

The Effect Of Covid-19 Infection On Pregnant Women In North Coastal Region Of Andhra Pradesh.

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Abstract

The COVID-19 pandemic has had a significant impact on the lives of people worldwide. Specifically, for pregnant women, there is an increased risk of complications and adverse outcomes if they contract the virus during pregnancy. We aimed to evaluate the association between severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection during pregnancy and adverse pregnancy outcomes. The present study was conducted with the 44 pregnant women in KGH hospital and from in and around Visakhapatnam, Andhra Pradesh. Pregnant women with complications after COVID infection visited the KGH Hospital, between January 2021 and December 2023. The present study revealed that increased total neutrophils (40 %), reduced total lymphocytes (32 %), increased serum IL-6 (52 %) and increased C - reactive protein (78 %) in the study subjects. There appears to be a higher incidence of pregnancy-related complications in SARS-CoV-2 positive mothers, such as miscarriage, restricted fetal growth, or still-birth. In this study, we discuss about the pathology of COVID-19 maternal infection and the potential adverse effects associated with viral infection, and the possibility of transplacental transmission.

Keywords: COVID-19, SARS- COV-2, maternal, transplacental transmission and Pregnancy

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I. Introduction

The COVID-19 pandemic has had a significant impact on the lives of people worldwide. Specifically, for pregnant women, there is an increased risk of complications and adverse outcomes if they contact the virus during pregnancy (Dashraath, P et al., 2020). According to recent studies, pregnant women infected with COVID-19 are more susceptible to severe illness and have a higher risk of preterm birth, preeclampsia, caesarean delivery, and sometimes maternal mortality. Furthermore, the physiological and behavioural changes that occur during pregnancy can exacerbate the risk of transmission of respiratory infections like COVID-19. These risks highlight the importance of appropriate prenatal care and preventive measures to protect pregnant women from COVID-19. Therefore, it is crucial for pregnant women to follow guidelines issued by health authorities, such as wearing masks, practicing good hand hygiene, maintaining social distancing, and attending regular prenatal appointments for proper monitoring and care during this challenging time.

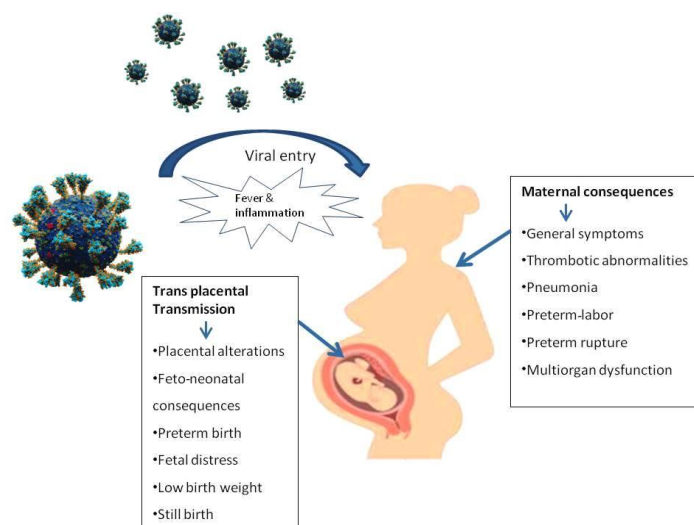


Figure.1 shows the COVID19 viral transmission and symptoms

Signs and symptoms of COVID-19

COVID19 or SARS-Cov-2 virus has been reported to possess three stages: Stage 1 is the incubation period where in some cases it may be asymptomatic and survive in the host undetected, stage II is where the virus is now detectable with minor or mild symptoms such as a fever, and stage 3, where severe symptoms arise including respiratory distress and subsequently death (Wang D et al., 2020)].The incubation period from the day of infection is about 5 days (Li Q et al., 2020) Thereafter, infected individuals with symptoms show signs of extremely high fever accompanied by coughing, headaches, difficulty in breathing, pneumonia, diarrhoea, haemoptysis and excessive sputum (Huang C et al., 2020, (Ren L-L et al., 2020, Wang W et al., 2020, Carlos WG et al., 2020). (Fig. 1) (Table.1). Some individuals with infection are asymptomatic and are labelled as highly infectious since they are unaware of their health status (Wang D et al., 2020). Fatal cases involved conditions such as respiratory distress, cardiac injury (Huang C et al., 2020).

II. Materials And Methods

The present study includes 44 pregnant women in King George hospital and from in and around Visakhapatnam, Andhra Pradesh. All the pregnant women were in third trimester except 4 cases, 2 were in I trimester and another 2 were in II trimester). Pregnant women with complications after COVID19 infection visited the KGH Hospital, between January 2021 and December 2023. Symptoms were recorded and conducted the investigations.

III. Results

The following investigation in 44 patients revealed, increased total neutrophils (40 %), reduced total lymphocytes (32 %), increased serum IL-6 (52 %) and increased C - reactive protein (78 %) (Lillie PJ et al., 2020).

Features of COVID19 in Pregnant women	
Characteristics	
No. of cases (n)	44
Gestational age at infection	Except 4 patients (2, I trimester & 2, II trimester), all were in third trimester
Respiratory comorbidities (n)	none
Symptoms	
Fever (%)	85
Cough (%)	32
Dyspnea (%)	15
Investigations	
Pneumonia (%)	76
Neutrophils (%)	40
Lymphopenia (%)	32
Thrombocytopenia (%)	13
IL6 (%)	52
C-reactive protein (%)	78
Maternal complications	
Mortality (%)	0
Mechanical ventilation (%)	4
Fetal complications	
Miscarriage/ stillbirth (%)	3
IUGR (%)	4
Preterm birth (%)	45
Neonatal complications	
Neonatal death (%)	1

Table.1 shows the features of COVID19 affected pregnant women.

IV. Discussion

Pregnant women and their fetuses are considered a high-risk population during infectious disease outbreaks, including the COVID-19 pandemic. Physiological and immune system changes during pregnancy

can increase susceptibility to infections, particularly those affecting the respiratory system. Additionally, the immune system adaptations that occur in pregnancy, which favour the protection of the fetus, can potentially leave the mother more vulnerable to viral infections. The present study revealed that the neutrophil count of the pregnant women was increased to 40% and the lymphocytes were reduced to 32%. Recent studies have been shown that a significant rise in neutrophil count among patients with COVID-19 (Pastorek M et al., 2022, Janiuk K et al., 2021, Gonzalez-Mosquera LF et al., 2022). Chen et al., 2020, reported that severe or critical COVID-19 patients had notably higher neutrophil counts upon admission than mild/moderate COVID-19 patients. In addition, elevated neutrophil count has been associated with increased disease severity and a poorer prognosis. Similarly, Li et al. observed that a significantly elevated neutrophil count could serve as an indicator to assess disease severity, consistent with the findings of previous reports (Chiang CC et al., 2020) The combination of an increased neutrophil count and a decreased lymphocyte count in COVID-19 patients leads to an elevated neutrophil-to-lymphocyte ratio (NLR) (Gujar RK et al., 2021, La Torre G et al., 2022, Egenc H et al., 1992). Brges L et al., 2020 compared COVID-19 patients admitted to the intensive care unit (ICU) with non-ICU admitted COVID-19 patients, and found that COVID-19 patients admitted to ICU had the lowest lymphocyte count, the highest neutrophil count and NLR, and the study showed that NLR was an independent predictor of disease severity in patients with COVID-19. This is because the immune system leans more towards a T-helper 2 dominance, which is less effective against viral infections than a T-helper 1 response (Dashraath et al., 2020). The immune system adaptations that occur in pregnancy, which are designed to protect the fetus, can also leave the mother more vulnerable to certain viral infections like COVID-19. Specifically, the immune system leans more towards T-helper 2 dominance, which is less effective against viral infections than a T-helper 1 response. This places pregnant women at a higher risk of developing severe illness from COVID-19 compared to non-pregnant individuals. The impact of COVID-19 infection on pregnant women during pregnancy can vary, with some studies suggesting a higher risk of severe illness compared to non-pregnant individuals (Wastnedge et al., 2021) (Schwartz, 2020).

Therefore, it is important for pregnant women to take precautions and follow guidelines from health authorities to protect themselves and their unborn babies from the potential risks of COVID-19 infection during pregnancy (Schwartz, 2020). Therefore, pregnant women should take necessary precautions such as wearing masks, practicing good hand hygiene, maintaining social distancing, and seeking regular prenatal care to minimize the potential risks associated with COVID-19 infection during pregnancy (Pountoukidou et al., 2021, Hapshy et al., 2021, Rasmussen et al., 2020, Wenling et al., 2020, Wastnedge et al., 2021, Wang C et al., 2021, Wastnedge et al., 2021, Rasmussen et al., 2020).

Pathogenesis of COVID-19

The COVID-19 structure is described as a positive single stranded RNA genome characterised by four genes; a spike protein, an envelope, a membrane and a nucleocapsid (Chen Y et al., 2020). The main target of the virus is the pulmonary area. The virus binds to the host receptor, which has been described as the angiotensin converting enzyme 2 (ACE2) via receptor binding domains (Wan Y et al., 2020). After the successful binding to the receptor of the host cell, the spike protein undergoes a conformational modification for the viral envelope to bind to the cell membrane for RNA release into the host cell. This process occurs through the endosomal pathway. Once RNA enters the host cell, it becomes translated into viral replicases, which are split into smaller particles by enzymes called proteinases. The particles are then translated into viral proteins by mRNAs and congregated into virions on the endoplasmic reticulum and the Golgi apparatus where they are released out of the cell via vesicles (Shereen MA et al., 2020). Following their release, they enter the alveoli cells, endothelial cells and blood cells. This causes exaggerated activation of immune cells and cytokines.

ACE2 receptor in pregnancy

The potential role of the renin angiotensin system (RAS) in pregnancy has been documented (Mor G et al., 2010, Goldstein B et al 2017, Aung M et al., 2017, Leñanos-Miranda A et al., 2018, Khaliq OP et al., 2020). The ACE2 receptor is critical for RAS since it is potentially involved in the conversion of angiotensinogen into angiotensin 1, angiotensin 1 into angiotensin II, and angiotensin II into angiotensin (1–7) (Ghadhanfar E et al., 2017). The expression of the ACE2 receptor has been reported in the placenta (Li M et al, 2020). The other members of the coronavirus family such as MERS-CoV and SARS-CoV have been involved in pregnancy complications (Favre G et al., 2020). These viruses possess analogous pathogenic traits as the current SARS-CoV2 (Favre G et al., 2020). This may indicate that SARS-CoV2 is a potential threat to pregnant women and fetal health. The expression levels of ACE2 in the placenta was reported to be higher in the villous cytotrophoblast, syncytiotrophoblast cells and in the decidua during the first trimester of pregnancy (Turco MY et al., 2019). The syncytiotrophoblast cells are involved in maternal and fetal gas exchange as well as nutrient supply (Teasdale F et al., 1985). Since ACE2 is highly expressed in this region of the placenta, this not only

increases the risk of the mother contracting SARS-Cov2, but is also plausible that transmission from mother to child may occur (Li M et al., 2020).

COVID19 pandemic includes a higher risk of severe illness, preterm birth, preeclampsia, labour complications, still birth/ neonatal death and maternal mortality. This emphasizes the importance of following preventive measures and seeking appropriate prenatal care to protect the health and well-being of pregnant women during the COVID-19 pandemic.

V. Conclusion

In conclusion, the impact of COVID-19 on pregnant women during pregnancy can be significant due to the physiological and immune system changes that occur. COVID-19 are marked by decreased lymphocytes, and increased ACE2, it therefore safer to conclude that pregnancy is a risk factor for COVID-19 development. Pregnant women are considered a high-risk population during infectious disease outbreaks, and the immune system adaptations that occur in pregnancy may leave them more vulnerable to viral infections like COVID-19.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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