

COVID-19 INFECTION IN PREGNANCY: A DESCRIPTIVE CROSS-SECTIONAL STUDY

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ARTICLE INFO

Received : 21 October, 2021

Accepted : 25 February, 2022

Published : 22 June, 2022

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ORA 296

DOI: <https://doi.org/10.3126/bjhs.v7i1.45821>

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Citation

Covid-19 Infection In Pregnancy: A Descriptive Cross-sectional Study.
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BJHS 2022;7(1):1713-1717.

ABSTRACT

Introduction

There is diverse evidence regarding the maternal and fetal effect of coronavirus disease 2019 (COVID-19) in pregnancy.

Objectives

The objective of this study was to assess the effect of COVID-19 in mother and fetus during pregnancy.

Methodology

A descriptive cross-sectional study was conducted during the second wave of COVID-19 in the Department of Obstetrics and Gynaecology at Birat Medical College Teaching Hospital from April 3 to July 3, 2021. All pregnant women admitted in the antenatal ward were sent real-time reverse transcription polymerase chain reaction (RT-PCR) for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. The patients with RT-PCR confirmed SARS-CoV-2 infection were enrolled in the study and followed up until discharged.

Result

The COVID-19 positivity rate was 18.0%. The mean age was 24.38 years. Majority of the patients were asymptomatic (79.7%). Among symptomatic patients, 73.3% had fever and respiratory symptoms and 95.9% of women didn't give any history of contact with COVID-19 patients. After confirmed SARS-CoV-2 infection, all pregnant women were immediately shifted to COVID ward, another COVID hospital or advised home isolation. Only one patient had pre-existing hypertension. Among the pregnancy complications, preterm labour was seen in 12.2% followed by premature rupture of membranes in 6.8%, fetal distress in 5.4%, and still birth in 2.7% of the pregnant women with SARS-CoV-2 infection. The minimum days of hospital stay was one and maximum days of hospital stay were 29 days. Average days of hospital stays was 2.24 days. Only 5.4% of patients who had severe disease required an intensive care unit (ICU) and one patient needed a mechanical ventilator. There was one maternal mortality due to Acute Respiratory Distress Syndrome (ARDS).

Conclusion

Symptom, clinical course and severity of COVID-19 in pregnancy is comparable with non-pregnant women with COVID-19 but associated with increases the risk of Preterm labour, Premature rupture of membranes, foetal distress and stillbirth.

KEYWORDS

COVID-19, Pregnancy, SARS-CoV-2

INTRODUCTION

The coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a highly infectious disease and has had a major impact worldwide.¹ It has affected almost every country including Nepal and has become a major global health threat. The World Health Organization (WHO) declared COVID-19 infection as a global pandemic on March 11, 2020.² Transmission occurs mainly through contact with respiratory droplets produced by an infected person.³ Measures to control and prevent the infection, such as adherence to universal precautions, quarantine, and timely diagnosis to control the transmission of SARS-CoV-2.⁴ COVID-19 causes common cold to severe Acute Respiratory Syndrome.⁵ Viral pneumonia is one of the leading cause for death during the pregnancy worldwide.⁶ Pregnant women undergo physiological and immunologic changes to support and protect the developing foetus, which lead to altered immune systems, which result in an altered response to SARS-CoV-2 infection in pregnancy, could potentially affect the severity of COVID-19 during pregnancy. High heart rate, oxygen consumption, stroke volume, and reduction in the lung capacity and functional residual capacity are major physiological changes that affect the cardiovascular and respiratory systems at the time of the pregnancy leading to more chances of developing the complications due to SARS-CoV-2 infection in pregnancy than non-pregnant population.^{8,9} Most people with COVID-19 experience mild to moderate disease, COVID-19 can cause severe disease or death, particularly in high-risk patients such as the elderly and those with underlying co-morbidities conditions.¹⁰ The SARS-CoV-2 virus can be transmitted from the mother to the newborn, although this rarely occurs.¹¹⁻¹³ There have been rare reports of suspected vertical transmission of SARS-CoV-2 virus.^{14,15} Mother-to-child transmission typically occurs by postnatal exposure and infection. Neonates with SARS-CoV-2 virus infection typically have a mild illness.^{16,17} The health care facility should be well equipped for early detection and managements of maternal course of illness and obstetric complications e.g., preterm labour or other foetal compromise.¹⁸ Royal college of Obstetricians and Gynaecologists (RCOG) reports that pregnant women are no more likely to infected with SARS-CoV-2, clinical course and severity of COVID-19 in pregnancy is similar to the general population,¹⁹ but the centers for disease control and prevention (CDC) report that pregnant women with COVID-19 manifest a more severe disease when infected with SARS-CoV-2.²⁰ Principles of management of COVID-19 in pregnancy include early isolation, aggressive infection control, early identification of complications and identification of co-morbidities conditions. Oxygen therapy, prophylactic antibiotics for prevention of superimposed bacterial infection and early intubation should be considered if there is a respiratory failure. Planning of delivery should be based on obstetrics indication.²¹ There are limited studies available throughout the world regarding the outcomes of COVID-19 during pregnancy, differences in clinical course, and the potential risks to the unborn child and no studies were done in Nepal. Therefore, this study was conducted with the aim to gather

information regarding the clinical manifestations, various maternal, obstetric and neonatal outcomes of SARS-CoV-2 infection in pregnancy.

METHODOLOGY

A descriptive cross-sectional study was conducted during the second wave of COVID-19 in the Department of Obstetrics and Gynaecology, antenatal ward of Birat Medical College Teaching Hospital from April 3 to July 3, 2021. Ethical clearance was taken from the Institutional Review Committee of Birat Medical College Teaching Hospital. All pregnant women admitted to antenatal ward were sent real-time reverse transcription polymerase chain reaction (RT-PCR) for SARS-CoV-2 infection. The pregnant women with RT-PCR confirmed SARS-CoV-2 infection cases were enrolled in the study and followed up till discharged from the hospital. All pregnant women with confirmed SARS-CoV-2 infection were shifted immediately to Birat Medical College Teaching Hospital COVID ward, another COVID hospital designated by the Government of Nepal or advised for home quarantine and self-isolation to prevent infection to other patients and health care providers. The participants were explained about the aim of study and informed consent was taken prior to data collection. Only those women who had given consent for study were enrolled in the study. Structured questionnaires were used to gather information regarding the clinical manifestations, various maternal, obstetrics and fetal complications of COVID-19 in pregnancy. Face to face interview and patients inpatients record file was used for data collection by the researcher, using a preformed proforma. Confidentiality was maintained throughout the study. The collected data were entered in Microsoft Excel and analyzed by using SPSS version 22. Data were presented using descriptive statistics in frequency, percentage, mean and standard deviations.

RESULTS

During the study period, 411 pregnant women RT-PCR for SARS-CoV-2 infection were sent. Among them, 74 (18.0%) of pregnant women were found to be infected with SARS-CoV-2 virus. The positivity rate was 18.0%. The age of the pregnant women were in the range of 18 to 41 years, with mean age and standard deviation of 24.38 ± 5.10 years. The age distribution of patients are shown in table 1.

Table 1: Age distribution of the COVID-19 infected pregnant women (n = 74)

Frequency Age (years)	n (%)
≤ 20	7 (9.5)
21-30	61 (82.4)
31-40	5 (6.8)
>40	1 (1.4)



Only 4.0% of pregnant women gave a history of contact with COVID-19 patients and 95.9% of women didn't give any history of contact with COVID-19 patients shown in figure 1.

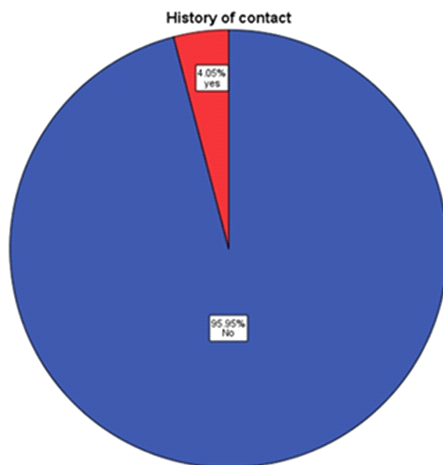


Figure 1: History of contact among the COVID-19 positive pregnant women (n = 74)

Majority of pregnant women were asymptomatic (79.7%). Among symptomatic patients, 73.3% had fever and respiratory symptoms and the rest of 26.6% had sore throat, Fatigue, weakness, loss of taste/smell shown in table 2.

Table 2: Clinical features of the COVID-19 positive pregnant women (n = 74).

Frequency	n (%)
Asymptomatic	59 (79.7)
Fever and respiratory symptom	11 (14.9)
Other symptom	4(5.4)

Only one patient had pre-existing hypertension. Pregnancy complications are shown in table 3. Around three fourth (73.0%) of pregnant women didn't have any pregnancy complications. Preterm labour occurred in 12.2% followed by premature rupture of membranes in 6.8%, fetal distress in 5.4%, and stillbirth in 2.7% of pregnant women.

Table 3: Pregnancy complications (n = 74)

Frequency	n (%)
None	54 (73)
Preterm labour	9 (12.2)
Premature rupture of membranes	5 (6.8)
Foetal distress	4(5.4)
Stillbirth	2(2.7)

Among 74 pregnancies 63(85.1%) were delivered, among which 63.4% delivered vaginally and 36.5% delivered by caesarean section. The caesarean section was done for obstetrics indication only. The minimum days of hospital stay was one day and maximum days of hospital stay was 29 days. Mean days of hospital stays and standard deviation was 2.24 ± 3.487 days. Only 5.4% of pregnant women who had severe disease, needed an ICU admission and one

woman needed a mechanical ventilator. There was one maternal mortality due to Acute Respiratory Distress Syndrome (ARDS).

DISCUSSION

The pregnant woman's health is very important and needs proper care during this rapidly increasing COVID-19 pandemic. Multidisciplinary care is necessary for proper management of pregnant women. The proper evaluation and treatment is necessary, considering both maternal and fetal outcomes in COVID-19 in pregnancy. There is limited evidence available regarding COVID-19 in pregnancy. There is still a doubt whether clinical characteristics and course of COVID-19 in pregnancy differ from those of non-pregnant women with COVID-19. This study was focused on determining the various maternal and fetal clinical manifestations of COVID-19 in pregnancy. Birat Medical College Teaching Hospital is a tertiary care hospital located in Eastern part of Nepal, provided maternity service during the peak of the second wave of COVID-19 when most of the hospitals of Nepal had stopped providing maternity service. The World Health Organization (WHO) has reported that there is no obvious difference in the clinical symptoms and course of SARS-CoV-2 virus infection between non-pregnant and pregnant women of reproductive age.²² We analysed 74 pregnant women with RT-PCR confirmed SARS-CoV-2 virus infection out of 411 pregnant women RT-PCR for SARS-CoV-2 virus infection were sent. The positivity rate during the second wave of COVID-19 was 18%. This finding is similar to an analysis done all over Nepal by Joshi RK et al during the second wave of COVID-19.²³ This is because during the peak of the second wave of the SARS-CoV-2 infection, infection was spread all over Nepal. We found that 95.5% of pregnant women didn't give any history of contact with COVID-19 patients. This is because SARS-CoV-2 virus infection had spread in the community, most people had asymptomatic SARS-CoV-2 infection and most of the people SARS-CoV-2 infection status was not known. SARS-CoV-2 infection could be transmitted even from the infected asymptomatic individuals.²⁴ In our finding the 82.4% infected women were between 21 to 30 years of age. This finding is similar to a study done by Sharma et al.²⁵ reported that the population of the age group 21 to 30 years is more infected with SARS-CoV-2 virus. The reason behind such distribution of SARS-CoV-2 infection is that, this is the age when most of the females become pregnant and this age group of females works outside the house so more chance of SARS-CoV-2 infection. We found 79.7% of pregnant women with SARS-CoV-2 infection were asymptomatic. Among symptomatic women 73.3% had fever and respiratory symptoms, 26.6% pregnant women with SARS-CoV-2 infection had other symptoms like fatigue, myalgia, joint pain, loss of taste and smell. This was similar to RCOG guideline, Coronavirus infection in pregnancy reported that more than two-thirds of pregnant women with SARS-CoV-2 infection have no symptoms and the most common symptoms of SARS-CoV-2 infection in pregnancy are cough and fever.¹⁹ Allotey et al. also reported that pregnant women with SARS-CoV-2

infection are less likely to manifest symptoms.²⁶ Sathian et al. et al also reported that the clinical presentation of pregnant women with COVID-19 is comparable with the SARS-CoV-2 infected non-pregnant females, and the frequent symptoms were fever, cough, myalgia, sore throat and malaise.²³ Pregnant women were not found to be at higher risk for COVID-19 than women who are not pregnant. However pregnant people with symptomatic COVID-19 may experience more adverse outcomes compared to non-pregnant people.²⁷ Hazari et al. reported that pregnant women had a much more severe course of illness compared to non-pregnant women with the COVID-19. They had more ICU admissions and suffered more complications of COVID-19, such as risk for miscarriage and preterm deliveries.²⁸ In our study pregnant women require admission in hospital for 1 day to 29 days with mean days of hospital stay and standard deviation of 2.24 and 3.487 respectively. Four pregnant women had severe COVID-19 infection, required ICU admission and oxygen support while one required mechanical ventilation. There was one maternal mortality (1.4%). This was similar to study done by Joshi RK et al, case fatality rate during second wave of COVID-19 was 1.5%.²⁹ According to RCOG guideline overall risk of maternal death remains very low in SARS-CoV-2 infection in pregnancy.¹⁹ The case fatality rate is low in our study, this is because in our study most of the pregnant women (82.4%) were of age group 21 to 30 years, only one pregnant women had comorbidity and majority of pregnant women were asymptomatic (79.7%) SARS-CoV-2 infection. Case fatality rate in COVID-19 varied considerably with age and case fatality sharply increase beyond 40 years of age and more than 18% beyond 60 years and is strongly associated with comorbidities.³⁰ We found that COVID-19 in pregnancy increased the risk of pregnancy complications like preterm labour occurs in 12.2% of pregnancy followed by premature rupture of membranes occurs in 6.8% of pregnancy, foetal distress occurs in 5.4% of pregnancy, and stillbirth occurs in 2.7% of pregnancy. This finding is supported by several studies that COVID-19 in pregnancy increases the risk of preterm labour and premature rupture of membranes (PROM).^{28,31-33} In contrast to our finding, a study done by Murphy et al. reported COVID-19 in pregnancy does not increase in the incidence of preterm birth.³⁴ and by Yu et al. has reported the maternal, foetal outcomes of COVID-19 in pregnancy appeared very good.³⁵ In our study caesarean

section rate is 36.5 % which is comparable to caesarean section rate of non COVID-19 pregnancy at tertiary care referral centre of eastern Nepal.³⁶ But Overtoom et al. reported that COVID-19 infection in pregnancy increased risk of caesarean section and ICU admission.³⁷ Allotey et al. reported that pregnant women with COVID-19 were associated with serious complications such as admission to intensive care unit, need of mechanical ventilation and maternal death than non-pregnant women of reproductive age.²⁶ A meta-analysis done by Wei SQ reported that COVID-19 in pregnancy was associated with preterm birth, stillbirth but not with increased risk of caesarean delivery compared with non COVID-19 pregnancy.³⁸ But Symptomatic COVID-19 in pregnancy was associated with an increased risk of caesarean delivery as compared with asymptomatic COVID-19 in pregnancy.³⁸

CONCLUSION

Symptomatically, clinical course and severity of COVID-19 in pregnancy is comparable to non-pregnant women with COVID-19 but associated with increased risk of pregnancy complications like Preterm labour, premature rupture of membranes, foetal distress and stillbirth.

RECOMMENDATIONS

The pregnant woman's health is very important and needs proper care during this rapidly increasing COVID-19 pandemic. Multidisciplinary care is necessary for proper management of pregnant women with COVID-19. The proper evaluation and treatment is necessary, considering both maternal and fetal outcomes in COVID-19 in pregnancy.

LIMITATIONS OF THE STUDY

The entire course of COVID-19 infection in pregnant women could not be assessed as patients were discharged.

ACKNOWLEDGEMENTS

We would like to thank all pregnant women for their valuable time, cooperation during this pandemic. Thanks to the Obstetrics and Gynaecology Department for their cooperation and support.

CONFLICT OF INTEREST

We declare no conflict of interest.

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