



Research Article

# Impact of Corona Virus Disease in Pregnancy and Newborn

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## A B S T R A C T

**Background:** The novel corona virus has made the world standstill. In India COVID first and second wave has created dramatic fear among the pregnant mothers and the treating obstetricians.

**Objectives:** To study the impact of COVID-19 in pregnancy, newborn and to compare the maternal and neonatal outcome among COVID-19 negative and COVID-19 positive pregnant women during the first and second COVID wave.

**Materials and Method:** This was a prospective study done over one year from July 2020 to July 2021 in a tertiary care hospital in South India. 400 pregnant women attending antenatal outpatient department during COVID willing to participate in the study were included. Nasopharyngeal RT-PCR was done. Socio-demographic profile, maternal and neonatal outcome were compared between non COVID and COVID positive pregnant women.

**Results:** A total of 400 pregnant women were screened for corona virus. 75 pregnant mothers turned positive for COVID-19 and 325 were negative. Among them, 10 were positive during first wave and 65 during second wave. Of them, 20 (26.7%) were asymptomatic and 55 (73.3%) were symptomatic. During the second COVID wave, there was a rise in missed miscarriage (21.5%), intrauterine growth restriction (46.15%), oligohydramnios (53.8%) and intrauterine demise (4.6%). The rate of caesarean and neonatal intensive care unit admission also increased to 70.3% and 59.5% respectively.

**Conclusion:** This study has found increased maternal and neonatal adverse effects associated with COVID second wave. Hence vaccine should be recommended for all pregnant women.

**Keywords:** Corona Virus, Impact, Maternal, Newborn, Pregnancy, Vaccine



### Introduction

The novel coronavirus disease has spread globally to more than 200 countries. COVID-19 was declared as a pandemic by World Health Organization.<sup>1</sup> At present there were 245,373,039 infected cases and 4,979,421 deaths globally. In India, there were 34,285,814 infected cases and 458,437 deaths due to coronavirus. WHO has estimated the global mortality of 3.4% with the novel coronavirus.

The world is witnessing the battle against the novel coronavirus. The novel coronavirus is similar to severe acute respiratory syndrome (SARS-CoV) and Middle-East respiratory syndrome (MERS-CoV). The virus has 79% nucleotide identity with SARS-CoV and 50% with MERS-CoV.<sup>2-4</sup> Literature review shows that SARS-CoV infected 12 pregnant women during the 2002-2003 pandemic. Four (57%) women had a miscarriage in the first trimester. In the second and third trimesters, two (40%) women had foetal growth restriction and four (80%) women had a preterm birth.<sup>2,3</sup> In the 2012-2015 pandemic, MERS-CoV infected 11 pregnant women. Of them, two (20%) women had preterm delivery and ten (91%) women had adverse outcomes. 55% of the neonates required admission to the intensive care unit and 27% died.<sup>3-5</sup> The global mortality rate was 10% for SARS-CoV and 37% for MERS-CoV.

However, there is a lack of literature on the impact of coronavirus disease in pregnancy in South India. This study was designed to describe the effects of COVID-19 during pregnancy and to compare the maternal and neonatal outcomes among COVID-19 negative and COVID-19 positive pregnant women during the first and second wave.

### Materials and Methods

This was a prospective study done over one year from July 2020 to July 2021 in a tertiary care hospital in South India after obtaining Institute ethical committee clearance. Inclusion criteria: All pregnant women irrespective of their duration of pregnancy, age and parity were approached for participation in the study during the study period. Exclusion criteria: Pregnant women in active stages of about were excluded and those who did not give consent for RT-PCR testing were excluded from the study. The objectives of the study were explained to them and confidentiality was assured. 400 pregnant women who attended the antenatal outpatient department during the COVID-19 pandemic and willing to participate in the study were included. Nasopharyngeal RT-PCR was done for all to confirm their COVID status. Participants eligible for the study, included in the study and analysed for outcomes were presented as follows in figure 1.

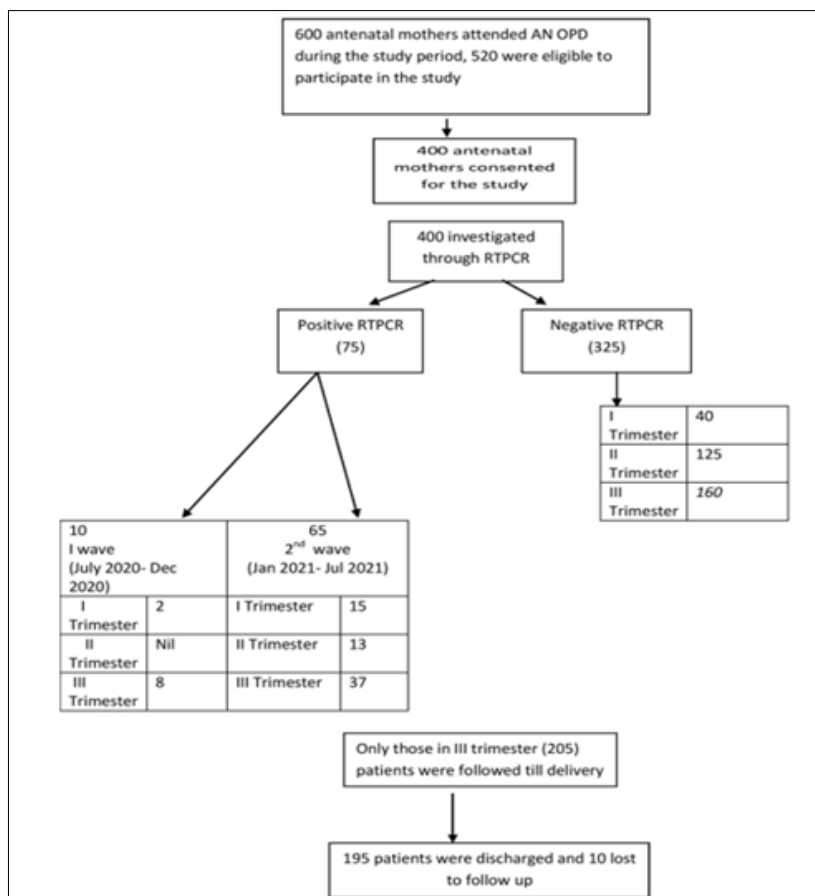


Figure I. Flow of study participants into the study

A semi-structured questionnaire was prepared to retrieve the following information from the study participants: demographic profile, obstetric index, symptoms, signs, comorbidities, laboratory reports, mode of delivery, maternal and perinatal outcome.

### Statistical Analysis

Data collected were entered in Microsoft excel sheet and analysed using IBM SPSS version 23. Descriptive analysis was done and the results were expressed in frequencies and percentages.

### Results

A total of 400 pregnant women were screened for coronavirus by real-time reverse transcription polymerase chain reaction using nasopharyngeal swab specimens during the study period. Out of them, 75 pregnant mothers were confirmed to

be positive for COVID-19 and 325 were negative constituting 18.75% and 81.25% respectively. During the first wave of COVID-19, 10 pregnant mothers and during the second wave, 65 pregnant mothers were confirmed for COVID RT-PCR and were included in the study. The socio-demographic profile of the study participants were shown in Table 1.

Among the 75 antenatal women with confirmed COVID-19, twenty (26.7%) were asymptomatic and 55 (73.3%) were symptomatic. Almost 80% had symptoms such as cough, sore throat and fever. Abnormalities in laboratory values such as leucocytosis and raised C-reactive protein was observed in 40 patients accounting for 53.3% in the study group. Other patients had normal complete blood count, renal, liver function test. LDH and D dimer were raised in one case. Chest X-ray with abdomen shield was done for all 75 women. Of these, haziness in lung was noticed in 25 women constituting 33.3%.

**Table 1. Sociodemographic Profile of Pregnant Women during COVID-19 (n=400)**

Characteristics	Non-COVID Pregnant Women (N=325)	CovidFirst Wave Pregnant Women (N=10)	CovidSecond Wave Pregnant Women (N=65)
Mean age (years)	28 ± 4	27	29±2
Obstetric history n (%)	Primi:170(52.3) Multi: 155 (47.7)	Primi: 6 (60) Multi: 4 (40)	Primi: 32 (49.2) Multi: 33 (50.7)
Trimester n (%)	First: 40 (12.3) Second: 125 (38.5) Third: 160 (49.2)	First: 2(20) Second: 0 (0) Third: 8 (80)	First: 15(23) Second: 13(20) Third: 37 (57)

**Table 2. Maternal and Neonatal Outcomes of 400 Pregnant Women during COVID-19**

Characteristics	Non-COVID Pregnant Women (N=325)	COVID First Wave Pregnant Women (N=10)	COVID Second Wave Pregnant Women (N=65)
Maternal complications	Anaemia: 92 Gestational Hypertension: 12 Gestational diabetes: 4 Hypothyroid: 12 Previous caesarean: 155	Hypothyroid: 1	Anaemia: 35 Gestational Hypertension: 18 Gestational diabetes: 2 Hypothyroid: 5 Previous caesarean: 12
Foetal complications n (%)	Threatened miscarriage: 2 (0.6) IUGR: 2 (0.6) Oligohydramnios: 4 (1.2)	Nil	Missed miscarriage: 14 (21.5) IUGR: 30 (46.15) Intrauterine demise: 3 (4.6) Oligohydramnios: 35 (53.8)
Delivered Mode of delivery n (%)	160 Vaginal: 108 (67.5) Caesarean: 52 (32.5)	8 Vaginal: 5(62.5) Caesarean: 3 (37.5)	37 Vaginal: 11 (29.7) Caesarean: 26 (70.3)
Outcome in Neonate n (%)	Term: 130 (81.3) Preterm: 30 (18.7)	Term: 6 (75) Preterm: 2 (25)	Term: 20 (54) Preterm: 17 (46)
Maternal ICU admission Maternal mortality	Nil Nil	Nil Nil	3 Nil
Neonatal ICU admission n (%) Neonatal mortality	12 (7.5) Nil	2(25) Nil	22 (59.5) 1

Asymptomatic pregnant mothers and those with mild COVID-19 were quarantined, administered drugs such as Azithromycin, Paracetamol, vitamin C and zinc. Those with moderate and severe disease received supportive measures such as oxygen, fluids, antivirals, intravenous antibiotics, steroids and low molecular weight heparin. Most of them were haemodynamically stable and three patients required intensive care admission. Injection Remdesivir was administered to mothers with severe disease. Steroids were also given for attaining foetal lung maturity.

Maternal and neonatal outcomes of these 75 confirmed COVID-19 positive mothers were compared with non-COVID pregnant women admitted to the hospital during the study period. The results were shown in Table 2.

#### **Risk Ratio for Threatened or Missed Miscarriage**

Risk in exposed = 21.54%, Risk in unexposed=0.61%, Risk ratio=35. In this study, antenatal mothers who were COVID-19 positive had 35 times the risk of threatened or missed miscarriage compared to antenatal mothers who were COVID-19 negative during the study.

#### **Risk Ratio for Oligohydramnios**

Risk in exposed = 53.85%, Risk in unexposed=1.23%, Risk ratio=43.75. In this study antenatal mothers who were COVID-19 positive had 43.75 times the risk of oligohydramnios compared to antenatal mothers who were COVID-19 negative during the study.

#### **Risk Ratio for IUGR**

Risk in exposed = 46.15%, Risk in unexposed=0.61%, Risk ratio=75. In this study, AN mothers who were COVID-19 positive had 75 times the risk of IUGR compared to AN mothers who were COVID-19 negative during the study.

Foetal surveillance by ultrasonogram was done for all. During the second COVID wave, there is a rise in missed miscarriage, intrauterine growth restriction, oligohydramnios and intrauterine demise. However, foetal malpresentation was not reported during the study period. During the second COVID wave, the rate of caesarean section increased to 70% when compared to 37.5% in the first wave. The common indications for caesarean section were foetal distress, intrauterine growth restriction and oligohydramnios. There was no maternal mortality in the study group. There were three intrauterine demise and one neonatal death. The probable cause was placental thrombosis attributed to COVID.

Among the neonates, 46% were preterm births and 54% were term births during the second COVID wave when compared to 25% preterm and 75% term during the first COVID wave. During the second COVID wave, 59.5% of the neonates required ICU admission. Most of them were admitted in view of preterm and low birth weight. These

neonates were discharged and in follow up in the neonatal clinics of the institution.

#### **Discussion**

With limited knowledge available on the effect of COVID-19, it was found that the pregnant woman is susceptible to severe coronavirus infection, especially in the third trimester.<sup>6</sup> The overall risk of death is low in pregnant women. The pregnant woman with COVID-19 can be asymptomatic or symptomatic. The incubation period of the virus is between two to ten days.<sup>7</sup> The virus infects all ages and the clinical manifestations may vary from mild to severe.<sup>8,9</sup> The symptoms may include common cold, fever, sore throat, cough, myalgia, shortness of breath, loss of sense of smell or taste, diarrhoea, etc. In severe cases, it can cause pneumonia, acute respiratory disease syndrome and even death. People with older age or with medical conditions such as heart disease, diabetes are at high risk of serious illness.<sup>1</sup>

Coronavirus was considered to be zoonotic initially. These viruses were found widespread in bats then spread from animals to humans. But later the virus has started to spread among humans through respiratory droplets. Currently, the virus spreads through direct contact and indirect contact but there is no evidence of virus transmission through genital fluids. However faecal shedding of the virus has been documented.<sup>6</sup>

Although vertical transmission is rare, there is an increased risk of stillbirth, small for gestational age babies and preterm births. In a study by Yu N et al., it was found that the symptoms in pregnant mothers were similar to that of non-pregnant women.<sup>9</sup> The maternal and neonatal outcomes during COVID-19 first wave in these seven infected mothers were good.

In the present study, 75 pregnant mothers were positive for COVID-19. Among them, 60% were primigravida and 40% were multigravida during the first COVID wave. 49.3% were Primigravida and 50.7% were multigravida in the second COVID wave. Complications such as missed miscarriage, intrauterine growth restriction, oligohydramnios were observed more in the second COVID wave. The rate of caesarean section and neonatal intensive care unit admission was also higher. This was similar to the study by Allotey J et al.<sup>10</sup>

The findings of the present study during the first wave of COVID were compared with other studies in China. In the study by Schwartz DA of the 38 infected pregnant women, there were no cases of maternal death.<sup>11,12</sup> There are case reports showing findings of preterm birth and foetal compromise among pregnant women with coronavirus disease.<sup>6</sup> In a study by Zhu H et al.<sup>13</sup> six out of nine women had intrauterine foetal distress and preterm delivery. The mode of delivery was caesarean in all.

In a case study by Wang S et al., it was found that pregnant mothers with COVID-19 required mechanical ventilation and emergency caesarean section.<sup>14</sup> At present, maternal deaths have also been reported in pregnant women with COVID-19.<sup>7</sup>

The primary management of COVID-19 in pregnancy includes early isolation, oxygen therapy, antipyretics, antibiotics, avoidance of fluid overload and involvement of multidisciplinary team.<sup>6</sup> Pulse rate, blood pressure, temperature, respiratory rate and oxygen saturation were monitored. Chest X-ray with abdomen shield was done for all pregnant mothers with COVID-19. Electronic foetal monitoring was recommended for all COVID mothers in labour. In India, as per the Federation of Obstetrics and Gynaecology, Hydroxychloroquine and Azithromycin were provided for COVID-19 positive cases during the first wave.<sup>15</sup> Studies in China have documented the use of antiviral drugs such as Ganciclovir, Oseltamivir and steroids.<sup>11,14</sup> However the antiviral drugs are used in moderate and severe illnesses in Indian scenario.<sup>15</sup> Most of the COVID-19 positive pregnant women in labour are managed by caesarean section in India during the second wave. This was similar to the reports in Italy and New York.<sup>16,17</sup>

In a study by Chen H et al., it was documented that there is no evidence of COVID-19 in amniotic fluid, cord blood, placenta or breast milk of infected mothers.<sup>12</sup> However in Yu N et al. and in a case report by Wang S et al., there was evidence of neonates infected with SARS-CoV-2 36 hours after birth.<sup>9,14</sup> There are also reports published with evidence of SARS-CoV-2 Ig M in neonate serum at birth. This shows the probability of vertical transmission of the virus. However, coronavirus disease is not a contraindication for breastfeeding.

As per the Government of India's guidelines, all COVID-19 cases have to be notified, quarantined along with their contacts to break the chain of transmission.<sup>18</sup>

Vaccination against COVID-19 is strongly recommended in pregnancy.<sup>6</sup> Hence vaccines should be offered to all pregnant mothers irrespective of the gestational age. At present three vaccines are approved in India. This includes COVAXIN (Bharath biotech), COVISHIELD (Astra Zeneca, Oxford, UK) and SPUTNIK V (Russia). The adverse effect of the vaccine is minor and is similar to the non-pregnant population. Vaccine during breastfeeding or lactation is also recommended.<sup>6,19</sup>

As the study was done in a tertiary care hospital, participants included in the study may not be representative of the population and the external validity or generalisability of the study is limited and it is hard to derive causal relationships from the current study. But this study can provide baseline information about the impact of COVID-19 on pregnancy

and newborns. In the future, prospective cohort studies can be done to prove the cause-effect relationships.

### Limitations

Convenience sampling was followed in the study to arrive at the sample size. Because of the pandemic situation, arriving at a larger sample size or following random sampling methods might not be feasible. So they were not adopted in the study which can lead to possible selection bias. Risk factors or health conditions were self-reported by the participants that can result in possible information bias.

As very fewer numbers of COVID-19 positive pregnant women were identified during the study period, studies involving a large cohort of study participants may further help to generate a hypothesis regarding the impact of COVID-19 in pregnant women and newborn

### Conclusion

This study has compared the maternal and neonatal outcome of COVID-19 positive pregnant women with COVID negative pregnant women and found that there are increased maternal and neonatal adverse effects during COVID second wave. Vaccination should be recommended for all pregnant women. They should also be advised to adhere to preventive measures such as social distancing, face masks, etc to prevent COVID-19.

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### References

1. World Health Organization [Internet]. Coronavirus disease (COVID-19): pregnancy and childbirth; 2021 [cited 2021 Aug 30]. Available from: <https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19-pregnancy-and-childbirth>
2. Wong SF, Chow KM, Leung TN, Ng WF, Ng TK, Shek CC, Ng PC, Lam PW, Ho LC, To WW, Lai ST, Yan WW, Tan PY. Pregnancy and perinatal outcomes of women with severe acute respiratory syndrome. *Am J Obstet Gynecol.* 2004 Jul;191(1):292-7. [PubMed] [Google Scholar]
3. Schwartz DA, Graham AL. Potential maternal and infant outcomes from (Wuhan) Coronavirus 2019-nCoV infecting pregnant women: lessons from SARS, MERS, and other human coronavirus infections. *Viruses.* 2020 Feb;12(2):194. [PubMed] [Google Scholar]
4. Alfaraj SH, Al-Tawfiq JA, Memish ZA. Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection during pregnancy: report of two cases & review of the literature. *J Microbiol Immunol Infect.* 2019 Jun;52(3):501-3. [PubMed] [Google Scholar]
5. Alserehi H, Wali G, Alshukairi A, Alraddadi B. Impact of Middle East Respiratory Syndrome coronavirus (MERS-

- CoV) on pregnancy and perinatal outcome. *BMC Infect Dis.* 2016 Mar;16:105. [PubMed] [Google Scholar]
6. Royal College of Obstetricians & Gynecologists [Internet]. Corona virus (COVID-19) infection in pregnancy; 2021. Last accessed on Oct 2021. Available from: <https://www.rcog.org.uk/globalassets/documents/guidelines/2021-08-25-coronavirus-covid-19-infection-in-pregnancy-v14.pdf>.
  7. Lauer SA, Grantz KH, Bi Q, Jones FK, Zheng Q, Meredith HR, Azman AS, Reich NG, Lessler J. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Ann Intern Med.* 2020 May;172(9):577-82. [PubMed] [Google Scholar]
  8. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z, Yu T, Xia J, Wei Y, Wu W, Xie X, Yin W, Li H, Liu M, Xiao Y, Gao H, Guo L, Xie J, Wang G, Jiang R, Gao Z, Jin Q, Wang J, Cao B. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.* 2020 Feb;395(10223):497-506. [PubMed] [Google Scholar]
  9. Yu N, Li W, Kang Q, Xiong Z, Wang S, Lin X, Liu Y, Xiao J, Liu H, Deng D, Chen S, Zeng W, Feng L, Wu J. Clinical features and obstetric and neonatal outcomes of pregnant patients with COVID-19 in Wuhan, China: a retrospective, single-centre, descriptive study. *Lancet Infect Dis.* 2020 May;20(5):559-64. [PubMed] [Google Scholar]
  10. Allotey J, Stallings E, Bonet M, Yap M, Chatterjee S, Kew T, Debenham L, Llavall AC, Dixit A, Zhou D, Balaji R, Lee SI, Qiu X, Yuan M, Coomar D, Sheikh J, Lawson H, Ansari K, van Wely M, van Leeuwen E, Kostova E, Kunst H, Khalil A, Tiberi S, Brizuela V, Broutet N, Kara E, Kim CR, Thorson A, Oladapo OT, Mofenson L, Zamora J, Thangaratinam S; PregCOV-19 Living Systematic Review Consortium. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. *BMJ.* 2020 Sep;370:m3320. [PubMed] [Google Scholar]
  11. Schwartz DA. An analysis of 38 pregnant women with COVID-19, their newborn infants, and maternal-fetal transmission of SARS-CoV-2: maternal coronavirus infections and pregnancy outcomes. *Arch Pathol Lab Med.* 2020 Jul;144(7):799-805. [PubMed] [Google Scholar]
  12. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, Li J, Zhao D, Xu D, Gong Q, Liao J, Yang H, Hou W, Zhang Y. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet.* 2020 Mar;395(10226):809-15. [PubMed] [Google Scholar]
  13. Zhu H, Wang L, Fang C, Peng S, Zhang L, Chang G, Xia S, Zhou W. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *TranslPediatr.* 2020 Feb;9(1):51-60. [PubMed] [Google Scholar]
  14. Wang S, Guo L, Chen L, Liu W, Cao Y, Zhang J, Feng L. A case report of neonatal 2019 coronavirus disease in China. *Clin Infect Dis.* 2020 Jul;71(15):853-7. [PubMed] [Google Scholar]
  15. The Federation of Obstetric and Gynecological Societies of India [Internet]. FOGSI GCPR Good Clinical Practice recommendation on Pregnancy with COVID-19 infection; 2020 [cited 2020 May 6]. Available from: [https://www.fogsi.org/wp-content/uploads/covid19/fogsi\\_gcpr\\_on\\_pregnancy\\_with\\_COVID\\_19\\_version\\_1.pdf](https://www.fogsi.org/wp-content/uploads/covid19/fogsi_gcpr_on_pregnancy_with_COVID_19_version_1.pdf)
  16. Maraschini A, Corsi E, Salvatore MA, Donati S, Group IC-W. Coronavirus and birth in Italy: results of a national population-based cohort study. *Ann Ist Super Sanita.* 2020 Jul-Sep;56(3):378-89. [PubMed] [Google Scholar]
  17. Prabhu M, Cagino K, Matthews KC, Friedlander RL, Glynn SM, Kubiak JM, Yang YJ, Zhao Z, Baergen RN, DiPace JI, Razavi AS, Skupski DW, Snyder JR, Singh HK, Kalish RB, Oxford CM, Riley LE. Pregnancy and postpartum outcomes in a universally tested population for SARS-CoV-2 in New York City: a prospective cohort study. *BJOG.* 2020 Nov;127(12):1548-56. [PubMed] [Google Scholar]
  18. Ministry of Health and Family Welfare, Government of India [Internet]. Guidelines for notifying COVID-19 affected persons by private institutions; [cited 2020 May 1]. Available from: <https://www.mohfw.gov.in/pdf/GuidelinesfornotifyingCOVID-19affectedpersonsbyPrivateInstitutions.pdf>
  19. Ministry of Health and Family Welfare [Internet]. Operational Guidance for COVID-19 vaccination of pregnant women. Last accessed on Oct 2021 Available from: <https://www.mohfw.gov.in/pdf/OperationalGuidanceforCOVID19vaccinationofPregnantWoman.pdf>.