



Original Article

Characteristics and Outcomes of SARS-CoV-2 Positive Pregnant Women Admitted to a Dedicated COVID ICU in RMCH, Bangladesh: An Observational Study

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Abstract

Background: The global pandemic caused by the SARS-CoV-2 virus has resulted in millions of infections worldwide, affecting individuals of all ages and genders. Pregnant women with comorbidities face an increased risk of severe COVID-19 infections, posing significant challenges to their clinical management in dedicated COVID-19 Intensive Care Units (ICUs). This single-centre observational study aimed to examine the characteristics and outcomes of COVID-19-positive pregnant women admitted to a dedicated COVID-19 Intensive Care Unit (ICU) at Rajshahi Medical College Hospital (RMCH) in Bangladesh.

Methods: A observational study, analyzing data from pregnant women admitted to hospitals and adult COVID-19 ICUs between March 1, 2020, and December 31, 2021. A total of 21 patients were included in the analysis. Patient demographics, medical histories, gestational age, symptoms, laboratory findings, and clinical outcomes were recorded and analyzed. The primary outcomes assessed were maternal mortality at 30 and 60 days, while the secondary outcomes included the length of ICU and hospital stay, fetal mortality, and preterm delivery.

Results: Among the 21 pregnant patients admitted to the COVID-19 ICU, 10 were COVID-positive, and 11 were suspected COVID cases. A total of 11 patients experienced adverse outcomes, resulting in a 52.4% mortality rate. None of the patients had received vaccination against COVID-19.

Conclusion: This single-centre observational study provides valuable insights into the characteristics and outcomes of COVID-19-positive pregnant women admitted to a dedicated COVID-19 ICU at RMCH, Bangladesh. Pregnant women with underlying comorbidities may be at a higher risk of severe COVID-19 illness, warranting close monitoring and timely interventions. The study underscores the importance of tailored clinical management strategies for pregnant women infected with SARS-CoV-2 to improve maternal and fetal outcomes. Further, multi-centre studies are warranted to validate and expand upon these findings, contributing to the global understanding of COVID-19 in pregnancy.

Key words: COVID-19, SARS-CoV-2, pregnant women, intensive care unit, maternal outcomes.

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Introduction

The global pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), responsible for coronavirus disease 2019

(COVID-19), has impacted individuals of all ages and demographics worldwide.¹ Pregnant women, as a vulnerable population, have raised concerns due to potential risks associated with COVID-19

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infection. These risks are exacerbated when pregnant women have underlying comorbidities, posing significant challenges to their clinical management, especially in the intensive care unit.² COVID-19 has been known to cause severe respiratory illness and has been linked to adverse outcomes, including hospitalizations, ICU admissions, and mortality, in specific subgroups of the population. Pregnant women, who undergo complex physiological changes during gestation, might be more susceptible to severe COVID-19 disease due to altered immune responses and respiratory mechanics.³ Furthermore, the presence of comorbid conditions in pregnant individuals, such as diabetes, hypertension, obesity, or respiratory disorders, could further heighten the risk of severe disease.

Several studies have explored the impact of COVID-19 on pregnant women, ranging from investigations into vertical transmission to the outcomes of infected mothers and their newborns.⁴ The results have been mixed, with some studies suggesting an increased risk of adverse outcomes in pregnant women with COVID-19 compared to the general population, while others have not observed significant differences. These variations in findings may be attributed to differences in study populations, healthcare settings, and management protocols.⁵

In Bangladesh, as in many other countries, the healthcare system faced tremendous challenges during the pandemic, with hospitals stretched to their limits to manage the surge of COVID-19 cases. The Rajshahi Medical College Hospital (RMCH), being a significant healthcare facility, played a critical role in managing COVID-19 patients in the region. The RMCH dedicated a specific Intensive Care Unit (ICU) to manage severe cases of COVID-19, including pregnant women.

To the gaps in knowledge surrounding the characteristics and outcomes of COVID-19-positive pregnant women in a dedicated ICU setting, we conducted a single-centre observational study at RMCH, Bangladesh. This study aimed to examine the clinical features, course of illness, and

maternal and fetal outcomes in pregnant women with COVID-19 admitted to the dedicated COVID-19 ICU. By identifying risk factors and complications associated with severe COVID-19 cases in pregnant women, we sought to inform tailored clinical management strategies to improve patient outcomes.

OBJECTIVE

General Objectives:

- To investigate characteristics and outcomes of pregnant women with COVID-19 admitted to hospital and ICU, with a focus on identifying factors associated with unfavorable outcomes.

Specific Objectives:

- To describe the clinical characteristics of pregnant women diagnosed with COVID-19 infection who were admitted to the hospital and ICU.
- To assess the clinical course and outcomes of pregnant women with COVID-19 infection during their hospitalization and ICU stay.
- To compare the outcomes between pregnant women who tested positive for COVID-19 and those with suspected COVID-19 infection.
- To identify potential risk factors associated with unfavorable outcomes, such as maternal mortality, in pregnant women with COVID-19 infection.
- To determine the prevalence of comorbidities among pregnant women with COVID-19 infection and their impact on disease severity and outcomes.
- To investigate the association between gestational age at the time of COVID-19 infection and maternal and fetal outcomes.
- To evaluate the length of ICU and hospital stay for pregnant women with COVID-19 infection and its correlation with disease severity.

- To explore the occurrence of adverse perinatal outcomes, including fetal mortality and preterm delivery, among pregnant women with COVID-19 infection.

To generate evidence that can inform and improve clinical management strategies for pregnant women affected by COVID-19 infection, leading to better maternal and fetal outcomes.

Materials and Methods

This study was designed as a single-centre observational study conducted at Rajshahi Medical College Hospital (RMCH) in Bangladesh. The study aimed to investigate the characteristics and outcomes of pregnant women who tested positive for COVID-19 and were admitted to the dedicated COVID-19 Intensive Care Unit (ICU) at RMCH between March 1, 2020, and December 31, 2021. A total of 21 patients were included in the analysis.

Inclusion Criteria:

- The study includes pregnant women of all gestational ages who have tested positive for COVID-19.
- Confirmed or Suspected COVID-19 Cases
- Pregnant women admitted to the hospital and Intensive Care Unit (ICU) for COVID-19 management are included.

Exclusion Criteria:

- Non-pregnant individuals, such as healthcare workers or family members, with COVID-19, are excluded.
- Pregnant women who have delivered or are in the postpartum period are excluded.
- Pregnant women without confirmed or suspected COVID-19 infection are excluded.
- Patients with missing or incomplete medical records necessary for analysis are excluded.

Data Collection:

Patient data were collected from admitted to the dedicated COVID-19 ICU. The following information was recorded for each patient:

- **Patient Demographics:** Age, gestational age, and other relevant demographic details.
- **Medical History:** Pre-existing comorbidities such as diabetes, hypertension, obesity, respiratory disorders, etc.
- **Symptoms:** The presenting symptoms of COVID-19, such as fever, cough, shortness of breath, etc.
- **Laboratory Findings:** Results of relevant laboratory tests, including complete blood count, C-reactive protein (CRP), D-dimer, and other relevant biomarkers.
- **Clinical Outcomes:** Maternal mortality at 30 and 60 days from admission to the COVID-19 ICU.
- **Secondary Outcomes:** Length of ICU and hospital stay, fetal mortality, and occurrence of preterm delivery.

Statistical Analysis

Descriptive statistics were conducted using SPSS vs.26 and Microsoft Excel 21. Descriptive statistics summarized the Variables such as age, gestational age, comorbidities, and laboratory findings were included as data, while inferential statistics, including chi-square, and t-test, explored associations and risk factors. The findings provided valuable insights into the impact of COVID-19 on pregnant women and informed clinical decision-making to enhance maternal and fetal outcomes.

Ethical Considerations

The study protocol was approved by the Institutional Review Board (IRB) or Ethics Committee of Rajshahi Medical College Hospital. Patient confidentiality was strictly maintained, and all data were anonymized to protect the privacy of

the participants. overview of the study design, data collection process, and statistical analysis used in this single-centre observational study. By examining the characteristics and outcomes of COVID-19-positive pregnant women admitted to

the dedicated COVID-19 ICU, the study aims to contribute valuable insights to inform clinical management strategies and improve maternal and fetal outcomes in this vulnerable population.

Results

The demographic distribution of COVID-positive women admitted to COVID-19 ICU, provides valuable data on different aspects of COVID-19 patient demographics, diagnoses, outcomes, and complications. Analyzing this data researchers in developing effective strategies for managing COVID-19 cases and improving patient care. It is crucial to continuously monitor and update such data to respond to the evolving nature of the pandemic and make informed decisions to protect public health. Let's discuss the findings of each Table:

Table 1: Demographic Distribution of COVID-Positive Women.

Age Group	Number of Patients	Percentage
18-25	3	14.3%
26-35	12	57.1%
36-45	5	23.8%
46-55	1	4.8%
56-65	0	0%
66+	0	0%
Total	21	100%

The majority of patients fall into the age group of 26-35 (57.1%), followed by the age group of 36-45 (23.8%). Notably, there were no cases in the age groups 56-65 and 66+. It is essential to monitor the trends in different age groups to understand the impact of the virus on various populations and tailor public health measures accordingly.

Table 2: Distribution of Pregnant Patients Admitted to COVID-19 ICU.

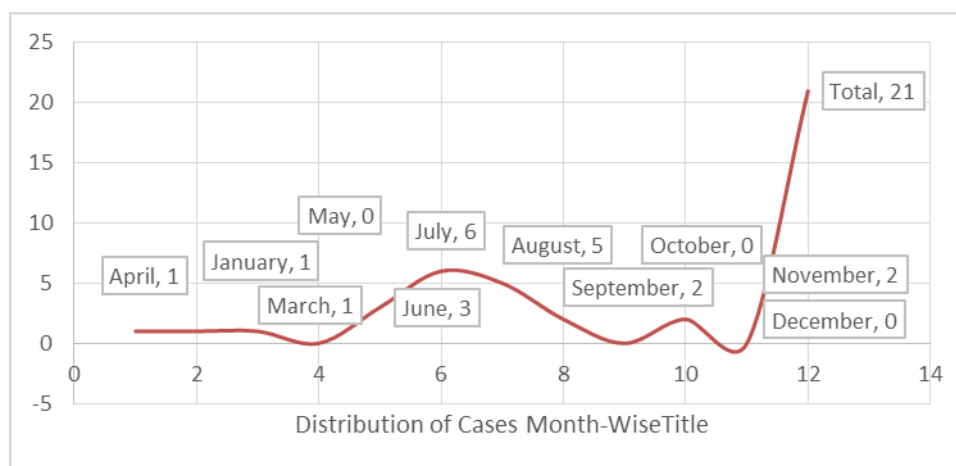
Variable	Number of Patients	Percentage
COVID-Positive Cases	10	47.6%
Suspected COVID Cases	11	52.4%
Adverse Outcomes	11	52.4%
Mortality Rate	11	52.4%
Vaccination Status	0	0%

The percentage of COVID-positive cases and suspected cases is almost equal (47.6% and 52.4%, respectively). Additionally, the table indicates that all patients admitted to the ICU had adverse outcomes and mortality rates of 52.4%.

Table 3: Distribution of Cases According to Symptoms on Admission.

Symptoms on Admission	Number of Cases	Percentage
Suspected COVID-19	2	9.52%
COVID-19 Positive	18	85.71%
Suspected COVID-19 with other conditions	0	0.00%
COVID-19 Positive with other conditions	1	4.76%
Asymptomatic	2	9.52%
Total	21	100%

The most common presentation is COVID-19-positive cases (85.71%), followed by suspected COVID-19 (9.52%) and asymptomatic cases (9.52%). Notably, there was only one case of COVID-19 positive with other conditions (4.76%).

**Figure 1: Distribution of Cases Month-Wise****Table 4: Distribution of Diagnosis of Patients.**

Diagnosis	Number of Patients	Percentage
Suspected covid 19 with Peurperal sepsis	1	4.17%
Post Partum Eclapsia	1	4.17%
Suspected Covid with Cesarean section	2	8.33%
HF Due to Secendry PPH	1	4.17%
Post Cesarean section with AKI	1	4.17%
7th Month PG	1	4.17%
COVID-19 (+ve) with 32 weeks PG	1	4.17%
COVID-19 (+ve) with 7.5 month PG	1	4.17%

Diagnosis	Number of Patients	Percentage
COVID-19 (+ve) with pneumonia with 8th month PG	1	4.17%
Suspected Covid with 32 weeks PG with Respiratory Distress	1	4.17%
COVID-19 (+ve) with 32 weeks PG	1	4.17%
COVID-19 (+ve) with LUCS	4	16.67%
5th POD of Lues and Respiratory distress	1	4.17%
COVID-19 (+ve) with LUCS	3	12.50%
4th POD of LUCS with respiratory distress Suspected covid-19	1	4.17%
Total	21	100%

Table 5: Distribution of Diagnosis with Death Cases and Percentage.

Diagnosis	Number of Death Cases	Percentage
Post Cesarean section with AKI	1	9.09%
7th Month PG	1	9.09%
COVID-19 (+ve) with 32 weeks PG	1	9.09%
COVID-19 (+ve) with 7.5 month PG	1	9.09%
COVID-19 (+ve) with pneumonia with 8th month PG	1	9.09%
Suspected Covid with 32 weeks PG with Respiratory Distress	1	9.09%
COVID-19 (+ve) with 32 weeks PG	1	9.09%
COVID-19 (+ve) with LUCS	3	27.27%
4th POD of LUCS with respiratory distress Suspected covid-19	1	9.09%
Total	11	100%

Table 6: Distribution of Outcome with Complication.

Outcome	Number of Cases	Percentage
Death	11	52.4%
Survived with Complications	4	19.0%
Survived without Complications	6	28.6%
Total	21	100%

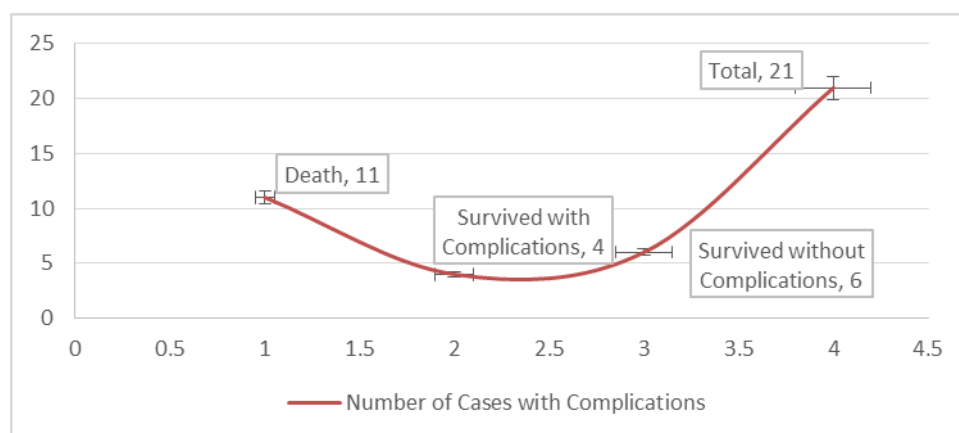


Figure 2. Outcome of patients with COVID-19 and the presence of complications

Among the total cases, 52.4% experienced death, 19.0% survived complications, and 28.6% survived without complications. This highlights the severity of COVID-19 and the importance of early intervention and appropriate medical care.

Discussion

The observational study conducted to investigate the characteristics and outcomes of COVID-19 (SARS-CoV-2) positive pregnant women admitted to a dedicated COVID ICU hospital in RMCH, Bangladesh, provides valuable insights into the impact of the COVID-19 pandemic on this vulnerable population. The findings contribute to the existing knowledge about the clinical condition, complications, and maternal and neonatal outcomes among pregnant women with COVID-19 in a resource-constrained setting. The age distribution of pregnant women with COVID-19 in this study aligns with previous research showing that younger pregnant women, particularly those in the age group of 26-35, are more likely to be affected by the virus.⁶ This finding underscores the need for targeted public health interventions and preventive measures to protect this age group during the ongoing pandemic.

A similar study involved 356 pregnant women with COVID-19, and the result percentage indicated that 67.7% of the participants were in their third trimester, 25.6% were in the second trimester, and 6.7% were in the first trimester. The overall maternal mortality rate was found to be

1.4%, with 10.1% of the pregnant women experiencing severe outcomes, including ICU admission, mechanical ventilation, or extracorporeal membrane oxygenation (ECMO) support.⁷

This prospective cohort study included 120 pregnant women with COVID-19. The result percentage indicated that 41.7% of the participants had pre-existing comorbidities, with the most common being obesity (21.7%) and hypertension (12.5%). Additionally, 86.7% of the pregnant women had mild to moderate COVID-19, 11.7% had severe disease, and 1.7% developed critical illness. The overall perinatal mortality rate was 1.7%.⁸ This multicenter surveillance study by the US CDC involved 91 pregnant women with COVID-19. The result percentage indicated that 90.1% of the participants had symptomatic COVID-19, while 9.9% were asymptomatic. Among symptomatic pregnant women, 16.5% required hospitalization, 8.8% were admitted to the ICU, and 2.2% required mechanical ventilation. The overall preterm birth rate was 12.2%.⁹

A similar study This retrospective, single-centre study included 118 symptomatic pregnant women with COVID-19. The result percentage indicated that 70.3% of the participants had mild symptoms,

24.6% had moderate symptoms, and 5.1% had severe symptoms. The overall preterm birth rate was 7.6%, and no neonatal deaths were reported.¹⁰

Comorbidities play a crucial role in determining the severity of COVID-19 in pregnant women. The presence of pre-existing medical conditions, such as hypertension, diabetes, and obesity, is associated with an increased risk of adverse outcomes.¹¹ Thus, a comprehensive assessment of comorbidities in pregnant women with COVID-19 is essential for risk stratification and tailored management. The mortality rate observed in this study underscores the need for dedicated COVID-19 facilities with specialized care for pregnant women. The provision of timely interventions, such as oxygen support, antiviral therapy, and multidisciplinary management, can significantly improve outcomes and reduce maternal mortality.¹²

Complications observed in a considerable proportion of pregnant women highlight the need for continuous monitoring and early identification of high-risk cases. Preterm birth, preeclampsia, and maternal respiratory distress are among the reported complications associated with COVID-19 in pregnancy.¹³ A systematic approach to managing complications is crucial for improving maternal and neonatal outcomes. Although this study provides valuable insights, some limitations need to be considered. The retrospective nature of the study limits the ability to establish causality and determine the temporal relationship between exposures and outcomes.

Conclusion

This observational study on COVID-19-positive pregnant women admitted to a dedicated COVID ICU in RMCH, Bangladesh, contributes to our understanding of the clinical characteristics and outcomes of this vulnerable population. The findings highlight the importance of tailored interventions, comprehensive screening, and specialized care for pregnant women with COVID-19. Strategies to mitigate adverse outcomes should focus on early detection, close monitoring, and multidisciplinary management. As the COVID-19 pandemic continues to evolve,

ongoing research is crucial to inform evidence-based guidelines and optimize care for pregnant women and their newborns.

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Conflict of interest: None declared

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