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

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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
Aim and objectives

Aim and objectives of the study were to compare the demographic characteristics, presenting features and feto-maternal 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. 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 Kuppuswamy'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.

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

### Table 2: Maternal parameters.

| Variables         | 1st wave, (n=92) | 2nd wave, (n=128) | P value |
|-------------------|-----------------|-------------------|---------|
|                   | No. | %   | 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           |     |     |     |     |                     |     |     |                     |         |
| Primigravida      | 31  | 33.70 | 56 | 43.75 | 0.132               |     |     |                     |         |
| Multigravida      | 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 | 1st wave, (n=92) | 2nd wave, (n=128) | P value |
|-----------|-----------------|-------------------|---------|
|           | No. | %   | 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.
### Table 4: Mode of delivery and indication of LSCS.

| Variables                      | 1st wave, (n=92) | 2nd 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**         |                  |                   |         |
| Cong. diaphragmatic hernia in baby | 1 (1.09)   | -                 | -       |
| Failed induction               | 2 (2.17)         | 8 (6.25)          | 0.152   |
| Fetal distress                 | 10 (10.87)       | 17 (13.04)        | 0.591   |
| Maternal request               | 1 (1.09)         | 4 (3.26)          | 0.317   |
| PIH (Severe)                   | 3 (3.26)         | -                 | -       |
| Previous CS                    | 12 (13.04)       | 16 (13.26)        | 0.905   |
Table 5: Neonatal outcome.

| Variables                  | 1st wave, (n=70) | 2nd wave, (n=95) | P value |
|----------------------------|-----------------|-----------------|---------|
| Birth weight (kg)          |                 |                 |         |
| <1.5                       | 3               | 4               | 4.29    | 4.21    | 0.77    |
| 1.5-2                      | 7               | 14              | 10.74   |         |
| 2 – 2.5                    | 10              | 10              | 10.53   |         |
| >2.5                       | 46              | 64              | 67.37   |         |
| Data not available         | 4               | 3               | 3.16    |         |
| APGAR at 5 min             |                 |                 |         |
| ≤5                         | 7               | 7               | 7.37    |         |
| 6                          | 4               | 3               | 3.16    |         |
| 7                          | 10              | 10              | 10.53   |         |
| 8                          | 15              | 37              | 38.95   |         |
| 9                          | 30              | 35              | 36.84   |         |
| Data not available         | 4               | 3               | 3.16    |         |
| Resuscitation at delivery  |                 |                 |         |
| Yes                        | 11              | 10              | 10.53   |         |
| No                         | 55              | 82              | 86.32   |         |
| Data not available         | 4               | 3               | 3.16    |         |
| Vertical transmission      |                 |                 |         |
| Yes                        | 2               | 3               | 3.16    |         |
| No                         | 64              | 89              | 93.68   |         |
| Not available              | 4               | 3               | 3.16    |         |
| Neonatal death             |                 |                 |         |
| Yes                        | 0               | 5               | 5.26    |         |
| No                         | 70              | 90              | 94.74   | 0.05*   |
| IUFD                       |                 |                 |         |
| Yes                        | 3               | 5               | 5.26    | 0.25    |
| No                         | 67              | 90              | 94.74   |         |
| Newborn complications      |                 |                 |         |
| COVID positive             | 2               | 3               | 3.16    | 0.91    |
| Lbw                        | 20              | 28              | 29.47   | 0.90    |
| NICU admission             | 9               | 14              | 14.74   | 0.73    |
| Preterm                    | 15              | 25              | 26.32   | 0.47    |
| Msl                        | 7               | 10              | 10.53   | 0.91    |
| Neonatal hypoglycemia      | 1               | 0               | 0.00    | 0.24    |
| RDS                        | 4               | 11              | 11.58   | 0.19    |
| Cong. diaphragmatic hernia in baby | 1          | 0               | 0.00    | 0.24    |
| None                       | 44              | 65              | 68.42   | 0.46    |
| Data not available         | 4               | 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. 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.

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

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(>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

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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.