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A RETROSPECTIVE STUDY OF MATERNAL NEAR MISS AND MATERNAL MORTALITY IN COVID-19

Obstetrics & Gynaecology

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ABSTRACT

Current study was a Retrospective study conducted in the department of obstetrics and gynaecology in Gandhi hospital, secunderabad. Case records of 118 antenatal and postnatal patients that got admitted in our intensive care unit between May 1 2021 and May 31 2021 with Reverse transcriptase polymerase chain reaction (RT PCR) positive confirmed COVID-19 were extracted from the Medical Record Department (MRD) of Gandhi hospital and studied.

KEYWORDS

COVID 19, maternal near miss, maternal mortality.

INTRODUCTION

The novel coronavirus disease (COVID-19) is the most challenging health crisis that we faced. The novel coronavirus infection (COVID-19) is a global public health emergency. The first case of coronavirus infection was identified in Wuhan, Hubei province of China and was notified to the WHO on 31st December 2019. By 30th of January 2020, the corona virus disease was declared as a Public Health Emergency of International Concern (PHEIC)[1]. It did not take long for the COVID-19 to establish its roots in India as the first case was confirmed on 30th January [2]. The mode of transmission is by droplets which can occur when the patient sneezes or coughs. The COVID-19 virus infects host cells through angiotensin-converting enzyme 2 receptors present predominantly within type II alveolar cells of the lung and across the aerodigestive tract. The altered inflammatory response to viruses during pregnancy is thought to be mediated, at least in part, by :-

1. A shift in CD4+ T cell population toward the Th2 phenotype over Th1 during pregnancy [3]. For the immune response to viral infections, a decrease in Th1 reactivity can result in an altered clearance of infected cells.
2. A decrease in circulating natural killer (NK) cells during pregnancy [4]. NK cells play an important role in the innate immune system's viral clearance
3. A decrease in circulating plasmacytoid dendritic cells (pDCs)[5]. These cells are key for type 1 interferon production against viruses .
4. An increase in circulating progesterone levels . Progesterone is a steroid hormone that has immunomodulatory properties .
5. Alterations in the innate immune system, including the pattern recognition receptors Toll-like receptors (TLRs) during pregnancy [6]. COVID-19 infection causes pyroptosis of host cells and release of DAMPs, which can be TLR ligands and further enhance inflammation.

COVID-19 disease in pregnancy is associated with increased rates of intensive care admission, invasive ventilation. Women should receive multidisciplinary care with input from senior decision makers and early escalation where required.

Of note, the proportion of women of childbearing age admitted to ICU with COVID-19 who were pregnant or within 6-weeks postpartum increased in the second wave, suggesting that this wave and the B.1.1.7 (alpha) variant had an increased detrimental effect on pregnant women when compared with the first.[7] In this study we assessed the outcome of the patients with COVID -19 disease in terms of maternal near miss and maternal mortality

Severity Of Covid Is Classified Into Mild, Moderate And Severe.

Mild disease	Upper respiratory tract symptoms (&/or fever) without shortness of breath and hypoxia
Moderate disease	1)Respiratory rate >/= 24/min, breathlessness 2)Spo_2: 90 to </= 93% on room air
Severe disease	1)Respiratory rate 30 / min, breathlessness 2) Spo_2< 90 % on room air

Maternal near miss events were identified using WHO criteria given for MNM :-

Box: Maternal life-threatening conditions

Dysfunctional system	Clinical criteria	Laboratory markers	Management based proxies
Cardiovascular	( ) Shock ( ) Cardiac arrest	( ) Severe hypoperfusion (lactate>5 mmol/L or >45mg/dL) ( ) Severe Acidosis (pH<7.1)	( ) Use of continuous vasoactive drugs ( ) Cardio-pulmonary resuscitation
Respiratory	( ) Acute cyanosis ( ) Gasping ( ) Severe tachypnea (Respiratory rate >40 bpm) ( ) Severe bradypnea (Respiratory rate <6 bpm)	( ) Severe hypoxemia (Oxygen saturation < 90% for ≥ 60 minutes or PaO2/FiO2<200)	( ) Intubation and ventilation not related to anaesthesia
Renal	( ) Oliguria non responsive to fluids or diuretics	( ) Severe acute azotemia (Creatinine ≥300 µmol/l or ≥3.5 mg/dL)	( ) Dialysis for acute renal failure
Haematologic/ Coagulation	( ) Failure to form clots	( ) Severe acute thrombocytopenia (<50,000 platelets/ml)	( ) Massive transfusion of blood / red cells (≥ 5 units)
Hepatic	( ) Jaundice in the presence of preeclampsia	( ) Severe acute hyperbilirubinemia (Bilirubin>100 µmol/l or >6.0 mg/dL)	
Neurologic	( ) Prolonged unconsciousness (lasting >12h) ( ) Stroke ( ) Uncontrollable fit / status epilepticus ( ) Global paralysis		
Alternative severity proxy			( ) Hysterectomy following infection or haemorrhage

Aim:

To know the effect of COVID-19 on maternal near-miss events and maternal mortality.

Objectives:

1. To determine the influence of COVID 19 on maternal near miss events and maternal mortality.
2. To observe the trend and frequency of near miss events and maternal mortality.

MATERIAL AND METHODS:

The present study was carried out over a period of one month at Gandhi Hospital, Secunderabad. It is a tertiary care hospital and a major referral centre for high risk obstetric cases in Telangana State.

Type Of Study: Retrospective study.
Sample Size: 118.

Case records of 118 antenatal and postnatal patients admitted from May 1 2021 to May 31 2021 in our intensive care unit with Reverse transcriptase polymerase chain reaction (RT PCR) positive confirmed COVID-19 were extracted from the Medical Record Department (MRD) of Gandhi hospital and studied.

During the above mentioned time period 118 patients required ICU admission. Standardised data was collected retrospectively from the patient records on demographics, comorbidities, clinical manifestations, laboratory tests, treatment methods, outcomes and complications. Data was collected at the point of presentation, defined as the day of hospital admission.

Clinical data included presenting symptoms, duration of symptoms and signs. Biochemical data included complete blood picture, D-Dimers, serum ferritin, serum LDH (Lactate Dehydrogenase), renal function tests, Liver function tests, CRP and Random Blood glucose.

Data regarding the co-morbidities which included diabetes, hyper-

tension, prior cardiac disease (any), respiratory disease (any) and immuno-suppression, renal diseases (any), anaemia, were extracted.

Inclusion Criteria:

1. All antenatal and postnatal patients with Reverse transcriptase polymerase chain reaction (RT PCR) positive test for SARS-CoV2 on nasopharyngeal swabs were included for analysis.
2. All patients requiring ICU admissions with comorbidities other than COVID -19 were included in the stud

Exclusion Criteria:

1. All antenatal and post-natal COVID-19 positive patients who do not require ICU admission or management were excluded from the study.

RESULTS:

Table 1 :- Statistics

Total number of COVID 19 positive admissions	274
Total number of COVID 19 positive ICU admissions	118 (43%)
Total number of maternal deaths	23 (19%)
Total number of maternal near miss	20 (17%)
Total number of patients(other than MNM) stepped down from ICU	75 (64%)

Analysis of Table 1 data reveals that out of 274 covid 19 positive admissions,118 patients (48%) required ICU admissions. Among 118 patients, 23 patients (19%) were maternal deaths.20 patients (17%) come under maternal near miss.75 patients (64%) stepped down from ICU.

Table 2 :- Maternal Age Distribution

Age wise distribution	ICU ADMISSIONS	Mortality group
<19 yrs	5(4.2%)	0
20 – 25yrs	40(33%)	7(31%)
26 – 30yrs	55(46.6%)	12(52%)
>30yrs	18(15.2%)	4(17%)

Analysis of Table 2 reveals that 46.6% patients admitted in ICU belong to 26-30 years of age and 52 % patients among 23 deaths belong to the age group 26-30 years of age. Mean age was 26.4(±4.61) among ICU admissions and 25.2 (± 7.21) in Mortality patients.

Table 3 :- Parity Wise Distribution

GRAVIDA	TOTAL ICU ADMISSIONS
PRIMI	48 (40.7%)
MULTIGRAVIDA	70 (59.3%)

Analysis of table 3 shows that out of 118 ICU admissions ,48 patients (40.7%) admitted in icu were primi gravid and 0 patients (59.3%) admitted in icu were multigravida

Table 4: Gestational Age Wise Distribution :-

Gestational Age	Icu admission	Maternal death
< 14 wks	5	2
14-28 wks	11	2
28-36 wks	42	14
36-40 wks	60	5
Total	118	23

Analysis of CHART 4 reveals that Out of 118 ICU admissions 42 patients (35.5%) were of 36- 40wks. Among the 23 maternal deaths 14 patients (60.8%) were of 28-36 weeks and 5 patients (21.7%) were of 36-40 weeks.

Table 5 :- Presenting Complaints

Asymptomatic	50(42.37%)
Cold	72(61.01%)
Anosmia	88(74.5%)
Fever	56(47.4%)
Cough	63(53.3%)
Myalgia	90(76.2%)
Shortness Of Breath	25(21.1%)
Headache	72(61.01%)
Loose stools	20(16.94%)
Vomitings	15(13.3%)
Loss of taste	88(74.5%)

Analysis of table 5 shows that the most common presenting complaints were cold, cough and fever, and shortness of breath. 50 (42.3%) patients were asymptomatic due to covid. 25(21.1%) patients were presented with shortness of breath. Symptomatic patients had more than one symptom. Patients with shortness of breath were associated with more mortality and morbidity

Table 6:- Associated Conditions

COMORBIDITY	MNM	MORTALITY	TOTAL ICU ADMISSIONS
SEPSIS	4	7	11
ANAEMIA	15	10	71
CARDIAC DISEASE	2	1	6
DIABETES	4	1	12
HYPERTENSIVE DISORDERS	7	6	48
THYROID DISORDERS	3	4	62
PRE EXISTING LUNG DISEASE	1	4	18
LIVER DISEASE	0	1	3
EPILEPSY	1	0	1

Analysis of table 6 reveals that the most common comorbidity associated was anaemia among all the 3 categories (15 out of 20 among MNM, 10 out of 23 among mortality patients and 71 among ICU admissions). Sepsis was the second most common comorbidity in the mortality category. One or more associated conditions were present in COVID 19 positive ICU admission patients.

Table 7 :- Inflammatory Markers And Mortality

INFLAMMATORY MARKERS	MORTALITY
RAISED	22(95.7%)
NORMAL	1(4.3%)

Table 7 analysis reveals that inflammatory markers (D-dimers/ LDH/ Serum ferritin) were raised in 95.7% patients (22 out of 23 patients) among maternal mortality patients. P value <0.001 which shows statistical significance ,in cases with mortality ,raised inflammatory markers were observed.

Table 8 :- Interventions

Steroids	83 (70.33%)
Remedesvir	52 (44.06%)
Low Molecular Weight Heparin (Lmwh)	109 (92.3%)
Hudsons Mask	52 (44.06%)
Mechanical Ventilation	22(18.6%)
Non Invasive Ventilation	32 (27.11%)
Surgical Intervention	0
Antibiotics	118(100%)

Analysis of table 8 revealed that Mechanical ventilation was required in 18.6% patients (22 patients) and 27.11% patients (32 out of 118 patients) required Non mechanical ventilation. Antibiotics were given in 100% of cases. Injection Remedesvir was given in 44.06% (52 out of 118) patients. Steroids were given in 70.33% patients (83 patients).

Table 9:- Length Of Hospital Stay

TOTAL	118
0-4 days	20(12.19%)
5-9days	72(43.9%)
10-14days	64(39.02%)
15-19days	6(3.65%)
20-25days	2(1.21%)

Mean duration of hospital stay was 10.4 (±4.35) days.

Table 10 :- Admission To Death Interval

TOTAL	23
0-4days	9(39.13%)
5-9days	8(34.7%)
10-14days	5(21.7%)
15-19days	1(4.3%)

Analysis of table 10 reveals that 39.13% (9 out of 23) deaths were between 0-4 days.

DISCUSSION

We have assessed the maternal near miss and maternal mortality among 118 ICU admissions and the effect of COVID-19 among them. In our study, out of 274 COVID-19 positive admissions 118 cases

required ICU admissions and 23 were maternal deaths and 20 cases were maternal near miss cases. Mean age was 26.4(±4.61) among ICU admissions and 25.2 (± 7.21) in Mortality patients and 42 patients (35.5%) were of 36- 40wks. Among the 23 maternal deaths 14 patients (60.8%) were between 28-36 weeks.

Our findings were in agreement with the results of study by Dorelien A about the effect of in utero exposure to COVID 19 on birth and infant outcomes.

Our study showed out of 274 COVID 19 patients,118(43%)required ICU admissions among which 18.6% required mechanical ventilation and 27.11% required non mechanical ventilation and 19% had maternal mortality. These results were in line with the results in the study by Ellington S, Strid P, Tong VT, Woodworth K, Galang RR, Zambrano LD, Nahabedian J, Anderson K, Gilboa SM. Characteristics of women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status which showed pregnancy was associated with significantly increased chance of hospitalisation (RR, 5.4; 95% CI, 5.1–5.6), ICU admission (RR, 1.5; 95% CI, 1.2–1.8) and need for mechanical ventilation (RR, 1.7; 95% CI, 1.2–2.4). There was no significant reduction in mortality (RR, 0.9; 95% CI, 0.5–1.5)[8].

The most common presenting complaints were cold, cough and fever, and shortness of breath. 50 (42.3%) patients were asymptomatic due to covid. 25(21.1%) patients presented with shortness of breath. Symptomatic patients had more than one symptom. Differentials for the commonly presenting symptoms should be considered so that other important diagnoses are not overlooked.This is in line with the study by Mahesh asal kar et al where Cases with maternal mortality were mostly in 3rd Trimester and presented with moderate to severe illness with breathlessness.

Multiple randomised trials indicate that systemic corticosteroid therapy improves clinical outcomes and reduces mortality in hospitalised patients with COVID-19 who require supplemental oxygen[9]. A short course of dexamethasone for the treatment of COVID-19 during pregnancy offers the potential benefit of decreased maternal mortality and a low risk of foetal adverse effects. Therefore, the Panel recommends using **dexamethasone** in hospitalised pregnant patients with COVID-19 who are mechanically ventilated or who require supplemental oxygen but are not mechanically ventilated . Steroids were given in 70.33% cases (83 out of 118) in the present study.

Usage of Steroids and remdesivir was higher in cases with raised inflammatory markers although remdesivir has not been scientifically approved for use in pregnancy, remdesivir can be prescribed in pregnancy reviewing the risk benefit ratio in line with study of Richard M Burwick et al[10] .

Since there is a tendency of hypercoagulation in pregnancy, thromboembolic events are more common. Therefore, starting LMWH treatment before Covid-19 infection progresses could be beneficial for preventing embolic complications that may be fatal[11]. Low Molecular weight heparin (LMWH) was given in 92.3% patients (109 out of 118 patients).

The most common comorbidity associated was anaemia among all the 3 categories (15 out of 20 among MNM, 10 out of 23 among mortality patients and 71 among ICU admissions). Sepsis was the second most common comorbidity in the mortality category.

Inflammatory markers (D-dimers/ LDH/ Serum ferritin) were raised in 95.7% patients (22 out of 23 patients) among maternal mortality patients. P value <0.001 which shows in cases with mortality, raised inflammatory markers were observed which is line with study by Mahesh asal kar et al Inflammatory markers such as CRP,D diners, LDH and serum ferritin were raised. Case fatality rate was calculated as the number of maternal deaths divided by the number of critically ill women. In our study the case fatality rate was 19.49%. This was higher than the CFR of 12.9% in the study by Clara Nam Hee Kim, Jennifer Hutcheon, Julie van Schalkwyk, Gerald Marquette about maternal outcome of pregnant women admitted to intensive care units for coronavirus disease 2019[12].Mean duration of hospital stay was 10.4 (±4.35) days. 39.13% (9 out of 23) deaths were between 0-4 days.

Summary

In our study the majority of mothers were discharged healthy. 20 cases out of 118 ICU admissions were identified as maternal near miss and 23 patients out of 118 were maternal deaths. Severe covid disease was observed in cases with raised inflammatory markers. Need for mechanical ventilation was higher in patients with severe COVID-19 disease. Usage of remdesivir and steroids was higher in cases with raised inflammatory markers. Bilateral pneumonia with Acute respiratory distress syndrome (ARDS) due to COVID-19 was the leading cause of maternal mortality followed by hypertension.

Haemorrhage and hypertensive disorders were leading causes of maternal near miss events. From the current evidence base,it was difficult to draw an absolute conclusion on whether pregnant women were at increased risk of severe consequences of COVID 19. In addition to our data limited to a single centre,it is possible that higher case rates and delay in seeking health care contributes to increased maternal mortality. Vaccination to pregnant and lactating women may reduce the complications leading to morbidity and mortality. Further studies were required to conclude the effect of COVID 19 on maternal health.

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