

Original Article

DENGUE FEVER AND MIXED ABORTION AMONG PREGNANT WOMEN: FINDINGS OF A COMPARATIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Dengue situation in Bangladesh has escalated over the last few years causing significant mortality and morbidity. Pregnant women are highly vulnerable to dengue infection leading to various grave complications for both mother and foetus including missed abortion. Despite the severity of this condition, few studies have explored the association of dengue fever with missed abortion in Bangladesh. This study aimed to investigate the association between missed abortion and dengue fever.

Methods: This comparative cross-sectional study enrolled 35 pregnant women having the history of missed abortion during the gestational age of less than 22 weeks and 35 pregnant women continuing their pregnancy with gestational age of more than 22 weeks receiving ante natal care. Both groups were selected conveniently. The study was conducted in a private facility from February to October, 2023. Data were collected from medical record review and analyzed with appropriate descriptive and analytical statistics. Cases of missed abortion attributed to dengue infection were compared with pregnant women receiving routine antenatal care if their pregnancies continued beyond 22 weeks' gestation. Other predictive factors for missed abortion were also examined.

Results: Dengue infection was detected among 14 (40%) of pregnant women with missed abortion in comparison to 3 (8.6%) pregnant women without missed abortion. Significant ($p < 0.05$) association was found between dengue infection and missed abortion in pregnant women.

Conclusion: Special preventive measures should be taken to protect pregnant mother against dengue infection.

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Key words: Dengue, Pregnant women, Missed abortion

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INTRODUCTION

Dengue, a viral fever caused by the dengue virus (DENV), poses a significant public health concern in Bangladesh, where it is endemic and experiences recurrent outbreaks¹. Dengue situation in Bangladesh has escalated over the last few years causing significant mortality and morbidity². The on-going dengue epidemic season in 2023 has marked one of the deadliest outbreaks of dengue fever in the country's history. Dengue virus, with an incubation period of 5-10 days³, is transmitted to humans through the bites of infected *Aedes* mosquitoes⁴. This single-stranded

RNA virus primarily manifests as a tropical disease, presenting flu-like symptoms lasting approximately 2-7 days, with high fever (40°C/104°F) often accompanied by symptoms such as headache and rash. Dengue illness is caused by any one of the four serotypes. Infection by one serotype is thought to produce lifelong immunity to that serotype but confers only a few months' immunity to others⁵. Dengue is characterized by three phases: febrile, critical, and recovery phase,⁶ occasionally leading to potentially lethal complications such as Dengue haemorrhagic fever.

The outbreak typically commences in the summer months (April-May) and escalates nation-wide during the monsoon season (July-August). Dhaka, the capital city, has been particularly hard-hit, serving as the epicentre of the outbreak, with more than half of the reported cases originating there. Dengue intensity in endemic area has also increased due to the spread of urbanization.⁷ Unusually, heavy episodic rainfall, coupled with high temperatures and humidity, has led to an increased mosquito population throughout Bangladesh.

Despite the significant impact of dengue fever on public health, there remains a paucity of research focusing on pregnant women affected by the disease during early pregnancy. Therefore, the present study aims to elucidate the clinical profile of missed abortion cases and investigate the correlation between dengue fever and missed abortion cases (gestational age <22 weeks). Additionally, the study will explore other predictive factors for missed abortion in this population.

METHODS

This comparative cross-sectional study was conducted at a private hospital in Dhaka to investigate the impact of dengue infection on early pregnancy missed abortion (defined as occurring at a gestational age of <22 weeks). The study population consisted of two groups who were selected conveniently. One group consisted of pregnant women diagnosed with missed abortion who presented to the hospital between February 2023 and October 2023. Missed abortion is defined as the in utero death of the embryo or fetus before 22 weeks. Another group was pregnant women with continuation of pregnancy beyond 22 gestational weeks and came for ANC checkup within the study

period. A total of 35 patients with early pregnancy missed abortion were included in the analysis. Data were collected retrospectively from the medical records of these patients and subsequently analyzed. Maternal dengue infection within one month before pregnancy or at any time during pregnancy was assessed. Dengue fever was diagnosed based on reported symptoms such as high fever, rash, body aches, and headache. Diagnosis was further confirmed through laboratory tests including NS1 Antigen test, Dengue-specific IgM ELISA test, or Dengue-specific IgG ELISA test. The association between dengue infection and missed abortion cases was assessed by comparing them with pregnant women receiving routine antenatal care (ANC) who were beyond gestational age of 22 weeks. Additionally, the clinical profile of missed abortion cases and other potential predictive factors for missed abortion like smoking, history of heavy work within last 6 months and history of journey were also investigated. Obstetric history including parity, history of missed and spontaneous abortion and history of prolonged labor were also compared between two groups. According to WHO spontaneous abortion is the expulsion or extraction from its mother of an embryo or foetus weighing 500 gm or less.⁸ In this study, 95% confidence interval was considered with p value <0.05 was regarded as significant.

RESULTS

Table 1 showing the comparison of sociodemographic characteristics in terms of age, level of education, occupation and monthly family income between pregnant with and without missed abortion. No significant (p>0.05) difference was observed between two groups in terms of the above mentioned sociodemographic attributes.

Table 1: Comparison of sociodemographic characteristics between two groups

Characteristics	Category	With missed abortion (n=35) f(%)	Without missed abortion (n=35) f(%)	Statistics
Age (Years)	<20	3 (8.6)	7 (20.0)	Fisher's exact test=0.34
	20-30	28 (80.0)	23 (65.7)	
	>30	4 (11.4)	5 (14.3)	
Educational level	Primary	10 (28.6)	15 (42.9)	χ ² value = 1.63 df=2, p= 0.44
	Secondary	16 (45.7)	12 (34.3)	
	Higher level	9 (25.7)	8 (22.8)	
Occupations	Housewife	28 (80.0)	30 (85.2)	χ ² value = 0.4 df=1, p= 0.52
	Service holder	7 (20.0)	5 (14.3)	
Monthly family income (Taka)	10,000-20,000	5 (14.3)	3 (8.6)	Fisher's exact test=0.62
	21,000-50,000	21 (60.0)	25 (71.4)	
	51,000-100,000	9 (25.7)	7 (20.0)	

f= Frequency, %= Percentage, χ² = Chi-square

Table 2 showing comparison of obstetric history between pregnant women with and without abortion. History of spontaneous abortion was found to be significantly ($p < 0.05$) associated with current missed

abortion. Parity, history of missed abortion, and history of prolonged labour was not significantly ($p > 0.05$) associated with missed abortion.

Table 2: Comparison of obstetric features between two groups

Features	Category	With missed abortion (n=35) f(%)	Without missed abortion (n=35) f(%)	Statistics
Parity	Primipara	21 (60.0)	18 (51.4)	χ^2 value = 0.52 df=1 p-value= 0.47
	Multipara	14 (40.0)	17 (48.6)	
History of spontaneous abortions	Yes	13 (37.1)	6 (17.1)	χ^2 value = 15.23 df=1 p-value= <0.01
	No	22 (62.9)	29 (82.9)	
History of missed abortions	Yes	8 (22.9)	3 (8.6)	χ^2 value = 2.69 df=1 p-value= 0.10
	No	27 (77.1)	32 (81.4)	
History of preterm labour	Yes	4 (11.4)	2 (5.7)	χ^2 value = 0.72 df=1 p-value= 0.39
	No	31 (88.6)	33 (84.3)	

f= Frequency, %= Percentage, χ^2 = Chi-square

Risk factors for missed abortion like smoking, history of heavy work and journey were compared between pregnant women with and without abortion. Table 3

showing no factors were found to be significantly ($p > 0.05$) associated with missed abortion.

Table 3: Comparison of other risk related to with missed abortions between two groups

Other risk factors	Category	With missed abortion (n=35) f(%)	Without missed abortion (n=35) f(%)	Statistics
History of smoking	Yes	2 (5.7)	0 (0.0)	χ^2 value = 2.05 df=1 p-value= 0.15
	No	33 (84.3)	35 (100.0)	
History of heavy work	Yes	4 (11.4)	8 (22.9)	χ^2 value = 1.60 df=1 p-value= 0.20
	No	31 (88.6)	27 (77.1)	
History of journey	Yes	5 (14.3)	12 (34.3)	χ^2 value = 3.80 df=1 p-value= 0.05
	No	30 (85.7)	23 (65.7)	

f= Frequency, %= Percentage, χ^2 = Chi-square

Table 4 shows clinical features of dengue of the patients. Among total 17 cases clinically and by different investigations, 14 were with missed abortion group and 3 were without missed abortion. Among women, 14 (40.0%) with missed abortion and 3 (8.6%)

without missed abortion had history of fever, headache, vomiting, and rash. NS1 antigen was positive among 8 (22.9%) women with missed abortion and 3 (8.6%) women without missed abortion.

Table 4: Comparison of clinical features of dengue between two groups

Dengue fever diagnosis by following	With missed abortion (n=35) f(%)	Without missed abortion (n=35) f(%)
Clinical symptoms present (Fever, headache, vomiting, rash)	14 (40.0)	3 (8.6)
NS1 antigen positive	8 (22.9)	3 (8.6)
Ig M antibody positive	10 (28.6)	1 (2.9)
Ig G antibody positive	14 (40.0)	3 (8.6)

Multiple Responses, f= Frequency, %= Percentage, χ^2 = Chi-square

Table 5 shows comparison of presence of dengue in pregnant women with and without missed abortion. Among 35 women with missed abortion, 14(40,0%) women had dengue fever. On the other hand, among

35 women without missed abortion, only 3 (8.6) had dengue fever. This difference was statistically significant ($p < 0.05$).

Table 5: Comparison of dengue fever between two groups

Dengue fever	With missed abortion (n=35) f(%)	Without missed abortion (n=35) f(%)	Significance
Yes	14 (40.0)	3 (8.6)	χ^2 value = 9.40 df=1 p-value= <0.01
No	22 (60.0)	32 (91.4)	
Total	35 (100.0)	35 (100.0)	

DISCUSSION

This study, conducted in a private sector hospital in Dhaka, aimed to investigate the potential role of dengue fever as a causative agent for missed abortion. The analysis included 35 patients diagnosed with missed abortion, considered as study group, and sought cases of dengue fever among pregnant individuals receiving routine antenatal care (ANC) with gestational ages. >22 weeks' gestation were the comparison group. By comparing the occurrence of dengue fever in both groups, we aimed to detect any association between dengue infection and missed abortion.

Majority of the participants from study (80%) and comparison (65.7%) were between 20 to 30 years' age group. Regarding obstetric history of patients, maximum 21 (60.0%) patients of missed abortion were primipara whereas, 18 (51.4%) had similar parity. Most of the missed abortion patients had no history of spontaneous abortion 22 (62.9%) and missed abortion 27 (77.1%) which is not statistically different from the participants continuing normal pregnancy. Total 31 (88.6%) patients with missed abortion did not give any history of preterm labour. One study showed that four out of the five patients (80%) who had an abortion had a previous history of one or two abortions,⁷

Regarding gestational age of patients with missed abortion, 22 (62.9%) women with missed abortion were of very early weeks of pregnancy 6-8 weeks, 10 (28.6%) patients were of 8 -12 weeks, 12 -16 weeks and 16 -22 weeks were of only 2 and 1 cases respectively. In a previous study by Sinha and Datta (2023), showed that 15 patients had a gestational age of less than or equal to 24 weeks (26.3 %.) Among them, seven (46.6 %) had a gestational age of less than 12 weeks Among these 15 pregnant patients who had a gestational age of less than 24 weeks five (33.3%) had abortion. In patients with gestational age of <12 weeks five out of seven had an early abortion with the percentage as high as 71.4 %.⁸ Among the other risk

factors for abortions were history of smoking 2 (5.7%), history of heavy work 4(11.4%), history of journey 5(14.3%) History of recent migration outside Dhaka 7(20.0%).

The literature on dengue and miscarriage or spontaneous abortion is sparse. A recent report on women in refugee camp at the Thai-Burmese border investigating antenatal febrile illness has found a dengue infection rate of 9.5 %. One women of 20 (5%) had dengue associated fever during pregnancy subsequently miscarried.⁹ Mild exposure to hyperthermia or fever during the preimplantation period and more severe exposures during embryonic and fetal development often result in prenatal death and abortion.¹⁰ Miscarriage have been reported in association with dengue illness.¹¹ In another study 5.2% of women who had an abortion showed recent dengue infection.¹² Another study showed eight (32%) out of 25 women had an early miscarriage.¹³ Finally a study by Agarwal et al . showed that spontaneous abortion occurred for four of six women diagnosed with dengue in the first trimester and one in two women diagnosed in the second trimester.¹⁴

Recent dengue infection (Ig M positive) was found in 11(2.6%) of one study participants. Tan et al. (2012) in their study found 63/2531(2.5%) dengue IgM rate among the participants at the time of their delivery. One previous study showed Ig G positive rate was more 213/411(52%) indicating prior dengue exposure in participants. Another study showed 83% dengue IgG positive rate from a cross sectional community based prevalence study.

Typically, dengue infection is asymptomatic or minimally symptomatic in 87% of cases.¹⁵ The patient with dengue had a history of fever, rash, vomiting, headache, body ache and epigastric pain and were present in more or less all 17 cases Finally out of 35 missed abortion cases 17 cases were diagnosed with dengue. Cases were NS 1 Ag positive .11 cases had dengue IgM positive report and 17 were of IgG

positive cases. On the other hand, 35 patients seeking routine ANC during their viable pregnancy only 3 had history of dengue with dengue diagnosis by NS 1 Ag positive, Ig M ab positive. Dengue specific IgM can be detected as early as the second day of symptoms and for up to three months.¹⁶ The IgM level typically peaks on the sixth day¹⁷ reaching 100 % detection by the eighth day.¹⁸ Dengue NS1 Ag test is designed to diagnose all serotypes of dengue infection from Day 1 to Day 9.¹⁹ Dengue Ig G antibodies is detected in 100 % of cases by Day 15 of primary infection.²⁰

Primipara with 20 -30 years of early pregnancy (6-8 weeks), housewife of middle class family without any significant risk factor for abortion (history of abortion, preterm labour, recent hard work or vigorous journey) recent dengue infection remained more frequently diagnosed in missed abortion cases than normal viable pregnancy of same gestational age.

The current study found that 40% patients with missed abortion had history of dengue infection either in early pregnancy or just immediately before being pregnant. One study showed that the patient with dengue in early pregnancy had an abortion rate of 33% which is much higher compared to the rate of 10% in other normal pregnant women.²¹

The study was conducted in a single center with a small number of participants, so the result could not be generalized. Further study of large scale is required to evaluate these findings. Moreover, the other factors related to missed abortion could not be controlled.

CONCLUSION

Dengue has become a major public health concern specially for pregnant women as it endangers both mother and fetus. Dengue has found to be significantly increased the risk of missed abortion. It is important to take steps to prevent dengue during pregnancy to protect the mother and developing foetus by using insect repellent, wearing long sleeved dresses and long pants, control of mosquito inside and out home. A woman should defer her intended pregnancy if she got infected by dengue.

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