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Evaluation of Treatment Outcomes in Pregnant Women Infected with COVID-19: A Retrospective Analysis

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Abstract

This study aimed to analyze maternal outcomes in pregnant women infected with COVID-19, focusing on the impact of disease severity, timing of medical intervention, and the effect of different SARS-CoV-2 variants. A retrospective analysis was conducted on 9,288 pregnant women diagnosed with COVID-19. Disease severity was classified as mild (30%), moderate (52%), severe (17%), and critical (2%). The study also examined the timing of medical care, with 41.6% of women seeking care within 7 days of symptom onset and 58.4% after 7 days. The average gestational age was 271.8 days, with the majority (93.8%) at full-term pregnancy. Results indicated that 88.2% of women continued their pregnancies during treatment, while 11.9% experienced pregnancy termination, including preterm deliveries and miscarriages. The study found a significant ($p < 0.05$) association between COVID-19 severity and adverse outcomes, such as preterm birth and maternal mortality. Severe and critical cases demonstrated increased risks of uteroplacental insufficiency (52.1% and 85.5%, respectively), the need for intensive respiratory support, and ICU admission. The differences in outcomes between the Delta and Omicron variants. The Delta variant was associated with more severe disease and higher rates of complications, including a higher need for cesarean sections, compared to the Omicron variant. The overall 30-day survival rate was 98.05%, with a noticeable drop to 43.59% in critically ill patients. This study underscores the importance of early medical intervention and continuous monitoring in managing COVID-19 in pregnant women. The findings also emphasize the need to consider the variant-specific effects of SARS-CoV-2 on maternal and neonatal outcomes, which can guide clinical decision-making and improve the prognosis for both mother and child.

Keywords

COVID-19, Pregnancy, Maternal Outcomes, SARS-CoV-2 Variants, Preterm Birth, Uteroplacental Insufficiency, Respiratory Support, Intensive Care, Maternal Outcomes

1. Introduction

The clinical course of COVID-19 in pregnant women has several key features that have been identified in numerous studies conducted since the start of the pandemic. According to the literature, approximately 47% of pregnant women with COVID-19 may be asymptomatic, while the remaining cases present symptoms ranging from mild to severe. The most common symptoms include fatigue, cough, and fever. Severe cases can lead to hospitalization, the need for oxygen support, or even mechanical ventilation (MV). In some instances, complications such as preeclampsia and HELLP syndrome have been observed [1]-[3].

COVID-19 in pregnant women is associated with an increased risk of preterm birth, particularly in cases of severe disease. Additionally, there is evidence that neonates born to mothers with COVID-19 may have low birth weights, although vertical transmission of the virus (from mother to fetus) is rare [4] [5].

Most neonates born to mothers with COVID-19 are healthy, with only a small percentage testing positive for SARS-CoV-2. In such cases, symptoms in neonates are typically minimal or absent [6] [7].

The timing of medical intervention in COVID-19 cases among pregnant women is a significant factor affecting both maternal health and fetal outcomes. Studies show that pregnant women who seek medical care at earlier stages of the disease have more favorable prognoses. Early treatment initiation, including hospitalization when necessary, can reduce the risk of severe complications such as acute respiratory distress syndrome (ARDS) and the need for MV. Furthermore, early infection detection allows for more rigorous fetal monitoring, helping to prevent preterm births [8] [9].

Delayed treatment initiation may lead to disease progression, increasing the likelihood of intensive care unit (ICU) admission, emergency deliveries, and poorer outcomes for both the mother and the fetus. In particular, women with severe COVID-19 who seek medical care at later stages are more likely to experience preterm births and a higher risk of fetal mortality [10] [11].

Patients presenting with severe or critical conditions generally face a higher risk of adverse outcomes, including the need for intensive therapy, mechanical ventilation, and elevated mortality rates among both mothers and neonates. This is supported by several studies that demonstrate the significant improvements in prognosis achievable through early diagnosis and treatment of COVID-19 in pregnant women. It is also crucial to consider how various clinical parameters can serve as predictors of treatment outcomes [12]-[15].

Our research can make an important contribution to understanding how different factors influence the treatment outcomes of COVID-19 in pregnant women and assist in developing optimal management strategies for this patient group.

2. Material and Methods

In a study involving 9288 pregnant women with COVID-19, mild disease severity was identified in 30% (2755 patients), moderate severity in 52% (4794 patients), and severe disease in 17.0% (1574 patients), with only 2.0% (165 patients) experiencing a critical condition. The mean age of participants was 31.5 years (SD ± 4.9), ranging from 18 to 53 years. The largest proportion of women (47.7%) were aged 25 - 29 years, followed by those aged 18 - 24 years (29.1%), 30 - 34 years (15.4%), and women aged 35 years and older (7.8%). The average time from symptom onset to seeking care was 11.6 days (SD ± 3.8), with a range of 2 to 22 days, indicating that most women delayed seeking medical attention, possibly due to underestimating the severity of the disease or difficulty accessing healthcare services (Table 1). A total of 3860 women (41.6%) sought care within 7 days of symptom onset, potentially reflecting earlier detection and a more favorable prognosis. However, 5428 women (58.4%) sought care more than 7 days after symptom onset, often after receiving unsuccessful treatment at other regional maternity hospitals, which may be linked to the later initiation of specialized treatment, increasing the risk of complications, particularly during pregnancy.

Table 1. COVID-19 course and severity in pregnant women admitted to Zangiota-1.

Parameter	n = 9288	
	n	%
Time from COVID-19 symptom onset to maternity complex admission		
Mean	11.6 ± 3.8 days	
Range	2 - 22 days	
<7 days	3860	41.6%
>7 days	5428	58.4%
Lung involvement		
Up to 50%	6120	65.9%
More than 50%	3168	34.1%
COVID-19 severity at initial assessment		
Mild	2755	30%
Moderate	4794	52%
Severe	1574	17%
Extremely severe	165	2%

A total of 6120 women (65.9%) had lung involvement of up to 50%, while 3168 women (34.1%) had lung involvement exceeding 50%, indicating a greater health risk for the mother and fetus, necessitating more intensive monitoring and

treatment. The period from December 2020 to the end of 2023 encompasses several pandemic waves, allowing for an analysis of how changes in treatment strategies, vaccination, and the emergence of new variants impacted outcomes. Out of the total number of women, 646 (7.0%) were nulliparous, while 8642 (93.0%) had previous childbirth experience. The predominance of multiparous women may indicate a higher likelihood of complications in this group or that they were more likely to seek medical care (Table 2).

Table 2. Pregnancy profile and gestational age of women with COVID-19 admitted to Zangiota-1.

Parameter	n = 9288	
	n	%
Parity		
Nulliparous	646	7.0%
Multiparous	8642	93.0%
Gestational age		
Mean gestational age (days)	271.8 ± 13.5	
Range (days)	152 - 302 days	
Gestational weeks		
22 to <32 weeks	113	1.2%
32 to <35 weeks	241	2.6%
35 to <42 weeks	8715	93.8%
≥42 weeks	219	2.4%

The mean gestational age was 271.8 days (±13.5), corresponding to approximately 39 weeks, close to full-term pregnancy. The range of gestational ages varied from 152 to 302 days, encompassing both preterm and post-term pregnancies. A total of 8715 women (93.8%) were at a gestational age of 35 to less than 42 weeks, indicating full-term pregnancy. This suggests that most women were admitted late in their pregnancies, possibly due to preparation for delivery or exacerbation of COVID-19 symptoms at this stage. Preterm deliveries, between 22 to less than 32 weeks, were observed in 113 women (1.2%), and between 32 to less than 35 weeks in 241 women (2.6%). These data highlight the risk of preterm birth among women with COVID-19. In 219 cases (2.4%), pregnancies extended beyond 42 weeks, indicating post-term pregnancy. Preexisting comorbidities were identified in 646 women (7.0%). The presence of comorbid conditions before pregnancy can significantly complicate the course of COVID-19, increasing risks for both the mother and fetus.

3. Results

The severity of the disease was assessed at the time of seeking medical care and was found to correlate with how quickly women sought help after the onset of COVID-19 symptoms. The majority of women (72.5%) who sought medical

assistance within the first seven days of symptom onset were diagnosed with mild COVID-19. The average time to seek care in this group was 6.1 ± 3.4 days. This indicates that early medical attention facilitates diagnosis at an earlier stage, before the disease progresses to more severe forms.

In the group with moderate COVID-19 severity (n = 4794), most women (70.5%) sought medical care more than seven days after symptom onset, which may explain the progression to more severe forms of the disease by the time of admission. The average time to seek care in this group was 12.4 ± 4.9 days, reflecting a delay in disease detection and treatment.

In cases of severe COVID-19 (n = 1574), delays in seeking care were also evident, with 73.3% (1154 out of 1574) of women seeking medical assistance more than seven days after symptom onset. The average time to seek care in this group was 14.5 ± 5.4 days. This suggests that delays in seeking care may be associated with disease progression to severe stages.

Mild COVID-19 severity was most prevalent among pregnant women aged 25 - 29 years (50.5%, 1391 cases), which may indicate better overall health and immune status in this age group. Moderate COVID-19 severity was also most common in women aged 25 - 29 years (47.4%, 2272 cases), possibly reflecting their active social and professional lifestyles, which may increase exposure risk. Severe COVID-19 was most frequently observed in pregnant women aged 25 - 29 years (46.1%, 726 cases) and 30 - 34 years (22.0%, 346 cases), emphasizing the need for close medical monitoring in these age groups. Critically severe COVID-19 was most common in pregnant women aged over 35 years (31.8%, 52 cases), highlighting the increased risk of complications in this age group and the need for intensive medical supervision.

Further analysis (**Figure 1**) shows that mild COVID-19 severity was most prevalent among multiparous women (91.3%, 2515 cases), with nulliparous women accounting for a smaller proportion (8.7%, 240 cases). Similarly, moderate COVID-19 severity was predominantly observed in multiparous women (93.6%, 4487 cases), while nulliparous women accounted for 6.4% (307 cases). Severe COVID-19 was also most commonly seen among multiparous women (94.0%, 1480 cases), with nulliparous women making up 6.0% (94 cases). Critically severe COVID-19 was almost exclusively observed in multiparous women (96.7%, 159 cases), with nulliparous women accounting for only 3.6% (6 cases).

These findings underline the importance of paying special attention to multiparous women, who comprise the vast majority of COVID-19 cases across all severity levels. While nulliparous women and cases of multiple pregnancies are less common, they also require careful monitoring and medical support.

Multiple pregnancies are comparatively rare in all cases, with the highest percentage observed in mild COVID-19 (2.1%, 58 cases) and the lowest in critically severe cases (1.4%, 2 cases).

These findings underscore the importance of special attention to multiparous women, as they constitute the vast majority of COVID-19 cases across all severity

levels. Nulliparous women and cases of multiple pregnancies are significantly less common but still require careful monitoring and medical support.

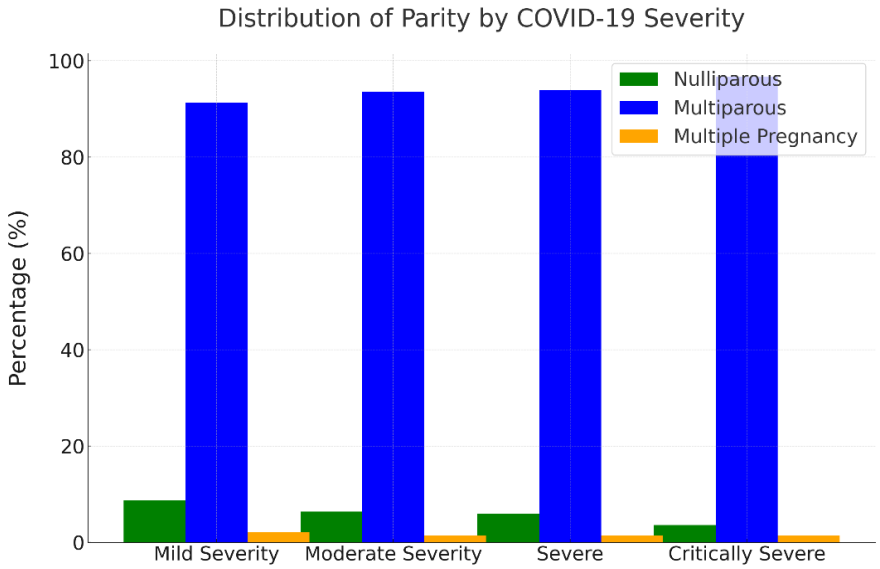

Figure 1. Distribution of parity by COVID-19 severity.

Comorbidities before pregnancy were recorded in 157 women (5.7%) with mild COVID-19, 273 (5.7%) with moderate, 190 (12.1%) with severe, and 26 (15.5%) with critically severe cases, totaling 646 cases of comorbidities. Gestational diabetes was identified in 52 women (1.9%) with mild COVID-19, 86 (1.8%) with moderate, 71 (4.5%) with severe, and 2 (1.4%) with critically severe cases, resulting in 310 total cases of gestational diabetes.

The mean gestational age for mothers with mild COVID-19 was 270.2 ± 10.2 days, ranging from 264 to 300 days. For mothers with moderate COVID-19, the mean gestational age was 268.7 days (SD = 11.6), ranging from 231 to 298 days. In the severe group, the mean gestational age was 224.6 days (SD = 14.6), ranging from 201 to 302 days, while in the critically severe group, it was 201.1 days (SD = 19.1), ranging from 152 to 249 days. Overall, the mean gestational age across the sample was 271.8 days (SD = 13.5), with a range of 152 to 302 days.

In mild COVID-19, 93.7% (2581 out of 2755) of pregnancies continued, indicating favorable outcomes in this group. Only 6.3% of pregnancies were terminated, reflecting less severe complications (**Figure 2**).

It was determined that the severity of COVID-19 significantly affects pregnancy and delivery outcomes (**Figure 3**). The more severe the disease, the higher the risk of preterm births and miscarriages.

The highest percentage of ongoing pregnancies is observed in mild cases (93.7%; 2581 out of 2755) and decreases with increasing severity, reaching 75.2% (124 out of 165) in critically severe cases. Correspondingly, the lowest percentage of terminated pregnancies is observed in mild cases (6.3%) and increases with greater severity, reaching 24.8% in critically severe cases.

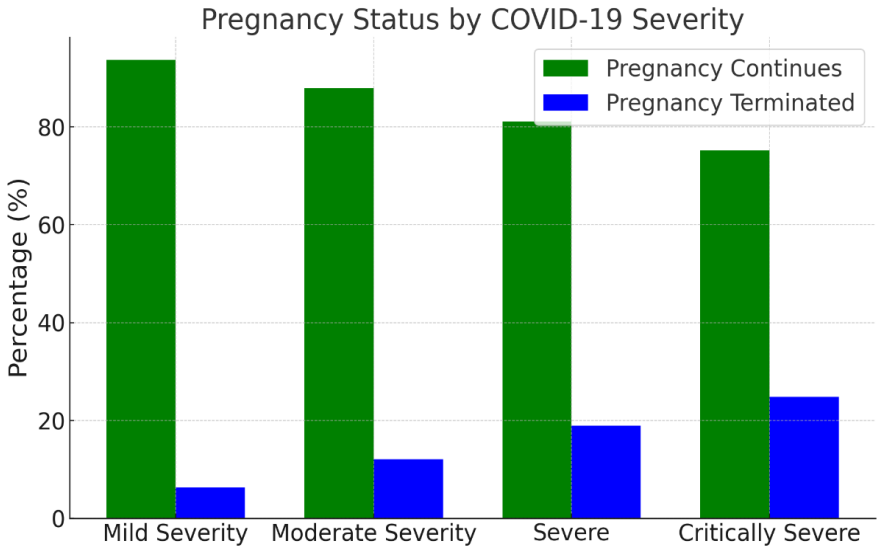

Figure 2. Ongoing and terminated pregnancies by COVID-19 severity.

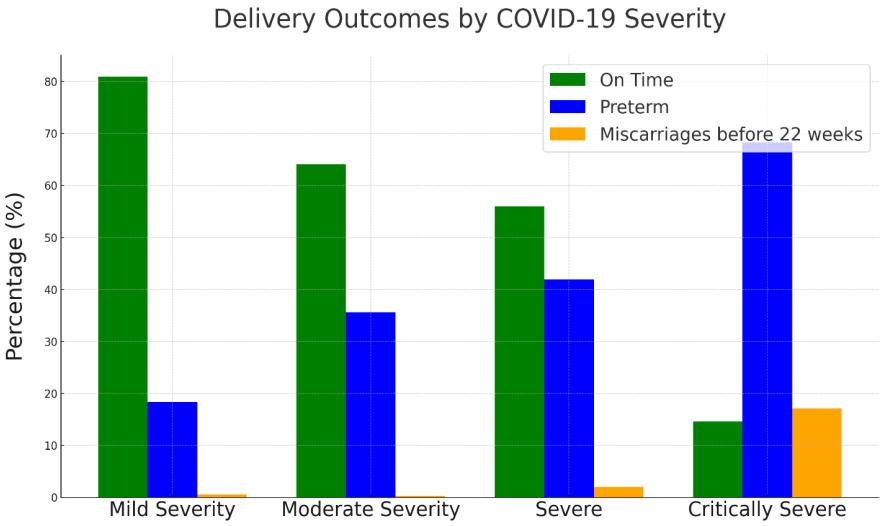

Figure 3. Characteristics of deliveries by COVID-19 severity.

In mild COVID-19 cases, 81.0% (141 out of 174) of deliveries occurred at term, significantly higher compared to other severity levels. In moderate cases, 64.1% (371 out of 579) of deliveries were at term, showing a notable decrease compared to mild cases. In severe cases, only 56.0% (167 out of 298) of deliveries were at term, highlighting the increase in complications. Critically severe COVID-19 showed the lowest percentage of term deliveries (14.6% or 6 out of 41).

Mild COVID-19 is associated with a relatively low percentage of preterm births (18.4% or 32 out of 174). Moderate COVID-19 increases the rate of preterm births to 35.6% (206 out of 579). In severe cases, the rate of preterm births is 41.9% (125 out of 298). Critically severe COVID-19 shows the highest percentage of preterm births (68.3% or 28 out of 41). Severe COVID-19 increases the rate of miscarriages to 2.0% (6 out of 298). Critically severe COVID-19 is characterized by the highest

rate of miscarriages (17.1% or 7 out of 41).

Mild COVID-19 is associated with the fewest complications. Most deliveries in this group occur at term, with a minimal percentage of miscarriages. Moderate and severe COVID-19 increase the risks of preterm births and are also linked to a higher frequency of miscarriages. Critically severe COVID-19 results in the most complications, with a sharp decline in the percentage of term deliveries and a rise in preterm births and miscarriages.

As the severity of the disease increases, the frequency of cesarean sections as the method of delivery rises significantly. Mild cases are predominantly associated with spontaneous vaginal deliveries (62.4%, 108 out of 173 pregnancies). For moderate and severe cases, cesarean sections are more frequent, occurring in 67.6% (390 out of 577 pregnancies) and 81.8% (239 out of 292 pregnancies) of cases, respectively. In critically severe cases, all deliveries were performed via cesarean section (100.0%, 34 out of 34 pregnancies).

Maternal-placental insufficiency (MPI) is one of the severe complications of pregnancy, particularly in the context of infections like COVID-19. The disease can disrupt blood flow in the mother-placenta-fetus system, leading to fetal hypoxia, intrauterine growth restriction, and other complications. The highest risk of MPI occurs in the second and third trimesters of pregnancy, when the maternal-placental system is under maximum strain. While the risk in the first trimester is lower, it is still present, especially in cases of severe intoxication or prolonged fever associated with the infection.

Regular ultrasound examinations with Doppler flow assessments of umbilical and uterine arteries are crucial for the timely detection of MPI in pregnant women with COVID-19. Monitoring fetal condition and growth dynamics is equally important to identify signs of intrauterine growth restriction early.

Disease severity plays a critical role in the development of MPI. Mild COVID-19 rarely results in MPI (0.9%), predominantly in mild forms (Grades 1A and 1B). In moderate cases, MPI frequency rises to 4.1%, still dominated by mild forms. Severe COVID-19 leads to a sharp increase in MPI frequency (52.1%), with a significant proportion of cases involving more severe forms (Grades 2 [17.1%] and 3 [17.2%]). In critically severe cases, MPI develops in the vast majority of pregnancies (85.5%), with Grade 3 MPI being the most prevalent (81.8%), reflecting the high severity of complications in this group.

Respiratory support is rarely required in mild COVID-19, with a preference for less invasive methods such as non-invasive ventilation (NIV, 2.7%, 75 cases). In moderate cases, the need for respiratory support increases, particularly for intensive care unit (ICU) admissions (8.6%, 413 cases) and NIV (3.9%, 188 cases). Severe COVID-19 significantly escalates the demand for intensive care, with 53.6% (843 cases) requiring ICU treatment and 22.2% (349 cases) needing invasive ventilation.

In critically severe cases, nearly all patients require invasive ventilation (95.8%, 158 cases), and almost all are admitted to the ICU (100.0%, 165 cases). These

findings underscore the substantial increase in the need for intensive respiratory support as COVID-19 severity worsens in pregnant women (Figure 4).

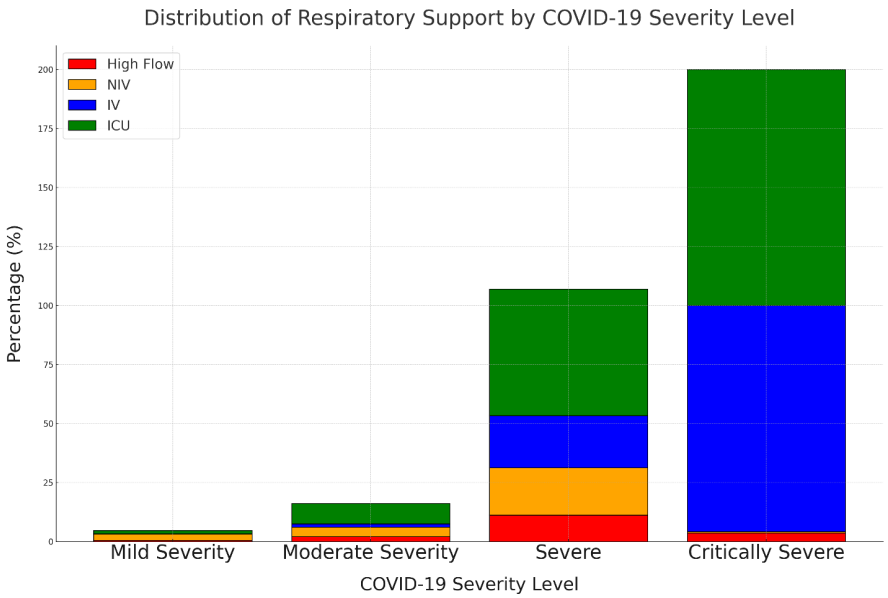

Figure 4. Analysis of respiratory support methods by COVID-19 severity in pregnant women.

Further analysis of hospital treatment outcomes showed that recovery rates for pregnant women with COVID-19 are strongly influenced by disease severity. For mild and moderate cases, favorable outcomes were nearly universal, with survival rates of 99.9% (2753 out of 2755) and 99.9% (4790 out of 4794), respectively. In severe cases, mortality rose to 1.2% (19 out of 1574), and in critically severe cases, mortality increased significantly to 26.7% (44 out of 165).

This highlights the importance of early intervention and close monitoring of pregnant women with COVID-19, especially in those with risk factors or signs of deterioration. Analysis of fatal cases revealed several direct causes of death related to COVID-19 complications: ARDS, diagnosed in 29 cases, was a leading cause of death in severe and critically severe cases, with hypoxemia and lung dysfunction leading to respiratory failure requiring intensive therapy, including mechanical ventilation. Multi-organ failure, seen in 24 patients, was characterized by dysfunction of vital organs such as the heart, kidneys, and liver. Thromboembolic complications, including pulmonary embolism, contributed to mortality in 18 cases, while infections like sepsis were the direct cause of death in 37 cases. COVID-19 also exacerbated pre-existing chronic conditions (e.g., diabetes, hypertension, cardiovascular disease) in some patients, leading to decompensation and contributing to fatal outcomes.

Kaplan-Meier survival analysis showed high survival rates among pregnant women with COVID-19 within the first 30 days, with only a slight decline in the later stages. Survival remained at 100% in the first few days post-infection, began to decline slightly by the 10th day, and gradually decreased to 98.05% by the 30th day.

A cumulative 30-day survival analysis by disease severity indicated that patients with critically severe COVID-19 had significantly poorer survival outcomes compared to other groups. In patients with initially satisfactory conditions, survival remained at 100% for all 30 days. Moderate COVID-19 cases also showed high survival, close to 100% throughout the observation period. Severe COVID-19 cases experienced a slight reduction, with survival dropping to 99.85% by day 30. Critically severe cases showed a marked decline in survival, starting from day 5, reaching 43.59% by the 30th day.

The most common complication observed was maternal-placental insufficiency (MPI), which developed more frequently in pregnant women infected with the Delta variant of SARS-CoV-2 (16.0% versus 11.0% with the Omicron variant; $p < 0.001$). The rate of ICU admissions was higher in the Delta variant group (682/3200; 21.3%) compared to the Omicron variant group (774/6088; 12.7%) ($p < 0.001$). Similarly, the frequency of invasive mechanical ventilation (IMV) use was significantly higher ($p < 0.001$) in women with the Delta variant of SARS-CoV-2 (314/3200; 9.8%) compared to 4.4% (267/6088) in the Omicron variant group. Pregnancy termination in the context of COVID-19 infection was recorded in 15.5% (495 of 3200) of women with the Delta variant and in 9.8% (597 of 6088) of women with the Omicron variant ($p < 0.001$). Among the 597 deliveries in women with the Omicron variant, 69.3% (414/597) were full-term deliveries, significantly higher than in the Delta variant group (271/495; 54.7%) ($p < 0.001$). Preterm births were more common in the Delta variant group (215/495; 43.4%) compared to the Omicron variant group (176/597; 29.5%) ($p < 0.001$). In the remaining cases, miscarriages were reported. In total, there were 486 deliveries in the Delta variant group and 590 deliveries in the Omicron variant group. Spontaneous vaginal deliveries were recorded in 28.0% (165 of 590 deliveries) of women with the Omicron variant, which was higher compared to 13.8% (67 of 486 deliveries) in women with the Delta variant ($p < 0.001$). Cesarean sections were more frequently performed in the Delta variant group (355/486; 73.0%) ($p < 0.001$). Maternal mortality was significantly higher in the Delta variant group (2.0%; 65 of 3200) compared to the Omicron variant group (0.1%; 4 of 6088) ($p < 0.001$).

Table 3. Relative risks of complications in pregnant women with COVID-19 when infected with the Delta variant of SARS-CoV-2 compared to the Omicron variant.

Complication	OR	95%CI	p-value
Uteroplacental insufficiency	1.45	1.31 - 1.62	$p < 0.001$
Acute respiratory distress syndrome	2.14	1.82 - 2.53	$p < 0.001$
Multiple organ failure	2.17	1.84 - 2.56	$p < 0.001$
Preterm birth	2.32	1.91 - 2.82	$p < 0.001$
Maternal fatalities	30.92	11.27 - 84.78	$p < 0.001$
Transfers to intensive care unit	1.88	1.63 - 2.17	$p < 0.001$
Need for mechanical ventilation	2.23	1.85 - 2.68	$p < 0.001$
Caesarean section	1.19	1.06 - 1.34	$p < 0.001$

The Delta variant of COVID-19 in pregnant women was characterized by a more severe course of the disease and a higher risk of complications, such as uteroplacental insufficiency (OR = 1.45, 95% CI 1.31 - 1.62, p < 0.001), ARDS (OR = 2.14, 95% CI 1.82 - 2.53, p < 0.001), multiple organ failure (OR = 2.17, 95% CI 1.84 - 2.56, p < 0.001), preterm birth (OR = 2.32, 95% CI 1.91 - 2.82, p < 0.001), and maternal mortality (OR = 30.92, 95% CI 11.27 - 84.78, p < 0.001). Accordingly, women with the Delta variant were more likely to require intensive care, including admission to intensive care units (OR = 1.88, 95% CI 1.63 - 2.17, p < 0.001), mechanical ventilation (OR = 2.23, 95% CI 1.85 - 2.68, p < 0.001), and cesarean delivery (OR = 1.19, 95% CI 1.06 - 1.34, p < 0.001) (**Table 3**).

4. Discussion

The findings of this study underscore the profound impact of COVID-19 severity on maternal and neonatal outcomes, highlighting the critical need for timely medical intervention, particularly in pregnant women. The retrospective analysis of 9,288 cases offers a robust dataset to elucidate these effects and provides valuable insights into the differences in clinical trajectories across disease severities and SARS-CoV-2 variants.

Our results demonstrate a clear correlation between disease severity and adverse maternal outcomes. Mild cases were predominantly associated with favorable maternal and neonatal prognoses, with low rates of complications, including preterm births and cesarean sections. Conversely, severe and critical COVID-19 cases presented significant challenges, such as higher rates of maternal-placental insufficiency (MPI), the need for intensive respiratory support, and maternal mortality. These findings align with studies by Pereira A. *et al.* and Syeda D. *et al.*, which similarly reported worse outcomes in severe cases, emphasizing the role of hypoxemia and systemic inflammation as mediators of maternal complications [1] [2].

Critically severe cases displayed alarming outcomes, with over 85% of patients developing MPI and nearly all requiring invasive ventilation. Such cases also saw significantly higher rates of preterm births and maternal mortality, reflecting findings by Iacovazzo C. *et al.*, who noted similar outcomes in ICU-admitted pregnant patients [10]. This underscores the vital role of early detection and management to mitigate progression to critical stages.

The timing of medical intervention emerged as a pivotal determinant of outcomes. Women who sought care within seven days of symptom onset exhibited substantially better outcomes, including higher rates of ongoing pregnancies and term deliveries. Delayed intervention, on the other hand, was associated with increased disease severity and poorer maternal and neonatal outcomes. This aligns with observations by Reis ZSN *et al.*, who highlighted the detrimental effects of delayed ICU admission on patient outcomes [12].

The study revealed significant differences in outcomes between the Delta and Omicron variants. The Delta variant was associated with more severe disease,

higher rates of complications, and increased maternal and neonatal mortality. Conversely, the Omicron variant, though more transmissible, showed reduced severity and improved survival outcomes. These findings are consistent with recent literature, including the work of Munshi L. *et al*., which highlighted the variant-specific impacts on disease severity and maternal outcomes [13]. Such differences emphasize the need for variant-tailored clinical strategies to optimize care.

The neonatal outcomes in this study varied significantly with maternal disease severity. Mild cases were associated with higher rates of term deliveries and fewer complications, while severe and critically severe cases showed increased rates of preterm births, neonatal ICU admissions, and neonatal mortality. These findings are corroborated by studies like those by Man O.M. *et al*., which emphasize the risks of intrauterine hypoxia and growth restriction in severe maternal COVID-19 [15].

One of the strengths of this study is its large sample size, enabling comprehensive subgroup analyses and robust statistical conclusions. However, limitations include its retrospective nature, which may introduce selection bias, and the lack of detailed data on long-term neonatal outcomes. Future prospective studies are needed to validate these findings and explore the long-term impact of maternal COVID-19 on offspring.

5. Conclusion

The study demonstrates that increasing COVID-19 severity significantly worsens pregnancy, delivery, and neonatal outcomes. Mild cases were associated with low rates of complications, while critically severe cases showed high rates of maternal placental insufficiency, invasive ventilation needs, and a sharp rise in mortality. Early intervention within the first 7 days was linked to better outcomes, underscoring the importance of timely medical care to improve survival and reduce complications in pregnant women with COVID-19.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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