Original Research Article

An observational study to assess feto-maternal outcome in severely ill COVID-19 positive pregnant females admitted at dedicated COVID care center of southern Rajasthan

Pooja Meena*, Savitri Verma, Aayush Jourwal, Sudha Gandhi, Sangeeta Tvinwal

Department of Obstetrics and Gynaecology, RNT Medical College, Udaipur, Rajasthan, India

*Correspondence:
Dr. Pooja Meena,
E-mail: Sbapna.1@gmail.com

ABSTRACT

Background: COVID-19 infection is caused by corona virus SARS-COV2. the aim of the study is to assess feto-maternal outcome in severely ill covid positive pregnant females.
Methods: An observational study was conducted at dedicated covid care center, RNT medical college Udaipur from Jan 2021 to May 2021 among pregnant females. In this study out of 236 total covid positive pregnant patients, 54 patients which could not maintain oxygen saturation, according to NIH criteria were included in our study.
Results: Out of 54 pregnant women, 24 women delivered with 2 twin pregnancies. Out of this 67% underwent cesarean section and 33% were delivered by vaginal route. Postpartum hemorrhage seen in 29% of patients. Maternal death reported in 39% of patients. Out of 54 patients 38 patients were admitted in ICU. Invasive ventilation received by 26% of patients while oxygen received by non-invasive ventilation (15%), Bains (18%) rest by NRBM and venturi mask (41%). Remdesivir were given in 26 (48%) patients.
Conclusions: Our study suggests there may be increased risk of adverse pregnancy outcome for mother and fetus. COVID-19 in pregnancy was associated with risks of pre-eclampsia, stillbirth, preterm birth, PPH. Similar to general population comorbidities do play a role in the outcome of disease in pregnancy. Further studies are needed for effective strategies to prevent adverse outcomes in pregnant females with COVID-19.

Keywords: COVID-19, PPH, NICU

INTRODUCTION

COVID-19 infection is caused by corona virus SARS-COV-2. It was declared a pandemic on 11 march 2020 by WHO. It is a multisystem disease ranging in severity from asymptomatic to fatal. physiological Adaptations in normal pregnancies, mainly cardiorespiratory and immune are known to increase the susceptibility of pregnant women to several infectious agents.[1] Physiological adaptations of pregnancy such as diaphragmatic elevation, edema of respiratory tract mucosa and increased oxygen consumption makes pregnant women are more prone to develop severe pneumonia and hypoxemic respiratory failure due to COVID-19 pneumonia.[2,3] pregnancy is a hypercoagulable state due to increased procoagulant factors which further contribute to increased COVID-19 morbidity.[4] There appears to be high chances of adverse feto-maternal outcome including need for admission to ICU, endotracheal intubation, ARDS, MODS (multiple organ dysfunction syndrome) and even death, Also high incidence of still birth, fetal growth restriction and preterm birth is expected during pregnancy.[5,7] There is immunomodulatory effect there is a shift in the balance between Th1 (T helper 1) associated and Th 2 (T helper 2) associated cytokines. The cell mediated immune response is downregulated causing a Th2 dominant. humoral

immune response which allows for immune tolerance to developing fetus but also contributes to increased susceptibility to viral infection in particular respiratory pathogens.[8,9] Th1 immune mediated response plays a imp role in COVID-19. Elevation of Th-1 associated cytokines e. g., IL-6 has been associated with poor outcome in COVID-19 patients. SARS-COV 2 is transmitted by respiratory droplets, direct contact with fomites, close person to person contacts and possibly by aerosols generated which enters the body via the nasal passage and infect pulmonary cells via SARS-COV2 receptors angiotensin enzyme 2 (ACE2) and uses transmembrane serine protese 2. It causes pyroptosis, inflammation mediated programmed cell death.[10]

Aims and objectives

Aim of our study to describe demographics, clinical characteristics, laboratory findings and feto-maternal outcome in severely ill covid positive pregnant females. For better characterization of COVID-19 infection in clinically ill pregnant patients to guide decision making regarding early intervention and feto-maternal surveillance.

METHODS

An observational study was conducted at dedicated covid care center, RNT medical college, Udaipur from Jan 2021 to May 2021 among pregnant females. Total 236 pregnant females were admitted in this duration. According to National institutes of health covid 19 disease criteria of severe disease are as follows oxygen saturation less than 94% on room air, oxygen requirement, respiratory rate greater than 30 breaths per minute, ratio of PAO2: FiO_2 less than 300, chest imaging with greater than 50% lung involvement. In this study all severely ill covid positive females which could not maintain oxygen saturation, met the criteria for inclusion in our study. Out of 236 total covid positive pregnant patients, 54 patients were included as per criteria and followed till discharge/death. Asymptomatic positive females were excluded. A complete history of patients including present complaints, past obstetric, medical, surgical, family history was taken. Patient's clinical examination done with all precautions. RT- PCR testing was done based on clinical symptoms of covid (cough, fever, myalgia, chest pain, dyspnea). All data regarding patient's status, mode of delivery, baby details were collected. Feto-maternal prognosis explained to relatives and patient.

RESULTS

The 2% were of age group<20 year, 48% women were of 21-25 year of age, 30% women were of 26-30 year of age group, 20% women were of >30 years of age group (Figure 1).

In our study 44% patients were primi, 56% of patients multiparous (Figure 2).
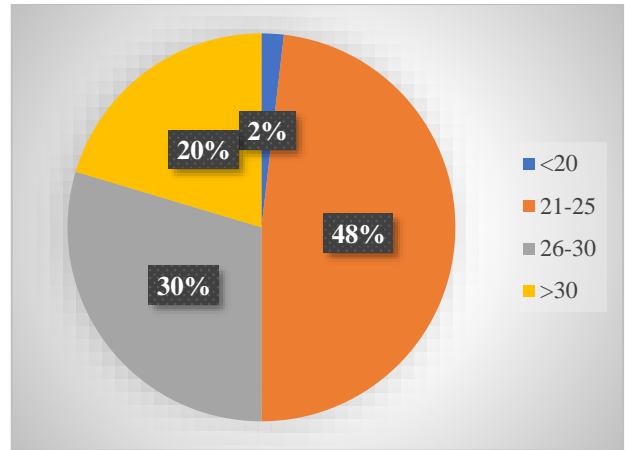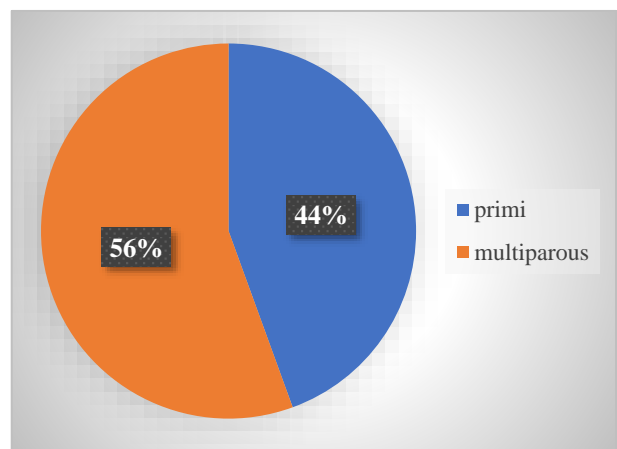

Figure 1: Age distribution of patients.

Figure 2: Distribution of patients according to parity.

Table 1: Gestational age on admission.

Gestational age (Weeks)	No. of patients	Percentage (%)
>37	13	24
34.1-36.6	12	22
<34	29	53

Most of patients were of <34 week of gestational age group.

Table 2: Associated comorbidities.

Comorbidity	No. of patients	Percentage (%)
Diabetes	1	1.85
Preeclampsia/ eclampsia	12	22.22
Hypothyroidism	4	7.40
Anemia	17	31.48

In 2% of patient's diabetes present. Eclampsia and preeclampsia were seen in 4% and 18% of patients respectively. Anemia and hypothyroidism were seen in 31% and 7% of patients. None of patients had past history of Asthma or cardiovascular disease.

Table 3: Symptoms observed in patients.

Symptoms	No. of patients	Percentage (%)
Fever	40	74.07
Cough	38	70.37
Dyspnea	46	85.18
Sore throat	12	22.22
Diarrhea	2	3.70
Myalgia	24	44.44

Most prevalent symptom was dyspnea, it was seen in 85% of patients, followed by fever n cough were seen in 74% and 70% of patients respectively.

Table 4: Laboratory finding observed in patients, on day of admission.

Findings	No. of patients	Percentage (%)
Radiographic imaging on chest imaging	38	70.37
Elevated CRP	26	48.14
Elevated IL -6	15	27.77
Thrombocytopenia	17	31.48
Lymphopenia	21	38.88
Leukocytosis	20	37.03
Abnormal LFT	10	18.51
Abnormal RFT	9	16.66
Elevated d- dimer	20	37.03

In our study lymphopenia, leukcytosis, elevated CRP were seen in 39%,37% and 48% respectively. Elevated IL6 and elevated d dimer were seen in 28% and 37% of patients respectively.

Table 5: Supportive therapy.

Outcome		No. of patients	Percentage (%)
Admission to ICU		38	62.96
invasive ventilation		14	25.92
Oxygen	NIV	8	15
	Bains	10	18.5
	NRBM and venturi mask	22	40.7
Remdesivir		26	48
Blood and blood products		9	16.66

Out of 54 patients 38 patients were admitted in ICU. All patients were on oxygen support and broad-spectrum antibiotics. Invasive ventilation received by 26% of patients while oxygen received by noninasive ventilation (15%), Bains (18%) rest by NRBM and venturi mask (41%). Blood products transfused in 9 patients. Remdesivir were given in 26 (48%) patients.

Table 6: Pregnancy related outcome.

Outcome		No. of patients	Percentage (%)
Mode of delivery	Cesarean section	16	66.66
	Vaginal delivery	8	33.33
Maternal complications	PPH	7	29.16
	Oliguria	7	13
	Septicemia	5	9.25
	Dialysis	3	5.55
Neonatal outcome	Low birth weight baby (<2.5 kg)	13	54.16
	Admission to NICU	7	29.16
	stillbirth	6	25

A total of 54 pregnant women, 24 women delivered with 2 twin pregnancies. Out of this 67% underwent cesarean section and 33% were delivered by vaginal route. Postpartum hemorrhage seen in 29% of patients. 54% of baby were <2.5 kg, 29% babies were admitted in NICU. Maternal death reported in 39% of patients. Septicemia was seen in 9% of patients.

DISCUSSION

In our study increased incidence of death in pregnant females seen in second wave in comparison to first wave of covid 19. RNT medical college is the tertiary care center of southern Rajasthan, covered 5 districts which most of the tribal belt and tribal district of nearby state also. The main reason of high mortality due to covid is lack of awareness, delay in seeking medical treatment and admission in institution in severe condition. We followed patients until hospital discharge or death but study lacks long term follow-up data including neonatal outcomes.

A study done by Yee et al their study the proportions of leukocytosis, lymphopenia and elevated CRP levels were 36 %,43% and 48% respectively.[11] In our study lymphocytosis, lymphopenia, elevated CRP were seen in 37%,39% and 48% respectively.

In our study most prevalent symptom was dyspnea, it was seen in 85% of patients, followed by fever n cough were seen in 74% and 70% of patients respectively, in study by Gao et al fever followed by dry cough being the most common clinical presentation.[12]

In our study 2% of patient's diabetes present. Eclampsia and preeclampsia were seen in 4% and 18% of patients respectively. A Study by Yan et al there is 7.8% with gestational diabetes, 4.3% with hypertensive disorders.

In study by Tarun et al 40% of early preterm deliveries (<34 week) and 60% were late preterm deliveries (34.1-

36.6 week).[13] In study most of patients were of <34 week of gestational age group in our study 53% of patients were admitted with <34 week and 22% were of 34.1-36.6 week

In study by Yan et al 5.2% received ventilation, 1.7% received invasive ventilation.[14] In our study invasive ventilation received by 26% of patients while 70% received oxygen by non-invasive ventilation (11%), Bains (18%) rest by NRBM and venturi mask.

Some studies have shown that SARS-COV-2 infection may create a proinflammatory state that is followed by systemic endothelial dysfunction and preeclampsia.[15,16] our finding is consistent with a 2020 study in Sweden that reported pregnant people with COVID-19 had a higher prevalence of preeclampsia.[17]

CONCLUSION

Although pregnant women do not seem to present an increased susceptibility to COVID-19 infection or more severe complications than non-pregnant females. Our study suggest they may be at increased risk of adverse pregnancy outcome for mother and fetus. Similar to general population comorbidities do play a role in the outcome of disease in pregnancy. At the end of study few things remain unclear whether to deliver early in the hope of improving the chest wall compliance and lung function or to treat and stabilize the patient first before subjecting her to stress of labour which may flare up the cytokine response. Secondly whether to go for an early intubation and ventilation to prevent maternal and fetal hypoxia or delay the intubation as long as possible with the aid of high flow oxygen. Both pregnancy and COVID-19 infection raise the risk of thromboembolic diseases, highlighting the need for long term follow up data in pregnant and postpartum women with COVID-19. Our study lacks the long term follow up data of pregnant women including neonatal outcome.

REFERENCES

1. Somervilee LK, Basile K, Dwyer DE, Kok J. The impact of influenza virus infection in pregnancy. Fut Microbiol. 2018;13:263-74.
2. Rigby FB, Pastorek JG. 2 Pneumonia during pregnancy. Clin Obstet Gynecol. 1996;39:10719.
3. Khan S, Niederman MS. Pneumonia in the pregnant patient in: Rosene-montela K, Bourjeily G, editores. pulmonary problems in pregnancy. New York Humana press. 2009;177-96.
4. Dashraath P, Wong JLJ, Lim Mxk. corona virus disease 2019 pandemic and pregnancy. Amj obstet Gynecol. 2020;222(6):521-31.
5. Wong SF, Chow KM, Leung TN. Pregnancy and perinatal outcome of women with severe acute respiratory syndrome. Am J Obstet Gynecol. 2004;191(1):292-7.
6. Ksiazek TG, Erdman D, Gold smith CS. A novel coronavirus associated with severe acute respiratory syndrome. N Enge J Med. 2003;348(20):1953-66.
7. World Health Organization. Middle East Respiratory syndrome coronavirus (MERS-COV);nl-2019(EB/OL). 2019.
8. Reinhard G, Noll A, Schlebush H, Mallmann P, Ruecker AV. Shift in the Th1/Th2 balance during Human pregnancy correlate with apoptic changes. Biochem Res Commun. 1998;245(3):933-8.
9. Qiao J. What are the risks of COVID-19 infection in pregnant women? Lancet. 2020;395(10226):760-2.
10. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R. Features, Evaluation, and Treatment of Coronavirus (COVID-19). 2021 Jul 17. In: StatPearls. Treasure Island (FL): StatPearls Publishing. 2021;32150360.
11. Yee J, Kim W, Han JM, Yoon HY, Lee N, Lee KE et al. Clinical manifestations and perinatal outcomes of pregnant women with COVID-19: a systematic review and meta-analysis. Scientific rep. 2020;10(1):1-7.
12. Gao YJ, Ye L, Zhang JS, Yin Yx, Liv M, Yu HB. Clinical features and outcomes of pregnant women with covid 19: a systemic review and meta-analysis. BMC infect Dis. 2020;20:564.
13. Tarun O, Hakim A, Dashraath P, Jeslyn WJL, Wright A, Abdul Kadir R. clinical characteristics, prognostic factors and maternal and neonatal outcomes of SARS-COV 2 infection Among hospitalized pregnant women: A systemic review Int J Gynecol Obstet. 2020;151(1).
14. Yan J, Gyo J, Fan C, Zhang Y, Poon L, Yang H. Corona virus disease 2019 in pregnant women; a report based on 116 cases. 2019.
15. Coronado-Arroyo JC, Conception-Zavaleta MJ, Zavaleta -Gutierrez FE. Is COVID-19 a risk factor for severe pre-eclmapsia? Hospital experience in a developing country. Eur J Obstet Gynecol Repord Biol. 2021;256:502-32.
16. Todros T, Masturzo B, Francia SD. COVID-19 infection: ACE2, pregnancy and preeclampsia. Eur J Obstet Gynecol Record Biol. 2020;253:330.
17. Been JV, Ochoa LB, Bertens LCM. Impact of COVID 19 mitigation measures on the incidence of preterm birth: a national quasi- experimental study. Lancet Public Health. 2020;5:e604-11.