7.9%), anaemia was found in 47 cases (12.4%) of the positive population. Preterm labour and oligohydramnios was

reported in 84 cases (27%) and 38 cases (10.9%) cases respectively. PPH was found in 5 cases(1.4%) cases. There was 1 case (0.3%) of thromboembolism noted in our population Table 5.

Table 5: Pregnancy specific high risk condition and covid :

High risk condition	% of condition present	% of condition Absent
Preeclampsia	11.1%(42)	88.9%(337)
GDM	7.9%(30)	92.1%(349)
Anaemia	12.4(47)	87.6%(332)
Thromboembolism	0.3%(1)	99.7%(378)
preterm labour	27.2%(84)	72.8%(295)

Blood group and COVID 19 positive pregnancy: The most common blood group in our study population was O +, 132 cases out of 379 (36.4%) had O positive blood group. Next most common blood group was B positive 125 cases (34.3%), followed by A positive 59 cases (16.2%) O negative and A negative cases were 4 each so 1.1% of total study population.

Table 6: Blood group and covid 19 positive pregnancy:

Blood group	No of case(N=379)
O +	132 36.4%
B+	125 (34.3%)
A+	59(16.2%)
A-	4(.1%)

Vertical transmission and fetal effects of covid -19 positive pregnancies: Total covid positive pregnancies delivered 137 Total of babies born 138 (include 1 twin). For all babies' nasopharyngeal swab was taken on second day and tested for covid 19 by RTPCR. Vertical transmission zero. No case of intrauterine death or neonatal death were noted. NICU stay 1. All babies were breastfed. EBM given when mother was sick. Preterm birth 24%.

Table 7: Vertical transmission and fatal effects of COVID -19 positive pregnancies

CT Score	Frequency
<7	13 (76.5%)
8-15	3 (17.6%)
>15	1 (5.9%)

Patients with covid pneumonia: Out of the 379 positive pregnancies 17 patients required oxygen and had significant CT changes. All the 17 required oxygen. Only 2 patients received noninvasive ventilation (HFNC) and gradually tapered to nasal oxygen therapy Table 7 Mild pneumonia seen in 13 patients (76.5%), Severe pneumonia CT score >15 in 1 case (5.9%). All patients were between 29 to 37 weeks. Women with co-morbidities like anemia and bronchial asthma are more prone. Women covid pneumonia were not at high risk for pre-eclampsia, preterm labour and oligo hydramnios. Average hospital stay was 12 days. Maternal and fetal outcome was good. Needs long term follow up.

Biochemical and haematological parameters in covid positive pregnancy: As per our study the neutrophil lymphocyte count was more than 3 in 193 patients. Remaining 186 it was equal to 3 or less than 3. Among the 17 women with severe illness 7 had increased NLR. Though NLR ratio was increased in 50.9%

of cases , most of them did not develop severe illness. D dimer was done in 205 cases. 20 cases had values more than 1700ng/ml .i.e. 9.7%. None of the 20 patients developed severe illness. All the positive 379 mothers were treated with prophylactic heparin for 7 days, but only one patient developed cortical venous thrombosis or deep vein thrombosis. Platelet counts were below normal range in 28 cases, 8%. In 21 cases above the normal range in 6%.

No incidence of APH or PPH noted in the thrombocytopenia group. Renal functions tests and liver function tests were done in all patients .RFT was normal in all patients. LFT, serum bilirubin was normal in all the cases, SGOT and SGPT were raised in 2 cases. LDH was raised in 3 patients, but disease was not severe in these cases and outcome was good.

Discussion

It was speculated that pregnant women and neonates were more susceptible to the COVID 19 infection than the general

population. The physiological and immunological changes in pregnancy predisposes to state of immunosuppression, which makes this population more vulnerable to coronavirus infection and complications. This has been well documented in the past epidemics with MERS COV2 and SARS COV1 IN 2003 & 2012 respectively. However, COVID-19 and its effects on maternal physiology has yet to be studied[6'7].

In our study of 379 pregnant women, 85% were asymptomatic. This is in line with the Pregcov 19 living systematic review reported a total 75% of pregnant women tested positive were asymptomatic[9]. Another study from USA by Sutton et al reported 84% women admitted in labour who tested positive for COVID-19 were asymptomatic Khoury et al[10]. showed that 61.4% of pregnant women did not show any symptoms of COVID-19 at the time of admission to the hospital. Among the symptomatic cases the most common symptoms were fever, cough, dyspnoea, the proportions were 14%, 10%, 3% respectively indicating relatively mild symptoms. This is similar to studies by Zhang et al, LIU et al who compared incidence of COVID-19 in pregnant and non-pregnant population and found that the former had milder symptoms. The milder symptoms may be due to younger average age compared to general population. The PREG COV 19 systematic review study [11] also showed the most common symptoms were fever both 36%. The Priority study [12] in US also states that the most common symptom is cough[20%]

The age of pregnant mothers and the severity of disease were analysed. Since increased age is a risk factor in general population. But in our study only 16 (4.2%) of 379 women were more than 35 years of age. Only 2 of them developed severe illness due to covid.

Many studies have shown that most cases tested positive were in the late 2nd trimester and third trimester. This may be attributed to the physiological and immunological changes that peaks during this time. Also due to higher testing rates near term for delivery. Our study showed 67% cases presented at gestational age >28weeks. All severely affected cases were in the third trimester. This is in accordance with UKOSS[2] study which showed 83% women diagnosed beyond 28 weeks. Maternal deaths due to cardiopulmonary complications, sometimes with multiorgan failure, have been reported in the previous literatures [13,14] In non-pregnant adult population, we find a definite association between comorbidities and severity of COVID.

Our study had 6 pregnant women who were asthmatics. Previous studies suggested that pregnant women are not more susceptible to SARS-CoV-2 infection than the general population [15]. However, the presence of comorbidities (e.g., diabetes and chronic hypertension), which often appear in the second trimester of pregnancy , as well as increased maternal age and high BMI may increase their risk of developing severe COVID-19 symptoms[16].

The effect of pregnancy specific risk factors like preeclampsia, gestational diabetes mellitus and COVID-19 infection were analyzed. About 11.6 % women with covid 19 had preeclampsia [17]. This is in accordance with William's incidence of 8 to 10%. In countries like India where anemia is a major challenge in pregnant women. About 12% of our covid `19 mothers had anemia. Interestingly incidence of oligohydramnios was higher 10.9%. Similar case reports of covid positive mothers presenting with oligohydramnios have been reported, Yao wenling et al[18,19]. This clearly establishes a possible role COVID-19 infection affecting THE placenta and its circulation. Study by Shanes et alexamined

the placentas of 16 women with severe COVID-19 infection[20]. The study found that pregnant women who were infected with COVID-19 and delivered in the third trimester were more likely to have placentas that show features of maternal vascular malperfusion and intervillous thrombi. No pathognomonic features were identified; However, these findings suggest abnormal maternal circulation. This clearly shows a possible role of COVID 19 infection in the placenta.

Labour and covid 19 pregnancy

During labour 1.4% had varying degree of PPH, all managed by medical management or mechanical tamponade. The incidence of preterm birth was 24% in our study showed overall preterm birthrate of 17%. A study from Italy involving only in severe covid infections. 102 positive pregnancies reported increased incidence of preterm birth[21].

Hematological parameters and covid 19:

About 45% positive mothers had elevated WBC. 53% had elevated NL ratio. But it did not correlate with disease severity. In a study involving 7 pregnant patients from china [16] reported increased WBC count and thrombocytopenia. In preg CoV living systematic review [2] white cell count was elevated in 28% and lymphopenia was found in 33%. D dimer elevated in 9.7% cases. Tang et al[19]. extensively discussed the significance of high D-dimer levels in non-pregnant population. It was associated with higher risk of DiC and poor prognosis. However, in our study of Pregnant women with high d dimer did not correlate with severity. In our study thrombocytopenia seen in 6% cases. A review article by waleed et al also shows similar findings[22].

Pregnancy substantially increases the risk of hyper-coagulability and women with primary or secondary thrombophilia are more prone to pregnancy complications Therefore, the management of hyper-coagulability in a pregnant woman

infected with COVID-19 needs special attention, since COVID-19 can aggravate the thrombotic complications. Studies by Di Renzo et al emphasises the need for thromboprophylaxis to prevent complications[23]

BUT none of the women in our study showed thromboembolic complications.

Low molecular weight heparin (LMWH) was given to all mothers. No adverse effects were noted. . However, further research on the thrombotic complications and its treatment options in pregnant women infected with SARS-CoV-2 is the need of the hour.

Patients with COVID Pneumonia:

Out of 379 cases, 17 cases (4.4%) developed lung involvement requiring oxygen. None required invasive ventilation. A similar cohort study also reported incidence of severe pneumonia 3-5% [24]. BUT in a prospective study involving 135 patients from Iraq, 10 cases needed ICU care and 5% maternal mortality was reported. All the 17 patients in our study were treated with steroids, antibiotics and heparin, multidisciplinary team was involved in all cases.

The article by Abdul magaala et al stresses the benefits of corticosteroids in severe respiratory illness due to COVID [25]. The preg coV systematic review reports 1.8 % required ICU admission, 16.7 % required oxygen through nasal canula. Maternal death and COVID-19 though out of 379 positive mothers 17 developed severe illness but there was no maternal death due to covid in our study.

According to the Preg CoV systemic review maternal mortality was 0.7%. but few studies have reported a very high maternal mortality.

A case series published in American journal of obstetrics and gynaecology reports 7 out of 9 pregnant women died due to covid related complications [26].

Neonatal effects:

194 live births, c section rate was 80.4%, spontaneous vaginal delivery-19.6%. Vertical transmission was nil. This is further supported by earlier case reports from China, who have reported lack of vertical transmission. Zhu et al studied the effect of covid 19 in neonates, also excluded the possibility of vertical transmission. But they have reported newborns of infected mothers developed respiratory distress and thrombocytopenia in their study involving 10 cases. Their neonatal mortality was 10%. In our study involving 137 live births though none had respiratory distress and there was no neonatal death. All babies were breastfed. EBM Given if Mother was Sick. Breastfeeding did not cause horizontal transmission in the neonates[27]. A case series from Italy by Cosma et al reports the possibility of presence of RNA in the fetal side of placenta.

Conclusion

Since the disease is at its most dangerous only in the third trimester, according to our research, all pregnant women who were infected with COVID-19 during the first wave of the outbreak between March 2020 and January 2021 were hospitalized. Since the disease is at its most dangerous only in the third trimester, home monitoring after risk assessment in the hospital may be suggested for low-risk cases, particularly in the first and second trimesters. Close monitoring of vital signs, early computed tomography of the chest in situations where it was needed, and oxygen treatment were the factors that contributed to our low maternal morbidity and zero maternal deaths. In the cohort that we were studying, inflammatory indicators did not correspond with the severity of the condition. However, further evidence is required to back up all of these conclusions.

Control of Conflict of Interests: As the research was carried out by a government

organization, there was no potential for a conflict of interest, and the study was not funded by any group. As a result, we did not gather any fees or employment information. This research was not submitted for any patents, and none of the authors are currently serving as reviewers for this publication.

Acknowledgement: We would also like to show our gratitude to the Dean of Government Erode Medical College sharing their pearls of wisdom with us during the course of this research.

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