

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20214644>

Original Research Article

A comparative review of maternal and neonatal outcome among pregnant women with COVID-19 in first and second wave in a tertiary care centre of South Rajasthan

Divya Chaudhary*, Madhubala Chauhan, Diksha Gupta, Shivraj Jat

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

Received: 16 October 2021

Accepted: 11 November 2021

*Correspondence:

Dr. Divya Chaudhary,

E-mail: Dr.divyachaudhary@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Corona virus disease 2019 has taken a huge toll over health infrastructure and care all across the world. This article depicts our experience of COVID-19 in pregnant women and analyses maternal and neonatal outcome of same in first and second wave of this pandemic. Aim and objectives of the study were to compare the demographic characteristics, presenting features and fetomaternal outcome in COVID positive pregnant women in first v/s second wave in a tertiary care hospital.

Methods: The RTPCR COVID-19 positive pregnant women admitted during the period April-2020 to March-2021 were considered in 1st wave of COVID-19 and that from April-2021 till June-2021 as 2nd wave of COVID-19. Data like baseline characteristics, past medical, obstetric history, clinical presentation, laboratory results, imaging findings, management modalities, maternal and neonatal outcome were analysed and compared.

Results: Peak of 1st wave of COVID-19 was found during the months of July-September 2020, while of 2nd in April-June 2021. Most women presented with COVID-19 RTPCR positive were asymptomatic both in 1st and 2nd wave. Though most patients were managed on room air in both waves, 6.52% and 9.38% were on oxygen, 1.09% and 10.94% were managed with mechanical ventilation and BIPAP in 1st and 2nd wave respectively. There was significant ($p < 0.05$) increase in maternal deaths in the 2nd wave (7.03%) as compared to 1st wave (1.09%).

Conclusions: A significantly large number of patients were affected in 2nd wave of COVID-19 pandemic with more morbidity and mortality. Neonatal population remained relatively unaffected in both waves.

Keywords: COVID-19, Maternal mortality, 2nd Wave of COVID-19, Pregnancy in COVID

INTRODUCTION

Coronavirus disease 2019 (COVID-2019) caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), since its declaration as a pandemic by WHO on March, 11, 2020¹, has taken a huge toll over health infrastructure and care all across the world. As of May 2021, over 170 million people all over the world have been infected, which represents approximately 2.15% of world population (170 million/ 7.9 billion). 3 million people lost their lives in this battle making the death rate of approximately 1.7%. India has 28 million COVID-19

positive cases as of May 2021 with death of more than 3 lakh cases.²

The effects of SARS-CoV-2 are influenced by patient's age and comorbidities.³ Pregnant women, due to their physiological changes of immunity and anatomical changes, were believed to be more susceptible to virus infection.⁴

This article depicts our experience of COVID-19 in pregnant women and analyses maternal and neonatal outcomes in 1st and 2nd wave of this pandemic.

Aim and objectives

Aim and objectives of the study were to compare the demographic characteristics, presenting features and fetomaternal outcome in COVID positive pregnant women in First v/s Second wave in a tertiary care hospital of Southern Rajasthan.

METHODS

All pregnant women, coming to our centre, OPD or emergency, who met at least one of the criteria for COVID-19 testing were tested. The medical records of these pregnant women with laboratory confirmed COVID-19 pneumonia and being admitted at RNT Medical College and Hospital, Udaipur between April 2020 to June 2021, were retrospectively reviewed. The patients admitted during the period April-2020 to March-2021 were considered in 1st wave of COVID-19 and that from April-2021 till June 2021 as of 2nd wave of COVID-19. All pregnant women with RTPCR positive were advised admission. Those who refused admission at our centre or opted for the home isolation were not included in this study.

Criteria of COVID-19 testing at our institute included: Symptoms of COVID-19; History of exposure to people with COVID-19; travel history; coming from hot spot areas; undergoing operative caesarean delivery.

Such pregnant women were then subjected to RTPCR (SARS-CoV-2) on deep nasopharyngeal and pharyngeal samples. Sample collection, processing and laboratory testing were done according to WHO guidance.⁵ In this study, we have included 220 pregnant women who were admitted to our centre with RTPCR positive.

Data collection

Data collection was done using medical records of included patients presenting in RNTMC, Udaipur. Data included baseline characteristics, past medical history, obstetric history, clinical presentation, laboratory results, imaging findings, management modalities, maternal and neonatal outcome.

Classification of socioeconomic classes were done on the basis of Kuppaswamy's new classification.

Statistical analysis

Statistical analysis was done with SPSS, version 20.0. Continuous variables were directly expressed as a range. Categorical variables were expressed as number (%). Parametric and non-parametric data were assessed according to tests applicable and results were analysed. P value of <0.05 was considered to be statistically significant.

RESULTS

Mean age of pregnant women with COVID-19 in 1st wave was 27.37 ± 5.05 years with a range of 19 to 37 years and mean age in 2nd wave was 26.89 ± 5.25 years. Average duration of stay at our centre was 8.21 ± 3.6 days in 1st wave (range 3-17 days) and 17.46 ± 2.40 days in 2nd wave (range 8-23 days) which was significantly high. Mean BMI was 24.42 ± 7.76 1st wave and 25.52 ± 4.37 2nd wave. Gestational age at presentation was also similar in both waves.

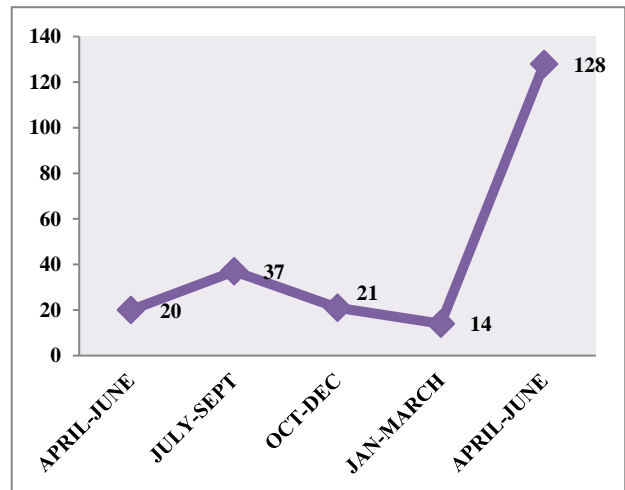


Figure 1: Number of COVID positive pregnant women admissions.

In 1st wave of COVID-19 peak patients were found during the months of July-September 2020 which decreased in the months of Jan-March 2021, while a sudden rise was seen in the months of April-June 2021 with significantly higher number (128) of COVID-19 infected pregnant patients.

Most women presented with COVID-19 RTPCR positive were asymptomatic both in 1st and 2nd wave of COVID-19. In first wave fever was seen in 31.52%, cough and myalgia in 25%, loss of taste in 13.04%, loss of smell in 8.70%, headache in 5.43%, sore throat in 3.26%, diarrhoea in 2.17%, shortness of breath in 2.17% and running nose/cold in 1.09% each.

In second wave fever was seen in 46.87%, cough in 34.37%, myalgia in 42.19%, headache in 20.31%, loss of taste in 16.41%, loss of smell in 17.19% and sore throat in 6.25%, which were much more and statistically highly significant as compared to 1st wave.

X-ray was also done in selected cases in 1st and 2nd wave of COVID-19. We found abnormal in 14 (15.22%) and 27 (21.09%) cases in 1st and 2nd wave respectively.

Most of the patients were managed on room air which included 90.22% in 1st wave and 79.69% in 2nd wave, 6.52% and 9.38% were on oxygen, 2.17% and 8.59% were on BIPAP 4.68% were managed with mechanical ventilation in 2nd wave.

There was significant ($p < 0.05$) increase in maternal deaths in the 2nd wave (7.03%) as compared to 1st wave (1.09%).

In first wave of COVID-19, 17 (18.48%) women had vaginal delivery, 50 (54.35%) had caesarean section, 2 (2.17%) had manual vacuum aspiration and 23 (25%) were not delivered. In 2nd wave 29 (22.66%) had vaginal delivery, 63 (49.22%) had caesarean section and 36 (28.13%) didn't deliver. Fetal distress and previous CS were the major indications for LSCS.

In first wave of COVID-19 of all the 70 babies born to women with active COVID infection, <1.5 kg was 4.29%, 1.5-2 kg were 10%, 2-2.5 kg were 14.29%, >2.5 kg was 65.71%, data not available for 5.71%, since they came to us post-delivery. All the babies born to women with h/o COVID infection were >2.5 kg. APGAR score at 5 min was noted ≤ 5 in 7 newborn (including 3 IUFD), 6 in 4, 7 in 10, 8 in 15, and 9 in 30 newborn babies. Data is not

available for 4 outside delivered babies. Resuscitation was given to 11 babies at birth. Vertical transmission was seen in 2 babies out of all babies born with COVID-19 infection. No neonatal death was seen in babies of active COVID positive mothers.

In second wave of COVID-19 of all the 95 babies born to women with active infection and history of COVID infection, APGAR score at 5 min was noted ≤ 5 in 7 newborn (including 5 IUFD), 6 in 3, 7 in 10, 8 in 37, and 9 in 35 newborn babies. Resuscitation was given to 10 babies at birth. Vertical transmission was seen in 3 babies. These findings were similar to that of the 1st wave. Although five neonatal deaths were observed in babies of active COVID positive mothers. Reasons for neonatal death were meconium aspiration, RDS and extremely low birth weight. None of the neonates with COVID RTPCR positive died in the second wave of COVID-19.

Table 1: Demographic of data.

Variables	1 st wave, (n=92)				2 nd wave, (n=128)				P value
	Mean	SD	Min	Max	Mean	SD	Min	Max	
Age (years)	27.37	5.05	19	37	26.89	5.25	18	42	0.49
Duration of stay (days)	8.21	3.6	3	17	17.46	2.40	10	23	0.001*
BMI	24.42	7.76	19.3	32.1	25.52	4.37	21.1	32.2	0.08
GA at presentation	34.87	7.36	8.2	40.4	36.38	5.31	16	41	0.09

Table 2: Maternal parameters.

Variables	1 st wave, (n=92)		2 nd wave, (n=128)		P value	
	No.	%	No.	%		
Area of living	Rural	46	50	71	55.47	0.423
	Urban	46	50	57	44.53	0.423
Socio-economic status	Lower	12	13.04	12	9.38	0.389
	Lower middle	32	34.78	37	28.91	0.354
	Middle	40	43.48	66	51.56	0.237
	Upper middle	5	5.43	9	7.03	0.632
	Upper	3	3.26	4	3.13	0.955
Gravida	Primi	31	33.70	56	43.75	0.132
	Multi	61	66.30	72	56.25	
Number of fetus	Single	77	83.69	125	97.66	0.001*
	Twins	3	3.26	3	2.34	0.680

Table 3: Maternal sign, symptoms, investigation and outcome.

Variables	1 st wave, (n=92)		2 nd wave, (n=128)		P value	
	No.	%	No.	%		
Symptoms	Asymptomatic	57	61.96	91	71.09	0.011*
	Fever	29	31.52	60	46.87	0.02*
	Cough	23	25.00	44	34.37	0.136
	Loss of taste	12	13.04	21	16.41	0.491
	Loss of smell	8	8.70	22	17.19	0.05*
	Myalgia	23	25.00	54	42.19	0.001*
	Headache	5	5.43	26	20.31	0.001*
	Sore throat	3	3.26	8	6.25	0.31
	Diarrhea	2	2.17	4	3.13	0.67
	Shortness of breath	2	2.17	26	20.31	0.001*
	Running nose	1	1.09	-	-	-

Continued.

Variables	1 st wave, (n=92)		2 nd wave, (n=128)		P value	
	No.	%	No.	%		
TLC range	<11000	51	55.43	85	66.41	0.098
	11000-20000	40	43.48	40	31.25	0.063
	>20000	1	1.09	3	2.34	0.491
CRP	<5	2	2.17	6	4.69	0.326
	5-25	38	41.30	62	48.44	0.295
	26-100	41	44.57	46	35.94	0.197
	>100	0	0.00	14	10.94	0.001*
	Not done	11	11.96	0	0.00	0.001*
IL-6	0-7	10	10.87	4	3.13	0.020*
	8-14	4	4.35	8	6.25	0.540
	15-100	20	21.74	25	19.53	0.689
	101-500	2	2.17	1	0.78	0.380
	>500	0	0.00	0	0.00	-
	Not done	56	60.87	90	70.31	0.144
S. Ferritin	Normal (50-150)	16	17.39	12	9.38	0.078
	Raised	6	6.52	25	19.53	0.006*
	Decreased	14	15.22	0	0.00	0.001*
	Not done	56	60.87	91	71.09	0.112
Platelet count (Lakh)	<0.5	3	3.26	1	0.78	0.175
	0.5-1	5	5.43	7	5.47	0.991
	1-1.5	9	9.78	27	21.09	0.025*
	>1.5	75	81.52	93	72.66	0.127
X-ray	B/L ground glass opacities	13	14.13	25	19.53	0.296
	B/L pleural effusion	1	1.09	2	1.56	0.764
	No abnormality detected	3	3.26	5	3.91	0.801
	Not done	75	81.52	96	75.00	0.251
Managed with	Room air	83	90.22	102	79.69	0.035*
	Oxygen	6	6.52	12	9.38	0.446
	BIPAP	2	2.17	8	6.25	0.152
	Mechanical ventilation	0	0	6	4.68	0.035*
Maternal	Deaths	1	1.09	9	7.03	0.037*

Table 4: Mode of delivery and indication of LSCS.

Variables	1 st wave, (n=92)		2 nd wave, (n=128)		P value	
	No.	%	No.	%		
Mode of delivery	Vaginal	17	18.48	29	22.66	0.452
	LSCS	50	54.35	63	49.22	0.453
	Manual vacuum aspiration	2	2.17	0	0	0.094
	Not delivered	23	25	36	28.13	0.001*
Indication of LSCS	Malpresentation	10	10.87	10	15.87	0.437
	Oligohydramnios	19	20.65	13	10.16	0.001*
	CPD	2	2.17	5	7.94	0.470
	Cong. diaphragmatic hernia in baby	1	1.09	-	-	-
	Failed induction	2	2.17	8	12.70	0.152
	Fetal distress	10	10.87	17	26.98	0.591
	Maternal request	1	1.09	4	6.35	0.317
	PIH (Severe)	3	3.26	-	-	-
	Previous CS	12	13.04	16	25.40	0.905

Table 5: Neonatal outcome.

Variables	1 st wave, (n=70)		2 nd wave, (n=95)		P value	
	No.	%	No.	%		
Birth weight (kg)	<1.5	3	4.29	4	4.21	0.77
	1.5-2	7	10	14	14.74	
	2 – 2.5	10	14.29	10	10.53	
	>2.5	46	65.71	64	67.37	
	Data not available	4	5.71	3	3.16	
APGAR at 5 min	≤5	7	10	7	7.37	0.27
	6	4	5.71	3	3.16	
	7	10	14.29	10	10.53	
	8	15	21.43	37	38.95	
	9	30	42.86	35	36.84	
	Data not available	4	5.71	3	3.16	
Resuscitation at delivery	Yes	11	15.71	10	10.53	0.41
	No	55	78.57	82	86.32	
	Data not available	4	5.71	3	3.16	
Vertical transmission	Yes	2	2.86	3	3.16	0.72
	No	64	91.43	89	93.68	
	Not available	4	5.71	3	3.16	
Neonatal death	Yes	0	0.00	5	5.26	0.05*
	No	70	100	90	94.74	
IUFD	Yes	3	4.28	5	5.26	0.25
	No	67	95.72	90	94.74	
Newborn complications	COVID positive	2	2.86	3	3.16	0.91
	Lbw	20	28.57	28	29.47	0.90
	NICU admission	9	12.86	14	14.74	0.73
	Preterm	15	21.43	25	26.32	0.47
	Msl	7	7.60	10	10.53	0.91
	Neonatal hypoglycemia	1	1.43	0	0.00	0.24
	RDS	4	5.71	11	11.58	0.19
	Cong. diaphragmatic hernia in baby	1	1.43	0	0.00	0.24
	None	44	62.86	65	68.42	0.46
Data not available	4	5.71	3	3.16	0.42	

DISCUSSION

With each passing day with COVID-19 and rapidly mutating strains, we are coming across a wide range of manifestations in different individuals. As a result of which the guidelines for managing these patients are changing rapidly as well. Although the death rate, in general population, due to COVID-19 infection is low, the evidence of the same for pregnant women is grossly lacking. We suggest more and more data to be published, so as to get the trend of COVID-19 infection in pregnant women and maternal and neonatal outcome can be compared.

The report from center for disease control and prevention (CDC) compared 8,207 cases of COVID-19 in pregnant women with 83,205 cases in non-pregnant women.⁶ Although the report showed a higher number of hospitalizations, ICU admissions, mechanical ventilation among the pregnant group but death rate among these two groups was found to be similar. In our study, during the 2nd wave, the need for mechanical ventilation was

significantly higher during pregnancy 6 (4.68%) as compared to none in 1st wave. Also, the maternal death rate during 2nd wave (7.03%) pregnancy was significantly high as compared to 1st wave (1.09%). Also, the neonatal deaths were significantly more 5 (5.26%) during the 2nd wave delivery as compared to none in the 1st wave but none was due to COVID infection per se.

Fever was present in 29 (31.52%) cases in the 1st wave as compared to 60 (46.87%) cases in 2nd wave, similarly symptoms like cough, myalgia, headache and shortness of breath were also much more during the 2nd wave of COVID-19. Our findings were similar to findings reported by Juan et al in their study during the 1st wave.¹³

Although most common pregnant ladies diagnosed with COVID were asymptomatic i.e., 61.92% in 1st wave and 71.09% in second wave, most common symptoms were fever, cough and myalgia. Headache and diarrhoea were seen less common. Most of the asymptomatic women had laboratory findings also in normal limits. In 1st wave leukocytosis was seen in 41 women (44.56%). Raised CRP

(>5) in 79 women, raised IL-6 (>7) in 26 women and raised ferritin (>150) seen in 6 women and that in second wave, leukocytosis was there in 43, raised CRP in 122 women, raised IL-6 in 34 and raised ferritin in 25 women. Of all women with raised ferritin, all had severe symptoms of COVID-19 infection. More studies are required to establish S. ferritin as a good marker of severity of COVID. X-ray was done only in selected cases with moderate to severe symptoms or atypical symptoms and were found abnormal in 14 cases out of 17 X-rays in 1st wave and in 27 out of 32 X-rays done in 2nd wave. CT scan was not done in any of our cases. D-dimer was also not done at our centre. Most of the cases were managed on room air during 1st wave (90.22%) as well as during 2nd wave (79.69%) but the need of mechanical ventilation was significantly high in 2nd wave, no one in 1st wave compared to 6 cases in second wave (4.68%). The case-fatality rate of 1st wave (0.43%) is lower than the mortality of COVID-19 patients reported by world health organization (6.80%) and the Chinese center for disease control and prevention (2.29%) and similar to the overall maternal mortality rate worldwide during the 1st wave (1 in 180) while in 2nd wave the scenario got totally changed and a significant 9 maternal deaths (7.03%) were seen.⁸⁻¹⁰

The average gestational age among women who were delivered was 34.87 in 1st wave and 36.38 weeks in 2nd wave. This is different from Chinese study where average gestational age was 38.1 weeks.¹⁰ The rate of preterm birth in 1st wave was 21.43% and 26.32% in second wave. This is different from 55/57 preterm births in China, and 32/57 from Italy.¹¹ 54.35% in 1st wave and 49.22 % of women in 2nd wave underwent caesarean delivery, Juan et al, from Italy, and a study in the United States showed a bit different result.^{12,13}

No neonatal deaths secondary to COVID-19 were reported in this study. In a Chinese report the NICU admission rate was 134 of 137 newborns, similar reports were from the United States.¹² In this study the overall NICU admission rate was 12.86% in 1st wave and 14.74% in 2nd wave. There were 2 (2.86%) in 1st wave and 3 (3.16%) cases of vertical transmission among 95 deliveries in 2nd wave. Findings of Juan et al are different who reported none in 310 deliveries to have vertical transmission, for which reverse-transcription polymerase chain reaction data were made available.¹³

We acknowledge that the true effect of the virus on both maternal and fetal morbidity and mortality will only be evident overtime.

CONCLUSION

Though the duration of 1st wave was longer than 2nd wave, a significantly large number of patients were affected in 2nd wave of COVID-19 pandemic with more morbidity and mortality. Vertical transmission was seen in few neonates. Neonatal population remained relatively unaffected in both 1st as well as 2nd wave. Many more patients required

mechanical ventilation, but most of the women were managed on room air. As there was rise in the maternal mortality and morbidity during the 2nd wave, which was alarming, hence vaccination drive for pregnant women needs to be boosted.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. WHO. Rolling updates on coronavirus disease (COVID19). 2020. Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-asthey-happen>. Accessed on <https://coronavirus.jhu.edu/map.html>. Accessed on March 25, 2020.
2. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet.* 2020;395:1038-54.
3. Tan EK, Tan EL. Alterations in physiology and anatomy during pregnancy. *Best Pract Res Clin Obstet Gynaecol.* 2013;27(6):791-802.
4. WHO Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases. Interim guidance. Available at: <https://www.who.int/publications-detail/laboratory-testing-for-2019-novel-coronavirus-in-suspected-human-cases-20200117>. Accessed on Jan 17, 2020.
5. Ellington S, Strid P, Tong VT, Woodworth K, Galang RR, Zambrano LD et al. Characteristics of women of reproductive age with laboratory-confirmed SARS-CoV-2 infection by pregnancy status-United States, January 22-June 7, 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69:769-75.
6. Naccasha N, Gervasi MT, Chaiworapongsa T, Berman S, Yoon BH, Maymon E et al. Phenotypic and metabolic characteristics of monocytes and granulocytes in normal pregnancy and maternal infection. *Am J Obstet Gynecol.* 2001;185(5):1118-23.
7. Kalafat E, Yaprak E, Cinar G, Varli B, Ozisik S, Uzun C. Lung ultrasound and computed tomographic findings in pregnant woman with COVID-19. *Ultrasound Obstet Gynecol.* 2020;55(6):835-7.
8. Karami P, Naghavi M, Feyzi A, Aghamohammadi M, Novin MS, Mobaeni A. Mortality of a pregnant patient diagnosed with COVID-19: A case report with clinical, radiological, and histopathological findings. *Travel Med Infect Dis.* 2020;101665.
9. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA.* 2020;323(11):1061-9.
10. Buonsenso D, Raffaelli F, Tamburrini E, Biasucci DG, Salvi S, Smargiassi A. Clinical role of lung

- ultrasound for the diagnosis and monitoring of COVID-19 pneumonia in pregnant women. *Ultrasound Obstet Gynecol.* 2020;22055.
11. Iqbal SN, Overcash R, Mokhtari N, Saeed H, Gold S, Auguste T. An Uncomplicated Delivery in a Patient with COVID-19 in the United States. *N Engl J Med.* 2020;382(16):e34.
 12. Juan J, Gil M, Rong Z, Zhang Y, Yang H, Poon LC. Effects of coronavirus disease 2019 (COVID-19) on maternal, perinatal and neonatal outcomes: a systematic review. *China Ultrasound in Obstet Gynaecol.* 2020;56(1):15-27.

Cite this article as: Chaudhary D, Chauhan M, Gupta D, Jat S. A comparative review of maternal and neonatal outcome among pregnant women with COVID-19 in first and second wave in a tertiary care centre of South Rajasthan. *Int J Reprod Contracept Obstet Gynecol* 2021;10:4471-7.