

Clinical Features and Outcome of Neonatal Dengue – Experience from a Tertiary Care Hospital

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Abstract

Introduction: Dengue is one of the most common viral infections affecting the general population in endemic areas annually. However, it is barely reported in newborns owing to a widespread belief that they are protected from severe viral infections in the first six months of life by the presence of maternal antibodies. Neonate can acquire dengue fever either by transplacental or after birth by mosquito bite. Presentation of neonatal dengue mimics neonatal sepsis.

Methodology: This retrospective study was done in Bangladesh Shishu Hospital and Institute over January to December 2023. Here we observe how many neonatal dengue had been admitted during that period and the clinical feature and their outcome.

Results: In 2023 total admitted dengue patients in Bangladesh Shishu Hospital and Institute were 2033 among them 7 were neonates (0.344%), during this period total 5099 neonates were admitted, among them 1608 neonates were admitted with the features of sepsis. Out of 7 neonates 6 mothers had positive NS1. Among them all had fever on admission and normal blood pressure during hospital stay. All of them had thrombocytopenia initially without any bleeding manifestation. Four neonates developed warning sign, they had raised S Ferritin level and were treated with dexamethasone. Sepsis was ruled out by septic screening. After treatment 6 neonates got discharged and 1 took LAMA (Leave Against Medical Advice). Follow up after 1 month revealed all are doing well.

Conclusion: So, dengue should be kept in mind as differential diagnosis if a neonate presents with fever/rash/thrombocytopenia in dengue season.

Key Words: Dengue, Neonate.

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Introduction

Dengue fever is an acute febrile illness caused by the four serotypes of a Flavivirus and transmitted by *Aedes aegypti* mosquito.¹ Neonatal dengue infection is usually uncommon. Urbanization and overcrowding increase the risk of contracting dengue in both adults and neonates.² Dengue is common in Asian countries. Dengue virus outbreaks have increased substantially over the past several decades in these countries.³ Dengue virus (DV) infection can have a range of presentation from dengue fever to dengue haemorrhagic fever/dengue shock syndrome (DHF/DSS) that is characterized by systemic capillary leakage, thrombocytopenia and hypovolaemic shock.¹ Maternal antibodies provide protection to a range of infections but they wane over a period of 6-12 months.⁴ Pregnant women should be taken into account as a high-risk population for dengue management planning. In particular, dengue infection during pregnancy carries the risk of vertical transmission to the fetus and newborn. Mother-to-child

transmission occurs both in early and late pregnancy.⁵ The rate of vertical transmission varies from 18.5% to 22.7%. This viral infection affects the mother and fetus with adverse outcomes, including maternal mortality, stillbirth, and neonatal mortality.⁶ The mechanism of vertical transmission has not yet been clearly elucidated, it is reported that the presence of DENV in the placenta of an infected mother causes abnormal findings such as hypoxia, choriodecidualitis, deciduitis, and intervillitis and also viral antigens were found in the cytoplasm of the trophoblast, villous stroma, and decidua.⁵ Congenital dengue in neonates can be confirmed by identification of the dengue virus in cord blood samples the positive dengue serology within the first week of life, together with the confirmed maternal dengue infection during pregnancy.⁶ The manifestations of dengue in neonate seem to be different from children and adults that require high alert attention to detect. Due to the absence of specific clinical manifestation, the diagnosis of neonatal dengue is mainly dependent on the

history of illness in the pregnant mother and the presence of either dengue Non-structural1 (NS1) antigen or dengue antibodies in neonates as reported in the literature which depends on the time and duration of infection in pregnant mothers and baby.⁷ So the objective of the study is to identify the presentation and the outcome of dengue in neonates during the outbreak of dengue fever in Bangladesh during 2023.

Methodology

This is an Observational (retrospective) study was done in Bangladesh Shishu Hospital and Institute from January 2023 to December 2023. The Study include 2033 admitted dengue patients and 1608 neonates suspected of sepsis. Inclusion Criteria was age between 0 to 28 days, Clinical suspected sepsis, Mother NS1 positive, any family member had dengue fever and older children who are NS1 positive.

During the study period total admitted neonates in different wards were 5099, among them 1608 were admitted with the features of sepsis. Dengue patients in different ward including neonatal ward were 2033. Neonates who had fever, lethargic, any other clinical symptom correlate with suspected neonatal sepsis were included, having NS1 positive mother or mother had high grade fever or any family member who had dengue fever were investigate for dengue and did CBC and NS1. Mother of 6 neonates were NS1 positive, one mother who was NS1 negative had dengue fever during her 32 weeks of gestation. If the patient found NS1 positive, then did other investigation according to baby's condition. Sepsis was ruled out by septic screening CBC, SGOT, S. albumin, S. ferritin, D dimer, anti pro BNP were done serially according to patient's requirement.

Every baby received intravenous fluid (Half strength normal saline) and rate was according to patient's condition. Initially all were treated with antibiotics. Among them 4 patients need steroid, they initially treated with Methylprednisolone then Dexamethasone. All 6 neonates took discharged with advice, one took LAMA. Follow up over phone was done after one month and all are in good condition

Results

- Among 1608 who had sepsis like clinical feature 7 neonates were NS1 positive
- Blood pressures were normal during hospital stay
- All of them were discharged
- Over phone follow up was taken

Table I : Rate of dengue infection in neonates

Total admitted dengue	Total neonate having positive NS1	%
2033	7	0.344

Table II: Rate of dengue fever in neonate among suspected neonatal sepsis

Total suspected Sepsis	NS1 positive neonate	%
1608	7	0.43

Table III: Clinical features of the NS1 positive neonates

Clinical feature	No of patients
Fever	7
BP (normal)	7
BP (unstable)	0
Pulse volume (good)	7
Active bleeding	0

Table IV: Investigations result of dengue patients

Investigation	No of patients	%
Hemoglobin (Within normal range)	7	100
Low platelet	6	85
HCT normal	7	100
Low S albumin	4	57
Raised S Ferritin	4	57
D dimer increased	2	28
Anti pro BNP (increased)	1	14
Troponin I (increased)	1	14

Table V: Treatment required for dengue patients

Treatment required	No of patient	%
Inj. Methyl Prednisolone	2	14
Inj. Dexamethasone	4	28

Table VI: Outcome of admitted dengue neonates

Outcome	No of patient	p value
Discharge with advice	6	< 0.001
LAMA	1	

Discussion

Dengue is one of the most frequently encountered viral illnesses and a prevalent public health issue. Based on the last World Health Organization (WHO) reports, there are 390 million new dengue cases yearly; with 67–136 million cases that manifest clinically.⁷ In our study among 7 neonates initially all were diagnosed as sepsis, among them 6 neonates had thrombocytopenia. Similar type study was done in Vietnam which showed 25% cases of neonatal dengue was misdiagnosed with neonatal sepsis and 12.5% cases were misdiagnosed with immune thrombocytopenia⁷. There are very few similar studies, mostly case reports were published. Now a days there is a growing concern on dengue cases in pregnant women due to the greater risk of complications in this population and the possible adverse perinatal outcomes caused by vertical transmission.⁸ Although, neonates are one of the vulnerable groups, the lesser incidence of complications could be explained due to their

immunological immaturity and also due to decreased production of mediators like Interleukin-1 (IL-1) 1 beta, IL-6 and tumour necrosis factor alpha by the neonate.⁹ In addition to that, in cases of vertical transmission resulting in increased perinatal morbidity and mortality.¹⁰ Pregnant female can pass dengue virus to fetus if she develops fever from 10 days before delivery to 10 hours after delivery. Mode of delivery does not affect the rate of transmission.³ Furthermore preterm birth and low birth weight or intrauterine growth restriction are the most prevalent complications after vertical transmission.¹⁰ Several cases of vertical transmission of dengue showing the presence of dengue virus in fetal and cord blood samples have been reported worldwide, demonstrating the intrauterine acquisition of dengue infection.¹¹

Neonatal dengue, most of the time is under diagnosed because it mimics neonatal sepsis and also due to less suspicion.⁹ Detection of NS1 antigen is considered the most used in the early stages of dengue. It has 99.2 % sensitivity and 96.0% of specificity.³ In our study all the neonates were NS1 positive. Dengue has an incubation period of 3 to 8 days but in the newborn period, neonates can become asymptomatic as late as 12 days after birth. Different literature reveals neonates who were NS1 positive having leukopenia with thrombocytopenia.^{2,4}

In our study both the neonates were NS1 positive, one on day 7 which had probably vertical transmission as mother was NS1 positive on the day of delivery. Another one had horizontal transmission as the baby was febrile and NS1 was positive on 26th day of life. Both were term neonate in our study but according to literature review, newborns with low birth weight have a higher risk of getting severe forms of dengue.⁹

Overall, a high suspicion of mother-to-child transmission of dengue includes three characteristics: first, vertical transmission of dengue is not negligible; second, it is more frequent when maternal dengue occurs during last trimester of pregnancy and near delivery; and third, reliable diagnostic tests must be used to allow the diagnosis of vertical transmission.⁶ Due to the absence of specific clinical manifestation, the diagnosis of neonatal dengue is mainly dependent on the history of illness in the pregnant mother and the presence of either dengue non-structural 1 (NS1) antigen or dengue antibodies in neonates as reported in the literature.⁷ In our study among 1608 neonates who had sepsis like clinical feature 7 neonates were NS1 positive. All mothers (100%) had laboratory-confirmed dengue by NS1 positive in the perinatal period⁷ in our study 85% mother was NS1 positive during perinatal period, only one mother was NS1 during 32 weeks of GA. Sensitivity and specificity of RTPCR of dengue is 95% and 100 % respectively.¹²

Conclusion

Neonatal dengue is an under-diagnosed entity; a high index of suspicion and prompt investigation is required for timely diagnosis of this sepsis mimicker. Infants with culture negative sepsis should be evaluated for seasonal and epidemic tropical infections like dengue and accordingly worked – up to minimize unnecessary antibiotic exposure.

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