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Maternal and Neonatal Outcomes of Dengue Fever in Pregnancy: A Cross-Sectional Study

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Abstract

Introduction: *Dengue fever is a significant public health concern, particularly in tropical and subtropical regions, and poses risks to pregnant women and their infants. This study aims to evaluate dengue fever's maternal and neonatal outcomes during pregnancy.* ***Materials and Methods:*** *A cross-sectional study was conducted over one year, from January 2023 to June 2024, at Bangabandhu Sheikh Mujib Medical University (BSMMU) and Ibn Sina Diagnostic & Consultation Center, Malibagh total of 200 pregnant women diagnosed with dengue fever were included in the study. The sample size calculation was based on an expected prevalence of adverse maternal outcomes of 20% in dengue-infected pregnancies, with a confidence level of 95% and a margin of error of 5%. Data regarding maternal demographics, clinical characteristics, and neonatal outcomes were collected and analyzed.* ***Results:*** *Among the 200 pregnant women, the mean age was 27.3 ± 6.1 years, with a majority (65%) in their third trimester. Thrombocytopenia was observed in 120 (60%) women, with severe cases (platelet count <50,000/μL) in 30 (15%). Maternal complications included postpartum hemorrhage in 25 (12.5%), acute kidney injury in 15 (7.5%), and acute respiratory distress syndrome in 10 (5%). The overall maternal mortality rate was 5% (10 women). Neonatal outcomes revealed 10 (5%) stillbirths, 5 (2.5%) neonatal deaths, and 22 (12%) low birth weight infants and 18(8%) prematurity.* ***Conclusions:*** *Dengue infection during pregnancy is associated with maternal and neonatal morbidity and mortality. Enhanced awareness, early diagnosis, and management strategies are crucial to mitigate the risks of dengue in pregnant women.*

Keywords: *Dengue, Pregnancy, Maternal Outcomes, Neonatal Outcomes, Cross-Sectional Study.*

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Introduction:

Dengue fever, caused by the dengue virus (DENV) and transmitted primarily by Aedes mosquitoes, has emerged as a significant public health concern in tropical and subtropical regions worldwide. The World Health Organization (WHO) estimates that approximately 390 million dengue infections occur annually, with a substantial proportion of these cases affecting pregnant women[1]. The implications of dengue infection during pregnancy are particularly alarming, as it poses risks not only to maternal health but also to fetal and neonatal outcomes. Understanding these risks is crucial for developing effective management strategies and improving health outcomes for both mothers and their infants. Pregnancy induces various physiological changes that can alter the immune response, potentially exacerbating the severity of infections, including dengue. Studies have shown that pregnant women are at a higher risk of developing severe forms of dengue, such as dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS)[2]. The increased susceptibility to severe disease can

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lead to significant maternal morbidity and mortality. For instance, a systematic review highlighted that pregnant women with dengue are more likely to experience complications such as postpartum hemorrhage, acute respiratory distress syndrome, and acute kidney injury compared to non-pregnant women[3]. These findings underscore the need for heightened awareness and monitoring of pregnant women diagnosed with dengue. The impact of dengue on neonatal outcomes is equally concerning. Research indicates that maternal dengue infection can lead to adverse effects on fetal development, resulting in complications such as low birth weight, preterm birth, and stillbirth[4]. A study conducted in Brazil found that infants born to mothers with dengue had a significantly higher risk of low birth weight and neonatal mortality compared to those born to uninfected mothers[5]. The mechanisms underlying these adverse outcomes may include placental insufficiency and fetal exposure to the virus, which can disrupt normal growth and development. Moreover, the psychological and social implications of dengue infection during pregnancy cannot be overlooked. The stress and anxiety associated with the potential health risks to both mother and child can have lasting effects on maternal mental health. A study emphasized the importance of providing psychological support to pregnant women diagnosed with dengue, as the fear of complications can exacerbate stress levels and negatively impact maternal well-being[6]. Despite the growing body of research on dengue infection during pregnancy, there remains a notable gap in understanding the full range of maternal and neonatal outcomes. While many studies focus on individual complications, comprehensive data detailing the overall impact of dengue on pregnancy outcomes is still limited. This gap is particularly evident in frequency-related data, which hinders the development of effective clinical guidelines and public health strategies to address the specific needs of pregnant women affected by dengue. Given the increasing incidence of dengue in endemic regions and the potential for outbreaks in non-endemic areas driven by climate change and urbanization, it is crucial to prioritize further research. In light of these considerations, our study aims to investigate the maternal and neonatal outcomes of dengue infection during pregnancy in a cohort of affected women. By analyzing the frequency and severity of complications, we hope to contribute valuable insights to the existing literature and highlight the urgent need for targeted interventions to improve health outcomes for mothers and their infants. This research is particularly timely, as the global burden of dengue continues to rise, necessitating a comprehensive understanding of its implications for vulnerable populations, including pregnant women.

Materials and Methods:

This cross-sectional study was conducted at Bangabandhu Sheikh Mujib Medical University (BSMMU) and Ibn Sina Diagnostic & Consultation Center, Malibagh, from January 2023 to June 2024. The study included pregnant women diagnosed with dengue fever, confirmed through NS1 antigen or IgM antibody tests. A total of 200 participants were included in the study.

Inclusion and Exclusion Criteria

Inclusion Criteria:

1. Pregnant women aged 18 years and older.
2. Confirmed diagnosis of dengue fever based on NS1 antigen or IgM antibody tests.
3. Women presenting with dengue symptoms during any trimester of pregnancy.
4. Consent was obtained willingly from all participants, reflecting their informed and deliberate choice.

Exclusion Criteria:

1. Pregnant women with a history of chronic illnesses (e.g., diabetes, hypertension) that could confound the results.
2. Women diagnosed with other viral infections (e.g., Zika virus, chikungunya) during the study period.
3. Pregnant women who were not willing to participate or provide informed consent.

Data Collection Methods

Data were collected using a structured questionnaire designed to capture relevant information regarding maternal demographics, clinical presentations, laboratory findings, and neonatal outcomes. The questionnaire was developed based on existing literature and expert consultations to ensure comprehensiveness and relevance.

1. Maternal Demographics: Age, parity, gestational age at diagnosis, and socioeconomic status.
2. Clinical Presentations: Symptoms experienced (e.g., fever, rash, joint pain), duration of symptoms prior to diagnosis, and any complications during hospitalization.
3. Laboratory Findings: Results of NS1 antigen and IgM antibody tests, complete blood count (CBC) results, and liver function tests.
4. Neonatal Outcomes: Birth weight, gestational age at delivery, Apgar scores, and any neonatal complications (e.g., stillbirth, neonatal death).

Data collection were performed by authors. Each participant was approached during their hospital visit, and informed consent was obtained prior to data collection. The questionnaire was administered through face-to-face interviews, ensuring clarity and accuracy in responses.

Data Analysis

Data were analyzed using statistical software (e.g., SPSS version 25.0). Descriptive statistics were calculated for maternal demographics and clinical characteristics, including means, standard deviations, and frequencies.

Ethical Considerations

Ethical clearance for the study was obtained from concerned authority prior to the commencement of data collection. All participants were informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time without any consequences. Confidentiality was maintained throughout the study, with all

data anonymized and securely stored. Informed consent was obtained from each participant before enrollment in the study, ensuring adherence to ethical standards in research involving human subjects.

Results:

A total of 200 pregnant women diagnosed with dengue fever were enrolled in the study. The age distribution of the 200 pregnant women diagnosed with dengue fever in this study reveals a predominant concentration within the 25–29 age range, which constitutes 41% of the sample, equating to 82 individuals. Following this, the 30–34 age range comprises 29% of the participants, totaling 58 women. The 18–24 age group accounts for 18.5% of the sample, representing 37 individuals. Additionally, 10% of the participants (20 women) fall within the 35–39 age range, while a small minority, comprising 1.5% (3 participants), are aged 40 years or older. This distribution indicates that the majority of the participants are situated within the 25–34 age range, with a notable decline in the number of individuals in both the youngest and oldest age categories. The mean age of participants was 27.3 ± 6.1 years.

Table I: Age Distribution of Pregnant Women Diagnosed with Dengue Fever

Age Range (Years)	Frequency (n=200)	Percentage (%)
18 - 24	37	18.5%
25 - 29	82	41.00%
30 - 34	58	29.00%
35 - 39	20	10%
≥ 40	3	1.50%
Total	200	100.0

Table II presents a comprehensive analysis of thrombocytopenia among a cohort of 200 pregnant women diagnosed with dengue fever. The data indicate that a significant proportion of the participants, specifically 120 women (60.00%), exhibited thrombocytopenia, which is characterized by a reduced platelet count.

The table further categorizes the severity of thrombocytopenia into three distinct classifications based on platelet count thresholds. Among those with thrombocytopenia, 60 women (30.00%) were identified as having mild thrombocytopenia, defined by a platelet count ranging from 100,000 to 150,000/μL. Additionally, 30 women (15.00%) were classified as having moderate thrombocytopenia, with platelet counts between 50,000 and 100,000/μL. Notably, another group of 30 women (15.00%) presented with severe thrombocytopenia, characterized by a platelet count of less than 50,000/μL.

Conversely, the remaining 80 women (40.00%) in the study did not exhibit any signs of thrombocytopenia, indicating a normal platelet count. This distribution underscores the prevalence and varying degrees of thrombocytopenia in this population, highlighting the potential clinical implications for maternal and fetal health in the context of dengue infection during pregnancy.

Table II: Thrombocytopenia in Pregnant Women Diagnosed with Dengue Fever

Thrombocytopenia Status	Frequency (n=200)	Percentage (%)
Total with Thrombocytopenia	120	60.00%
- Mild Thrombocytopenia (100,000 - 150,000/μL)	60	30.00%
- Moderate Thrombocytopenia (50,000 - 100,000/μL)	30	15.00%
- Severe Thrombocytopenia (<50,000/μL)	30	15.00%
Total without Thrombocytopenia	80	40.00%

Table III provides a detailed overview of the maternal and neonatal outcomes associated with dengue infection during pregnancy, based on a cohort of 200 pregnant women diagnosed with the disease. The outcomes are categorized into maternal and neonatal groups, with corresponding frequencies and percentages reported for each outcome.

Maternal Outcomes: The table indicates that postpartum hemorrhage was the most prevalent maternal complication, affecting 25 women, which corresponds to 12.50% of the study population. Acute kidney injury was reported in 15 women (7.50%), while acute respiratory distress syndrome was observed in 10 women (5.00%). Additionally, maternal mortality was recorded in 10 cases, representing 5.00% of the participants. These findings highlight the significant risks associated with dengue infection during pregnancy, emphasizing the potential for severe maternal morbidity and mortality.

Neonatal Outcomes: In terms of neonatal outcomes, the data reveal that stillbirths occurred in 10 cases, accounting for 5.00% of the total births. Neonatal deaths were reported in 5 infants, which corresponds to 2.50% of the cohort. Furthermore, a notable proportion of infants, specifically 22 (12%) were classified low birth weight and infants 18(8%) prematurity, indicating a concerning trend in neonatal health outcomes linked to maternal dengue infection. Overall, the data presented in Table 3 underscore the serious implications of dengue fever on both maternal and neonatal health, highlighting the need for vigilant monitoring and management of pregnant women affected by this viral infection. The outcomes reflect the multifaceted challenges posed by dengue in pregnancy, necessitating further research and targeted interventions to improve health outcomes for both mothers and their infants.

Table III: Maternal and Neonatal Outcomes of Dengue Infection in Pregnancy

Outcome	Frequency (n=200)	Percentage (%)
Maternal Outcomes		
Postpartum Hemorrhage	25	12.50%
Acute Kidney Injury	15	7.50%
Acute Respiratory Distress Syndrome	10	5.00%
Maternal Mortality	10	5.00%
Neonatal Outcomes		
Stillbirths	10	5.00%
Neonatal Deaths	5	2.50%
Low Birth Weight Infants	22	12.00%
Prematurity	18	8.00%

Discussion:

Dengue fever, a mosquito-borne viral infection, poses significant health risks, particularly for pregnant women and their neonates. This discussion synthesizes findings from our study on maternal and neonatal outcomes of dengue infection during pregnancy,

contextualizing them within the broader literature to highlight the severity and impact of this disease.

Maternal Outcomes in Context

Our study found that postpartum hemorrhage occurred in 12.50% of pregnant women with dengue, which aligns with findings from a study conducted in Burkina Faso, where dengue during pregnancy was associated with increased maternal mortality and severe complications requiring intensive monitoring[7]. This suggests that the physiological changes during pregnancy may exacerbate the effects of dengue, leading to heightened risks of severe outcomes such as acute kidney injury and respiratory distress syndrome, which were observed in 7.50% and 5.00% of our cohort, respectively. Moreover, the maternal mortality rate of 5.00% in our study is consistent with the literature indicating that pregnant women are at a higher risk of severe dengue compared to their non-pregnant counterparts[8]. This reinforces the need for healthcare providers to be vigilant in monitoring pregnant patients with dengue, as the potential for severe outcomes is significantly elevated.

Neonatal Outcomes and Comparisons

In terms of neonatal outcomes, our findings indicate that 5.00% of pregnancies resulted in stillbirths and 2.50% in neonatal deaths. These rates are concerning and echo the results from a narrative review that highlighted the risks of fetal and neonatal death associated with dengue infection[9]. The prevalence of low-birth-weight infants (12.00%) and prematurity (8%) in our study further emphasizes the adverse effects of dengue on neonatal health, corroborating findings from other studies that report similar trends in low birth weight and preterm deliveries among dengue-infected mothers[10].

Implications for Future Research and Practice

The implications of our findings are profound, suggesting that dengue infection during pregnancy not only poses immediate health risks to mothers but also has lasting effects on neonatal health. The need for targeted interventions and enhanced surveillance during dengue outbreaks is critical. As highlighted in the updated systemic review on dengue, understanding the epidemiology and clinical manifestations of the disease is essential for developing effective management strategies[11].

Furthermore, our study underscores the importance of public health initiatives aimed at reducing dengue transmission, particularly in endemic regions. The integration of maternal health services with vector control strategies could significantly mitigate the risks associated with dengue during pregnancy.

Conclusion:

In conclusion, this study highlights that maternal and neonatal outcome associated with dengue fever during pregnancy. Maternal complications, including thrombocytopenia, postpartum hemorrhage and acute kidney injury, were prevalent, with a maternal mortality rate of 5%. Neonatal outcomes also revealed concerning rates of stillbirth, low birth weight, and prematurity. These findings underscore the need for enhanced monitoring and management of dengue fever in pregnant women to improve maternal and neonatal outcomes.

Conflict of Interest: None.

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