

COVID-19 and Pregnancy: Time to Think beyond Medications

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ABSTRACT

We are facing an unprecedented challenge this season. The progression of COVID-19 has impacted the globe in all aspects. Timely antenatal services need to be continued despite various restrictions due to lockdown. This article is to bring to limelight the various aspects of management of pregnancy during this pandemic to practicing clinicians. We reviewed various authentic literature available to date. Pregnant women are at the same risk of contracting the infection as nonpregnant individuals. The clinical presentation may range from no symptoms to pneumonia and death. Atypical presentations should be kept in mind while dealing with any pregnant woman. Newborns are generally safe although a mild risk of complications exist. Beyond medical management, there are social and mental issues that need to be addressed. Prevention of the disease remains the best possible management option currently. Breastfeeding is to be continued with care. To date, there is no definitive vaccine or drug to prevent or cure COVID-19. Hence, obstetricians need to be updated with existing evidence. Further research and changes in recommendations are expected in the future. In this review article, we have highlighted a few focus areas to be concentrated in clinical practice considering the importance of social obstetrics in antenatal care.

Keywords: Pregnancy, Coronavirus, COVID-19, Antenatal care.

INTRODUCTION

Motherhood is a unique, emotional, and blissful experience. Globally, around 131 million women give birth per year.¹ With millions of people being affected by Coronavirus disease (COVID-19), we are inevitably going to encounter pregnant women with COVID-19 in our clinical practice. Previous experience with viral respiratory infections like influenza, severe acute respiratory syndrome (SARS) has shown an increased risk of morbidity and mortality in pregnant women.² Hence, pregnant women and neonates are a special population in terms of medical care and management. There are few other challenges as well which need to be addressed.

BACKGROUND

COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The infection

is transmitted by droplets and fomites predominantly.³ The chance of infection via feces although rare should also be kept in mind.² The first case of COVID-19 was reported from Wuhan. Later, it turned out to be a global public health issue.³ Currently, there is limited Indian data on the effect of COVID-19 in pregnancy. The problems experienced due to severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) cannot be extrapolated to a different Novel coronavirus (SARS-CoV-2) just because it belongs to a common coronavirus family.

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The chances of contracting COVID-19 from a hospital can be up to 41%. Healthcare setups can be a major risk area for contracting infection particularly the labor units where multiple patients are attended on a random and continuous basis.⁴ Moreover, obstetric care has to be provided at the earliest. There are lots of concerns regarding the risk to mother and baby due to COVID-19. Hence, obstetricians should be aware of the present situation and literature evidence pertaining to the presentation, diagnosis, and management of COVID-19 in pregnancy.

METHODS

We identified to date the references through searches in PubMed and Google Scholar using keywords such as “coronavirus”, “pregnancy”, and “COVID-19”. Guidelines for the management of pregnancy in COVID-19 pandemic issued time to time by the Federation of Obstetric and Gynaecological Societies of India (FOGSI), Royal College of Obstetricians and Gynaecologists (RCOG), American College of Obstetricians and Gynecologists (ACOG), Society for Maternal and Fetal Medicine (SMFM), International Society for Ultrasound in Obstetrics and Gynecology (ISUOG) were reviewed. We also looked into the guidelines for the management of COVID-19 issued by the World Health Organization (WHO), US Centers for Disease Control and Prevention, Ministry of Health and Family Welfare, Government of India, and Indian Council of Medical Research (ICMR). Further, we reviewed relevant references cited in the retrieved articles and the final reference list was compiled.

RISK FACTORS

In general, the placental barrier protects the fetus from various pathogens. The ACE2 receptor and S protein priming protease TMPRSS2 are co-expressed by a subset of trophoblasts during the first half of the pregnancy. These are potential cellular targets for coronavirus entry and can lead to viremia in the developing placenta.⁵ Fortunately, during the first trimester, the expression of ACE2 (Angiotensin-converting enzyme 2) on the placenta is very low, and this may probably be the reason for no maternal-fetal transmission in the early stages of pregnancy.⁶ Recently, a case was reported where the mother, fetus, and placenta were

tested positive for COVID-19 with chronic intervillitis and macrophages in the placenta. Hence, the vertical transmission may likely be possible in COVID-19.⁷ Histopathological examination of the placenta showed at least one feature of maternal vascular malformation during the third trimester, signifying that there is placental involvement in COVID-19.⁸

Women are less prone to COVID-19 than men due to the attenuation of the ACE2 receptor.^{9,10} The risk factors associated with an increased likelihood of COVID-19 related hospitalization are overweight, obesity, poor socioeconomic status, presence of preexisting comorbidities, and those with age above 35 years.² Alterations in the cell-mediated immunity can predispose women to infections.¹¹ Moreover, there are anatomical and physiological changes in the respiratory system which may lead to severe discomfort with COVID-19 infection.¹² The immune changes during pregnancy particularly during the end of pregnancy can be associated with increased severity of COVID-19.² Further, frequent visits to healthcare facilities during pregnancy may also put the women at increased risk of exposure to COVID-19.

CLINICAL PRESENTATION

A detailed symptom, travel, and contact history is to be taken along with the systemic examination in all patients. The incubation period is around 5 to 6 days on an average and can extend up to 14 days. During the pre-symptomatic period, people can be infectious up to 3 days before the onset of symptoms. The clinical presentation may range from no symptoms to pneumonia, and death.¹³

The commonly observed symptoms in COVID-19 are fever, tiredness, dry cough, increased sputum production, difficulty in breathing, sore throat, aches and pains, conjunctival congestion, and sometimes hemoptysis.¹⁴ A systematic review of 324 COVID-19 confirmed pregnant women till 20 April 2020 showed that the most common symptoms were fever, cough, dyspnea, and fatigue. CT chest findings suggestive of COVID-19 were seen in most of the cases.¹⁵ Pathological dyspnea caused due to COVID-19 should be differentiated from physiological dyspnea associated with pregnancy.^{11,16} They can also present with abdominal symptoms like nausea and loose stools.¹⁷ It is still unclear whether the virus detected in fecal

samples signifies active viral multiplication or residual virus. However, it appears that viral shedding from the gastrointestinal tract may be longer than that seen from the respiratory tract which may lead to unexpected transmission.¹⁸

Further, atypical presentations have also been reported in pregnant women. A case report from France in a COVID-19 positive woman during the first trimester showed elevated transaminases with symptoms such as fatigue and nausea.¹⁹ Cardiomyopathy has been reported.²⁰ Anosmia was one of the reported symptoms in pregnant women.²¹ Acute tubular necrosis was also recently reported.²² It has been reported that COVID-19 in intrahepatic cholestasis of pregnancy can result in severe liver damage.²³ These signify that COVID-19 may be a multisystem affecting infection.

COVID-19 severity can be classified as a mild, moderate, severe, and critical disease (Table 1).^{13,14} The quick Sequential Organ Failure Assessment (qSOFA) score ≥ 2 may indicate a high possibility of sepsis necessitating ICU care.³ Unfortunately, the majority of the COVID-19 positive cases are asymptomatic, which remains a challenge to diagnosis. COVID-19 can also predispose women to immune thrombocytopenia (ITP) in pregnancy.²⁴ Hypercoagulability is seen during pregnancy and the presence of COVID-19 can worsen it.²⁵ A report from the UK has shown that

a COVID-19 pregnant woman succumbed to death due to thrombotic complications in the background of maternal comorbidities.²⁶ A study from Sweden reported that the risk of being admitted in critical care units may be higher in pregnant women during the antepartum and postpartum period when compared to the non-pregnant women.²⁷ Severe pneumonia in pregnant women was less frequently observed than expected and the majority of them required intensive care unit (ICU) admission.¹⁵

MATERNAL EFFECTS

Many studies report that pregnant women have fewer symptoms and complications due to COVID-19 compared to non-pregnant women. But few countries have also reported that pregnant women were severely affected by COVID-19.²⁰ A report of 16749 hospitalized individuals in the United Kingdom showed that the proportion of hospitalized pregnant women was similar to that of non-pregnant women and that pregnancy was not associated with increased mortality as one would notice with viral influenza illness.² However, death among pregnant women in Iran has been reported despite the absence of any comorbidities.²⁰

The UK Obstetric Surveillance System (UKOSS) study involving 427 COVID-19 confirmed pregnant women showed that nearly 9% of them required intensive care and less than 1% required advanced care like Extracorporeal Membrane Oxygenation (ECMO). The case fatality rate was reported to be 1.2% with a maternal mortality rate of 5.6 per 100000 pregnancies due to COVID-19. Two case series from China reported fetal compromise and hence, continuous electronic fetal monitoring during labor is recommended in COVID-19 affected pregnant women.² Therefore, timely obstetric care should not be delayed or compromised in order to test for COVID-19. Sudden maternal hypoxia can lead to unfavorable intrauterine environment for the fetus which can result in neonatal death in less than two hours.²⁸ Few COVID-19 positive symptomatic pregnant women had a higher rate of preterm deliveries and severe illness when compared to the asymptomatic counterparts.²⁹ COVID-19 infection in pregnant women may also cause placental abruption as reported in one case from London.³⁰

Previous studies have well established the fact that reduction in the number of antenatal visits can be

Table 1

Classification of COVID-19 disease severity

Severity	Findings
Mild	Presence of symptoms without evidence of pneumonia clinically or radiologically and with SpO ₂ normal at room air
Moderate	Presence of symptoms with evidence of pneumonia clinically or radiologically and SpO ₂ $\geq 90\%$ at room air
Severe	Pneumonia with either <ul style="list-style-type: none"> • Respiratory rate > 30 breaths per minute or • SpO₂ < 90% at room air or respiratory distress or • Chest radiology involvement > 50%
Critical	Severe Pneumonia with either <ul style="list-style-type: none"> • Acute respiratory distress syndrome or • Acute respiratory failure or • Sepsis or Septic shock or • Multi-organ dysfunction

associated with increased risk of maternal deaths, and adverse perinatal outcomes. Hence, unless the woman is under quarantine or self-isolation, periodic antenatal visits should continue giving them the care and support which was provided before the pandemic. To mitigate the spread of infection, restrictions on visitors entering the healthcare facility have been implemented. Though it is a good step, we should not forget that loneliness or social isolation in a pregnant lady can be harmful. Hence, allowing one birth partner during the intrapartum period should be considered.²

FETAL EFFECTS

There is currently no data on the risk of teratogenicity due to COVID-19 in pregnancy.² In general, the risk of transmission of infection via the placenta increases as pregnancy progresses. On the other hand, the severity of infection on the fetus decreases as pregnancy progresses.⁶ There is no evidence regarding fetal Doppler abnormalities or other follow-up-based variations identified in growth scans.¹⁷ In a systematic review involving 219 newborns, it was shown that low birth weight, neonatal asphyxia, and fetal death were among the reported complications in those born to COVID-19 positive mothers.¹⁵ The rate of preterm delivery can go up to 47% in COVID-19 affected pregnant women.³¹ Only very few cases of spontaneous miscarriage were reported.¹⁵ Prenatal interventions that can create transplacental access should be avoided, and fetal medicine specialists need to weigh the benefits over risk before such procedures.

Recently, it was found that the breast milk of COVID-19 mothers had antibodies to SARS-CoV-2. Hence, breast milk is beneficial for newborns and infants.³² A systematic review analysis showed that breast milk tested negative for COVID-19 in affected mothers.² A case series from China reported that one out of three breast milk samples tested positive for COVID-19 as well, further raising concerns over the safety of breast milk.³³ But the potential benefits of breast milk need to be kept in mind before advising to stop or avoid breastfeeding. During the cytokine storm or hyper-inflammatory state, the interleukin-6 (IL-6) level in the body increases. It has been shown that maternal IL-6 level correlates inversely with the neurological development of the child at 1 to 2 years of age. Thus, maternal COVID-19 severity can lead to neurodevelopmental delay in the child.³⁴

DIAGNOSIS

A pregnant woman with fever and lymphocytopenia should be tested for COVID-19. Depending on the local protocols, appropriate testing for acute febrile illness should be carried out. The ICMR has recommended various strategies of COVID-19 testing in symptomatic and a selective subset of asymptomatic individuals. However, a recent study from New York showed that the majority of the pregnant women admitted in the hospital were asymptomatic and tested positive for COVID-19. This population may be a possible threat to the healthcare workers and other patients in hospitals. Hence, universal screening of COVID-19 in pregnant women is to be considered.³⁵

Nasopharyngeal swab testing by reverse-transcription polymerase chain reaction (RT-PCR) is the most common investigation for the diagnosis of COVID-19.¹⁷ Antibody testing in patients with symptomatic influenza-like illness (ILI) has also been recently recommended in addition to RT-PCR.¹⁸ However, antibody testing is solely not recommended for the primary diagnosis of COVID-19 infection.³ The sensitivity of RT-PCR testing for COVID-19 in nasal swab is only around 63%, whereas it is lowest (29%) in feces and highest (93%) in bronchoalveolar lavage. The accuracy of immunoglobulin M (IgM) antibody testing is also not widely evaluated. It is believed to have a sensitivity of up to 88.2% and specificity of up to 99% according to a few reports. The IgM assays are also prone to false positive, false negative, and cross-reactive results which make them unreliable.⁶ IgM antibody identified in few newborns with negative RT-PCR of the nasopharyngeal swab for SARS-CoV-2 is suspected to be due to a secondary response to the intrauterine infection and is still inconclusive.^{3,29}

Laboratory abnormalities observed in pregnant women were slightly different from those seen in non-pregnant women. A meta-analysis showed that elevated D-dimer (82%), neutrophil count (81%), c-reactive protein (CRP) (69%), and decreased lymphocyte count (59%) were among the most common parameters.³⁶ Mild elevation in liver enzymes has also been noted. To add on, raised ferritin and procalcitonin levels have also been noted in COVID-19 patients.³ CRP and D-dimer levels correlated directly with the severity of the disease. The neutrophil-lymphocyte ratio can be a reliable prognostic marker in those infected with COVID-19.³⁷ The oxygen saturation, lymphocyte count, blood gas

analysis, and CT chest imaging may be early prognostic markers in severe COVID-19 patients.²⁸

The most common radiological findings seen in COVID-19 are bilateral consolidation or ground-glass opacities, sometimes with pleural effusion.³ Informed consent should always be taken before radiological procedures in pregnant women. Point of care ultrasound of lung (POCUS) can be an additional diagnostic tool in high suspect COVID-19 patients. It is reasonably sensitive and specific in detecting peripheral pulmonary and pleural changes.³⁸ CT scan of the chest is shown to be more sensitive to COVID-19 changes when compared to RT-PCR.³⁹

MEDICAL MANAGEMENT

The statement “prevention is better than cure” holds true for COVID-19 infection. The infection prevention control (IPC) measures such as hand hygiene, use of personal protective equipment (PPE), disinfection of surfaces, and safe waste disposal should be ensured. There should be a dedicated unit to handle COVID-19 infected patients. Wherever possible, a negative pressure system can be established to prevent the dissemination of infection.¹⁸ Patients with mild COVID-19 should be isolated at home or in any health facility. In moderate COVID-19 the decision regarding isolation in the house or health facility should be individualized based on their risk factors, clinical presentation, need for supportive care, and presence of vulnerable people around them. Severe and critical COVID-19 require aggressive hospital intensive care management under a multidisciplinary team.³

There should be a strategic screening system at the entry point in the healthcare facility. For outpatients, those with low risk of exposure can be consulted as usual with safety precautions. Those with probable or suspected or confirmed COVID-19 should be deferred from direct consultation and should make use of teleconsultation facilities. Once the quarantine or isolation period is completed they can be called for a direct consultation.⁴⁰

As per triage, pregnant women with low risk of exposure to COVID-19 can follow the usual admission protocol of the hospital. Those with a potential risk of exposure to COVID-19 or suspected or confirmed to have COVID-19 should be admitted in a designated isolated room. Facility for telecommunication with

family members and healthcare workers should be provided.⁴⁰

Supportive care remains the mainstay of management. This includes adequate rest, hydration, and nutrition along with oxygen supplementation when in need.³ The facility for telecommunication should also be provided.¹⁸ Also, pregnant women may require more oxygen to keep their saturation levels in the target range.²⁹ The Federation of Obstetric and Gynecological Societies of India (FOGSI) has suggested the use of drugs like azithromycin, hydroxychloroquine, and other antivirals as recommended by the ICMR to treat COVID-19. Hydroxychloroquine should not be used as a prophylactic drug in pregnancy.³ Although hydroxychloroquine consumption during pregnancy seems to be safe, there always remains a chance for complications considering its long half-life. Hence, vigilant monitoring through antenatal scans and ocular check-up of the newborn may be recommended.⁴¹ Administration of low molecular weight heparin in COVID-19 affected women should be decided individually based on the risk of venous thromboembolism.⁴²

Whenever necessary, testing of the baby should be done at Day 1 and Day 2 after birth. Further testing can be done every two to three days until two consecutive results turn out to be negative.¹⁸ Another school of thought suggests newborns of COVID-19 positive mothers should undergo weekly RT-PCR testing until 28 days.³ Routine vaccinations before discharge from the hospital should be ensured. Presently, there is no recommendation to administer any drug to treat COVID-19 infection in the newborns.¹⁸

OBSTETRIC MANAGEMENT

In India, it is presently advised that the antenatal visits may be cut short to three visits in order to reduce disease transmission.³ However, other countries with better healthcare facilities have suggested a minimum of six antenatal visits.⁴³ Once a pregnant woman recovers nearly two weeks later an ultrasound 14 days may be required to detect fetal and placental abnormalities.³ While planning antenatal visits, face to face consultations should coincide with ultrasound or other relevant investigations. Utmost care and preference should be given to pregnant women by allotting specific time slots for consultations. This will

reduce their waiting time and ease the consultation process thereby reducing the chances of dissemination of infection.⁴⁴ Pregnant women after 24 weeks of gestation should be asked to check for fetal movements every day.³

Women with low-risk pregnancy can be subjected to limited physical antenatal visits and followed up by teleconsultation. On the other hand, the high-risk pregnant women need special attention and their care plan should be decided on an individual basis by a multidisciplinary team based on the severity of the problem, their socio-cultural background, and level of education. Timely blood pressure and weight monitoring can be advised either at nearby local health centers or at home using automated machines. At every visit, the clinician should discuss the plan of the next visit, assess whether she requires a direct or teleconsultation in the subsequent visit, and give

information on how to contact the doctor directly. After 24 weeks of gestation, the women should be asked to check for fetal movements every day which can be considered as a positive sign of fetal viability during this pandemic. We should be cautious that anytime during the course of pregnancy a low-risk pregnant woman can turn out to be a high risk one.⁴⁵ After looking into various guidelines we have proposed a schedule for the antenatal visits (Table 2) which can be followed during this pandemic.

High-risk patients such as COVID-19 suspected, probable or confirmed cases should not be mixed with routine patients, and must be treated separately preferably by a separate team. This is where proper systematic screening comes into effect based on national, local, and institutional algorithms to categorize pregnant women based on the risk of COVID-19 infection.⁴⁴ Proper obstetric and pre-

Table 2
Antenatal visits for low risk pregnancy during a pandemic

<i>Time</i>	<i>Type</i>	<i>Focus areas</i>
At confirmation of pregnancy	Teleconsultation	<ul style="list-style-type: none"> • History and risk assessment • Antenatal vitamins to commence if not started • Counsel on nutrition and other concerns • To check weight
11-14 weeks	Direct visit	<ul style="list-style-type: none"> • Confirm history and risk assessment • Check BP, weight, height • Routine antenatal lab investigations • Dating and NT scan, Combined first trimester screening • Iron and calcium supplements
20 weeks	Direct visit	<ul style="list-style-type: none"> • Check BP, weight, Urine test • Anomaly scan • Inj Td – 1st dose
26-28 weeks	Direct visit	<ul style="list-style-type: none"> • Check BP, weight, SFH • Urine test, GTT or GCT • Inj Td – 2nd dose • Maintain daily fetal movement count chart
34 weeks	Teleconsultation	<ul style="list-style-type: none"> • Review fetal movements, clinical features of preterm labor, preeclampsia • Follow up weight gain and blood pressure
36 weeks	Direct visit	<ul style="list-style-type: none"> • Check BP, weight, SFH, urine test • Discuss signs of labor (True/false) • Discuss birth plan, labor analgesia, breastfeeding
38-40 weeks	Direct visit	<ul style="list-style-type: none"> • Check BP, weight, SFH, urine test • Fetal surveillance • Per vaginum examination and plan admission

BP, Blood pressure; NT, Nuchal translucency; Td, Tetanus diphtheria; SFH, Symphysiofundal height; GTT, Glucose tolerance test; GCT, Glucose challenge test; Hb, Hemoglobin

anesthetic check-ups is needed to prevent maternal and neonatal adverse outcomes.⁴ All procedures should be carried out under strict aseptic precautions. The epidural route can be preferred to provide labor analgesia when needed.³ Wherever possible, regional anesthesia should be preferred. General anesthesia is not contraindicated in COVID-19 but should be reserved for those cases in which regional anesthesia may be contraindicated.⁴ Hence, it is better to avoid laparoscopic surgeries. And also usage of electrocautery should be avoided or minimised.³

Antenatal corticosteroids may be given between 24 and 34 weeks of gestational age.³ Corticosteroids offer the maximum benefit to women before 31 weeks of pregnancy who are in suspected, diagnosed, or established preterm labor.⁴⁶ They may lead to hyperglycemia which can delay clearance of coronavirus, and also worsen the clinical condition in pregnant women. Hence, steroids should be administered judiciously. Preferably a low dose of steroids may be beneficial in these special situations.⁴⁷ The decision regarding labor management cannot be strictly based on guidelines and recommendations. It is to be individualized based on multiple factors in liaison with the multidisciplinary management team after weighing all the benefits and risks.⁴ The decision regarding induction of labor or mode of delivery is not related to the presence or absence of COVID-19 and should be as per standard obstetric practice. The UKOSS study showed that the majority of the cesarean deliveries were due to maternal and fetal reasons.² Shortening of the second stage of labor should be considered to avoid aerosol exposure and maternal exhaustion in COVID-19 affected pregnant women. Active management in the third stage of labor should be practiced to prevent postpartum hemorrhage. The concept of delayed cord clamping in the light of COVID-19 is still controversial. Nonsteroidal anti-inflammatory drugs may be used in low doses as analgesic whenever acetaminophen is not effective.⁴⁵ Avoiding beta mimetics is suggested in COVID-19 affected patients with respiratory issues. Tocolytics may also be avoided in the management of preterm labor in COVID-19 patients, although an individualized decision is to be considered.³

Proper education regarding the delivery plan and complication readiness plan should be given for prompt utilization of services. Women should be counselled about healthy diet, nutrition, exercise, avoidance of

usage of tobacco and alcohol, the continuation of essential medicines, and of availing the timely antenatal and postpartum services. Postpartum patients may be discharged as early as one day after vaginal delivery and two days after cesarean section to prevent the risk of transmission during the hospital stay.⁴⁸ Before discharge from the hospital, women should be educated about proper breast care, perineal hygiene, newborn care, and regarding when to reach out for help. As far as possible, postpartum consultations can also be conducted through teleconsultation.⁴⁵ Offering long-acting reversible contraceptives in the postpartum period may be an effective way to prevent unintended pregnancies.⁴⁹ Those planned for caesarean section and who wish for permanent contraception should undergo tubal ligation, but in case of vaginal delivery, a long-acting reversible contraceptive or depot medroxyprogesterone acetate can be preferred.

Whenever the mother is positive for COVID-19, it is ideal to test the baby as well. To avoid the transmission of infection, the baby should be kept away from the sick mother until two samples 24 hours apart are tested negative. It is prudent to discuss the situation with the mother and family members to ensure the safety of the baby.³¹ The WHO has recently recommended that the COVID-19 affected mothers should be encouraged to breastfeed the babies since breastfeeding outweighs the risk of transmission in general.¹³ The mothers should be educated that the risk of transmission is more through respiratory droplets and contact. Hence, proper hand hygiene should be maintained before and after touching the baby, feeding bottle, or breast pump. Ideally, the mother should wear a mask at the time of breastfeeding or when in close proximity to the baby. Those mothers who are sick should seek the help of someone who is well to feed the expressed milk to the baby.³

MENTAL WELLBEING

A study showed that mental health problems during this pandemic have almost doubled than that seen during the pre-pandemic period. This indicates the importance of proper psychosocial support during pregnancy.⁵⁰ It is well known that good support during the intrapartum period helps in the reduction of pain during labor thereby avoiding the need for analgesia. It also reduces the need for operative delivery, improves the overall

satisfaction during labor and reduces postpartum depression. Stress during pregnancy may result in preterm deliveries and low birth weight babies.^{2,51}

A study from Ireland showed that the COVID-19 crisis had affected the psychosocial wellbeing of individuals, and the majority of them were concerned about their family members and financial situation. The psychosocial consequences of COVID-19 on pregnant women are financial deprivation, insecurity, fear of COVID-19, lack of support from friends and family, lack of timely healthcare services, reduced access to support system, and increased domestic violence.² Addressing these issues will reduce the anxiety and stress of pregnant women leading to better maternal and fetal outcomes.

The neglected consequence of isolation in pregnant women is postpartum depression which can lead to infantile neurodevelopmental issues. To ensure the safety of the baby and to promote breastfeeding, skin to skin contact of the mother with her child may be encouraged with necessary precautions. If not addressed, this may also lead to depression in mothers. The clinicians must not neglect the mental health assessment and screening for domestic violence during this tough time.⁵¹

CHALLENGES AND SOLUTIONS

Proper care has to be given to all women attending the hospital and their stay should be protected from exposure to COVID-19 infected patients. In lower and middle-income countries, poor maternal health outcomes may be related to the present crisis. In a few places, due to the increased risk of infection in hospitals, there may be a need for home deliveries by trained birth attendants with aseptic precautions. Poor nutrition in pregnancy can lead to low birth weight babies who in the future can become overweight or obese. This can possibly project the impact of COVID-19 on the rise of non-communicable disease years later. Poor neonatal outcomes were observed in the newborns of those women who had poorly managed hyperglycemia, hypertension, and obesity during pregnancy. All these put together not only drain the health resources but also cause a huge economic burden in the present situation. Hence, effective antenatal care is necessary.⁵² Teleconsultation may help to deal with various high-risk conditions such as hypertension, diabetes, neurological disorder, cardiovascular disease, mental health issues,

poor obstetric history, and fetal problems like growth restriction, congenital anomalies, and multiple gestations.⁵³

Screening for gestational diabetes mellitus by oral glucose tolerance test (OGTT) may take as long as up to 2 hours. To avoid such a long duration of stay in the hospital, selective strategic screening can be implemented with fasting blood sugar and glycated haemoglobin (HbA1c) as an alternative to OGTT during this period.⁵⁴ There may be a huge challenge in identifying birth defects and managing such pregnancies antenatally considering the restriction in the number of antenatal visits during the lockdown period.⁵⁵ Pregnant women have been excluded from all clinical trials although drugs like hydroxychloroquine, lopinavir-ritonavir combination, azithromycin, and even Interferon beta-1a have been used in pregnancy for various other indications. This inequality in consideration may devoid the usage of these medications if proven beneficial in the future.¹ Pregnant women may need to be protected through research and not from research.

Safe breastfeeding practice is to be ensured. Mothers with asymptomatic or mildly symptomatic COVID-19 may continue rooming-in along with direct breastfeeding. Whereas those with severe COVID-19 should be encouraged to use the breast pump to express breast milk, and the baby should be fed by a healthy unaffected individual. Moreover, physical distancing in terms of maintaining 1-meter distance between the mother and the baby is to be followed. Neonatal resuscitation has to be carried out at a minimum of 2 meters distance from the delivery table, which may be a constraint in small setups.³ Following cough etiquettes and proper hand hygiene at every point of contact with the baby is a challenge indeed.

Access to medical abortions has also become difficult during the lockdown. It cannot be called as non-essential service keeping in mind the maternal risks associated with unintended pregnancies. Hence, timely access to such services should be ensured.⁴⁹ Although FOGSI recommends that drugs for medical abortion should not be prescribed over teleconsultation, it is unclear if this is possible considering the prevalence and progress of the disease. Timely emergency contraceptive pills can be advised over teleconsultation when required.³ Healthcare workers should be wise enough to balance professionalism with empathy at these tough times to

decide and carry out a management plan. On exposure to COVID-19 patients, it is mandated that healthcare workers should be isolated. Considering the already existing shortage of medical manpower in our country, this may lead to disturbances in the healthcare system.

CONCLUSION

Except for very few cases, majority of the pregnant women have overcome the disease quite well. In large, the effect of COVID-19 on the fetus during the first and second trimester is still unknown. Due to the rapid progression of this disease, a large study with long-term follow up has not been possible. Recent emphasis by the WHO has been on balancing between health, economy, social disruption, and human rights. Access to prompt contraceptive services should be ensured to avoid unintended pregnancies. Creating social support groups to help isolated women may reduce the suffering to an extent.

As the disease and knowledge evolve, newer recommendations and evidence regarding COVID-19 in pregnancy are expected in the future. Further data based on COVID-19 and pregnancy is required, and various national and international registries such as UKOSS, PRIORITY, COVI-PREG, PAN COVID, ROI COVID-19, NethOSS, ItOSS, CHOPAN, and FOGSI's National Registry can provide better real-life, evidence-based, and reliable information. It is good that we shifted from "ask and mask" strategy to "mask and mask" strategy in due course of the lockdown. All we can do now is reach out to our patients, listen to their concerns patiently, make them feel comfortable during this lockdown thereby making their difficult times easier.

Key Take Home Points

- Ensure Social distancing, Stay at home, Safe sanitation, and Secure the face (4S)
- Personal protective equipments for healthcare workers is a must
- Keep in mind asymptomatic and atypical presentations
- Screen, triage and manage separately
- Infection control practices to be followed strictly
- No rationale to induce labor or deliver by operative method unless indicated
- Provide routine newborn care with safe breastfeeding
- Continue sexual health services
- Use teleconsultation wherever possible
- Address the mental and social health issues

Source of Support

Nil

Conflict of Interest

None to declare.

Financial Disclosure

Nil

REFERENCES

1. Whitehead CL, Walker SP. Consider pregnancy in COVID-19 therapeutic drug and vaccine trials. *The Lancet*. 2020;395(10237):e92. doi: 10.1016/S0140-6736(20)31029-1.
2. Coronavirus (COVID-19) infection and pregnancy Version 9 [Internet]. Royal College of Obstetricians and Gynaecologists. Available at <https://www.rcog.org.uk/globalassets/documents/guidelines/2020-05-13-coronavirus-covid-19-infection-in-pregnancy.pdf> [Last accessed on 31 May 2020].
3. FOGSI Good Clinical Practice Recommendation on Pregnancy with COVID-19 Infection Version 2 [Internet]. The Federation of Obstetric and Gynecological Societies of India. Available at: <https://www.fogsi.org/fogsi-gcpr-on-pregnancy-with-covid-19-infection-version-2/> [Last accessed on 31 May 2020].
4. Morau E, Bouvet L, Keita H, et al. Anaesthesia and intensive care in obstetrics during the COVID-19 pandemic. *Anaesthesia, Critical Care and Pain Medicine*. 2020 May 13. doi: <https://doi.org/10.1016/j.accpm.2020.05.006/>.
5. Ashray N, Bhide A, Chakarborty P, et al. Single-Cell RNA-seq Identifies Cell Subsets in Human Placenta That Highly Expresses Factors to Drive Pathogenesis of SARS-CoV-2. *Preprints*. 2020. doi:10.20944/preprints202005.0195.v1. Available at <https://www.preprints.org/manuscript/202005.0195/v1>. [Last accessed on 31 May 2020].
6. Amouroux A, Attie-Bitach T, Martinovic J, et al. Evidence for and against vertical transmission for SARS-CoV-2 (COVID-19). *Am J Obstet Gynecol*. 2020 May 4. doi: <https://doi.org/10.1016/j.ajog.2020.04.039>.
7. Patane L, Morotti D, Giunta MR, et al. Vertical transmission of COVID-19: SARS-CoV-2 RNA on the fetal side of the placenta in pregnancies with COVID-19 positive mothers and neonates at birth. *Am J Obstet Gynecol Mfm*. 2020 May 18. doi: 10.1016/j.ajogmf.2020.100145.
8. Shanes ED, Mithal LB, Otero S, et al. Placental pathology in COVID-19. *medRxiv*. 2020 Jan 1. doi: <https://doi.org/10.1101/2020.05.08.20093229>
9. Zhao Y, Zhao Z, Wang Y, et al. Single-cell RNA expression profiling of ACE2, the receptor of SARS-CoV-2. *bioRxiv* 2020. doi: <https://doi.org/10.1101/2020.01.26.919985>. Available at <https://www.biorxiv.org/content/10.1101/2020.01.26.919985v2> [Last accessed on 31 May 2020].

10. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *NEJM*. 2020; 382(18):1708-20.
11. Zaigham M, Andersson O. Maternal and Perinatal Outcomes with COVID19: a systematic review of 108 pregnancies. *Acta obstetrica et gynecologica Scandinavica*. 2020 Apr 7. doi: 10.1111/aogs.13867.
12. O'Day MP. Cardio-respiratory physiological adaptation of pregnancy. *Semin Perinatol*. 1997;21(4):268-75.
13. Clinical management of COVID-19: interim guidance, 27 May 2020 [Internet]. World Health Organization. Available at <https://apps.who.int/iris/handle/10665/332196>. [Last accessed on 31 May 2020].
14. Garg N, Kothandaraman K, Jeyaraman M. Optimization of the Response to nCOVID-19 Pandemic in Pregnant Women: An Urgent Appeal in Indian Scenario. *Int J Cur Res Rev*. 2020;12(09):14. doi: <http://dx.doi.org/10.31782/IJCRR.2020.12094>.
15. Juan J, Gil MM, Rong Z, et al. Effects of coronavirus disease 2019 (COVID-19) on maternal, perinatal and neonatal outcomes: a systematic review. *Ultrasound Obstet Gynecol*. 2020 May 19. doi: 10.1002/uog.22088.
16. Gardner MO, Doyle NM. Asthma in pregnancy. *Obstet Gynecol Clin North Am*. 2004;31(2):385-413.
17. Madappuram NA, Kamel HH. Covid19 and Pregnancy. *Annals of Neonatology Journal*. 2020 May 6. doi: <https://dx.doi.org/10.21608/anj.2020.29120.1011>.
18. Balasubramanian S, Rao NM, Goenka A, et al. Coronavirus Disease 2019 (COVID-19) in Children - What We Know So Far and What We Do Not. *Indian Pediatr*. 2020;57(5):435-442. doi: 10.1007/s13312-020-1819-5.
19. Lamazou F, Oger P, Dieli-crimi R, et al. COVID-19 Infection in First Trimester of Pregnancy Marked by a Liver Cytolysis: A Case Report. *SSRN Electronic Journal* (May 5, 2020). Available at <https://ssrn.com/abstract=3597355>. [Last accessed on 31 May 2020]
20. Schwartz DA. The Effects of Pregnancy on Women with COVID-19: Maternal and Infant Outcomes. *Clin Infect Dis*. 2020 May 11:ciaa559. doi: 10.1093/cid/ciaa559.
21. Christelle K, Zulkifli MM, Draman N. Anosmia, a Hidden Sign for COVID-19? A Case Report and Literature Review. *Research Square*. 2020. doi: 10.21203/rs.3.rs-27117/v1. Available at <https://europepmc.org/article/ppr/ppr158936>. [Last accessed on 31 May 2020].
22. Taghizadieh A, Mikaeili H, Ahmadi M, et al. Acute kidney injury in pregnant women following SARS-CoV-2 infection: A case report from Iran. *Respiratory Medicine Case Reports*. 2020 May 13. doi: 10.1016/j.rmcr.2020.101090.
23. Ai L, Wei J, Wang S, et al. COVID-19 is a risk factor for severe liver damage for patients with intrahepatic cholestasis of pregnancy: a case report. *Research Square*. 2020. doi: <https://dx.doi.org/10.21203/rs.3.rs-26348/v1> Available at <https://europepmc.org/article/ppr/ppr158318> [Last accessed on 31 May 2020].
24. Tang MW, Nur E, Biemond BJ. Immune Thrombocytopenia during Pregnancy due to COVID-19. *Am J Hematol*. 2020 May 23. doi: 10.1002/ajh.25877.
25. Dashraath P, Jeslyn WJ, Karen LM, et al. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. *American Journal of Obstetrics and Gynecology*. 2020 Mar 23. doi: 10.1016/j.ajog.2020.03.021.
26. Ahmed I, Azhar A, Eltaweel N, et al. First Covid-19 maternal mortality in the UK associated with thrombotic complications. *British Journal of Haematology*. 2020 May 18. doi: 10.1111/bjh.16849.
27. Collin J, Bystrom E, Carnahan A, et al. Pregnant and postpartum women with SARSCoV2 infection in intensive care in Sweden. *Acta Obstetrica et Gynecologica Scandinavica*. 2020 May 9. doi: <https://doi.org/10.1111/aogs.13901>.
28. Li J, Wang Y, Zeng Y, et al. Critically ill pregnant patient with COVID-19 and neonatal death within two hours of birth. *Int J Gynaecol Obstet*. 2020 May 5. doi: 10.1002/ijgo.13189.
29. London V, McLaren Jr R, Atallah F, et al. The Relationship between Status at Presentation and Outcomes among Pregnant Women with COVID-19. *American Journal of Perinatology*. 2020 May 19. doi: 10.1055/s-0040-1712164.
30. Kuhrt K, McMicking J, Nanda S, et al. Placental abruption in a twin pregnancy at 32 weeks' gestation complicated by COVID-19, without vertical transmission to the babies. *American Journal of Obstetrics and Gynecology Mfm*. 2020 May 8. doi: 10.1016/j.ajogmf.2020.100135.
31. Carvalho WB, Gibelli MA, Krebs VL, et al. Expert recommendations for the care of newborns of mothers with COVID-19. *Clinics*. 2020;75. doi: 10.6061/clinics/2020/e1932.
32. Fernandez-Carrasco FJ, Vazquez-Lara JM, Gonzalez-Mey U, et al. [Abstract] Coronavirus Covid-19 infection and breastfeeding: an exploratory review. *Rev Esp Salud Publica*. 2020;94:e202005055. Available at https://www.mscbs.gob.es/biblioPublic/publicaciones/recursos_propios/resp/revista_cdrom/VOL94/REVISIONES_RS94C_202005055.pdf [Last accessed on 31 May 2020].
33. Wu Y, Liu C, Dong L, et al. Coronavirus disease 2019 among pregnant Chinese women: case series data on the safety of vaginal birth and breastfeeding. *BJOG*. 2020 May 5. doi: 10.1111/1471-0528.16276.
34. Martins-Filho PR, Tanajura DM, Santos HP Jr, et al. COVID-19 during pregnancy: Potential risk for neurodevelopmental disorders in neonates? *Eur J Obstet Gynecol Reprod Biol*. 2020:S0301-2115(20)30264-5. doi: 10.1016/j.ejogrb.2020.05.015.
35. Khalil A, Hill R, Ladhani S, et al. SARS-CoV-2 in pregnancy: symptomatic pregnant women are only the tip of the iceberg. *Am J Obstet Gynecol* 2020 May 7. doi: 10.1016/j.ajog.2020.05.005.
36. Shi L, Wang Y, Yang H, et al. Laboratory Abnormalities in Pregnant Women with Novel Coronavirus Disease 2019. *Am J Perinatol*. 2020 May 12. doi: 10.1055/s-0040-1712181.
37. Pereira A, CruzMelguizo S, Adrien M, et al. Clinical course of Coronavirus Disease2019 (COVID19) in pregnancy. *Acta Obstetrica et Gynecologica Scandinavica*. 2020 May 22. doi: <https://doi.org/10.1111/aogs.13921>.
38. Inchingolo R, Smargiassi A, Moro F, et al. The Diagnosis of Pneumonia in a Pregnant Woman with COVID-19 Using Maternal Lung Ultrasound. *Am J Obstet Gynecol*. 2020:S0002-9378(20)30468-3. doi: 10.1016/j.ajog.2020.04.020.
39. Ai T, Yang Z, Hou H, et al. Correlation of chest CT and RT-PCR testing in coronavirus disease 2019 (COVID-19)

- in China: a report of 1014 cases. *Radiology*. 2020 Feb 26. doi: 10.1148/radiol.202000642.
40. Qi H, Chen M, Luo X, et al. Management of a Delivery Suite During the COVID-19 Epidemic. *Eur J Obstet Gynecol Reprod Biol* 2020 May 20. doi: 10.1016/j.ejogrb.2020.05.031.
 41. Lacroix I, Benevent J, Damase-Michel C. Chloroquine and hydroxychloroquine during pregnancy: What do we know? *Therapie*. 2020;S0040-5957(20)30093-7. doi: 10.1016/j.therap.2020.05.004.
 42. Benhamou D, Keita H, Bouthors AS, CARO working group. Coagulation changes and thromboembolic risk in COVID-19 pregnant patients. *Anaesthesia, Critical Care and Pain Medicine*. 2020 May 10. doi: 10.1016/j.accpm.2020.05.003.
 43. Guidance for antenatal and postnatal services in the evolving coronavirus (COVID-19) pandemic [Internet]. Royal College of Obstetricians and Gynaecologists. Available at: <https://www.rcog.org.uk/globalassets/documents/guidelines/2020-05-22-guidance-for-antenatal-and-postnatal-services-in-the-evolving-coronavirus-covid-19-pandemic.pdf> [Last accessed 30 May 2020]
 44. Bogler T, Bogler O. Interim schedule for pregnant women and children during the COVID-19 pandemic. *Can Fam Physician*. 2020;66(5):e155.
 45. Narang K, Ibirogba ER, Elrefaei A, et al. SARS-CoV-2 in Pregnancy: A Comprehensive Summary of Current Guidelines. *J Clin Med*. 2020;9(5):1521.
 46. Zhou CG, Packer CH, Hersh AR, et al. Antenatal corticosteroids for pregnant women with COVID-19 infection and preterm prelabor rupture of membranes: a decision analysis. *The Journal of Maternal-Fetal and Neonatal Medicine*. 2020 May 19; doi: <https://doi.org/10.1080/14767058.2020.1763951>.
 47. Kakoulidis I, Ilias I, Koukkou E. SARS-CoV-2 infection and glucose homeostasis in pregnancy. What about antenatal corticosteroids?. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*. 2020 May 6. doi: 10.1016/j.dsx.2020.04.045.
 48. Boelig RC, Manuck T, Oliver EA, et al. Labor and delivery guidance for covid-19. *Am J Obstet Gynecol MFM*. 2020;2(2). doi: <https://doi.org/10.1016/j.ajogmf.2020.100110>.
 49. Robinson EF, Moulder JK, Zerden ML, et al. Call to Action: Preserving and Advocating for Essential Care for Women during the COVID-19 Pandemic. *Am J Obstet Gynecol*. 2020 May 13. doi: 10.1016/j.ajog.2020.05.022.
 50. Durankus F, Aksu E. Effects of the COVID-19 pandemic on anxiety and depressive symptoms in pregnant women: a preliminary study. *J Matern Fetal Neonatal Med*. 2020 May 18:1-7. doi: 10.1080/14767058.2020.1763946.
 51. Jago CA, Singh SS, Moretti F. Coronavirus Disease 2019 (COVID-19) and Pregnancy: Combating Isolation to Improve Outcomes. *Obstet Gynecol*. 2020;00:1-4. doi: 10.1097/AOG.0000000000003946.
 52. Kapur A, Hod M. Maternal health and noncommunicable disease prevention: An investment case for the post COVID19 world and need for better health economic data. *Int J Gynaecol Obstet*. 2020 May 13. doi: 10.1002/ijgo.13198.
 53. Aziz A, Zork N, Aubey JJ, et al. Telehealth for High-Risk Pregnancies in the Setting of the COVID-19 Pandemic. *Am J Perinatol*. 2020 May 12. doi: 10.1055/s-0040-1712121.
 54. Vambergue A, Jacqueminet S, Lamotte MF, et al. Three alternative ways to screen for hyperglycaemia in pregnancy during the COVID-19 pandemic. *Diabet Metabol*. 2020 May 6. doi: 10.1016/j.diabet.2020.04.003.
 55. Ludorf KL, Salemi JL, Kirby RS, et al. Perspectives on challenges and opportunities for birth defects surveillance programs during and after the COVID19 era. *Birth Defects Research*. 2020 May 16. doi: 10.1002/bdr2.1710.