

# Clinical and laboratory profile of dengue fever in hospitalized children in a tertiary care hospital in Bangladesh

Khan S<sup>a</sup>, Baki MA<sup>b</sup>, Ahmed T<sup>c</sup>, Mollah MAH<sup>d</sup>

## Abstract

**Background:** Dengue is a major health problem affecting Bangladesh. The number of cases have increased over the last few years with a large number of population being children. However data regarding dengue among children is limited. The objectives of this study were to see the clinical and laboratory profile of dengue fever (DF) in children and their outcome.

**Methods:** This cross - sectional study was carried out in the department of Paediatrics, BIRDEM General Hospital 2 from June 2018 to August 2019. Three hundred and ten confirmed dengue cases were enrolled in the study. Their clinical profile and laboratory findings including haemoglobin (Hb%), haematocrit (Hct), total count of white blood cells (TC), differential count of white blood cells (DC), platelet count (PC), serum alanine aminotransferase (S. ALT), serum aspartate aminotransaminase (S. AST), prothrombin time (PT), international normalized ratio (INR), activated partial thromboplastin time (APTT) were documented. Comparison was made between the clinical and laboratory profile with severity of dengue.

**Results:** One hundred and ninety eight (63.9%) had dengue fever, 58(18.7%) had dengue haemorrhagic fever (DHF I, II) and 54 (17.4 %) had dengue shock syndrome (DHF III and IV). All the patients had fever, vomiting was present in 40%, ascites and skin rash in 21 %, pleural effusion 20%, abdominal pain 14% and 12.2% came with shock. Thrombocytopenia, raised hct, raised liver enzymes and abnormal coagulation profile were more common in dengue haemorrhagic fever when compared to patients with dengue fever.

**Conclusion:** Gastrointestinal features like vomiting, ascites ,abdominal pain were common presentations. Thrombocytopenia, raised hct, raised liver enzymes, abnormal coagulation profile were more common in dengue haemorrhagic fever.

**Key words:** Dengue fever, dengue haemorrhagic fever, shock ,clinical profile, laboratory profile.

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## Author information

- Shareen Khan, Registrar, Department of Paediatrics and Neonatology, BIRDEM General Hospital 2, Dhaka, Bangladesh.
- Md Abdul Baki, Assistant Professor, Department of Paediatrics and Neonatology, BIRDEM General Hospital 2, Dhaka, Bangladesh.
- Tasnima Ahmed, Registrar, Department of Paediatrics and Neonatology, BIRDEM General Hospital 2, Dhaka, Bangladesh.
- Md Abid Hossain Mollah, Professor, Head of the Department of Paediatrics and Neonatology, BIRDEM General Hospital 2, Dhaka, Bangladesh.

**Address of correspondence:** Shareen Khan, Registrar, Department of Paediatrics and Neonatology, BIRDEM General Hospital 2, Dhaka, Bangladesh. Email: shareenkhan26@gmail.com

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## Introduction

Dengue is one of the most important arboviral illnesses affecting tropical countries. It is a self-limiting acute mosquito born disease characterized by fever, headache, muscle and joint pain, rash, nausea and vomiting.<sup>1</sup> Dengue is caused by one of the four serotypes of the dengue virus (DENV); (DENV-1 to DENV-4) belonging to the family Flavivirida. Dengue infections can result in a wide spectrum of disease severity ranging from an influenza-like illness (dengue fever) to the life-threatening dengue hemorrhagic fever (DHF)/dengue shock syndrome (DSS). Infection with one serotype of DENV provides lifelong immunity to that serotype, but it is well documented that sequential infection with

different DENV serotypes increases the risk of developing DHF.<sup>2</sup> Nearly 90% of the dengue infections occur in children and risk of dying during a secondary attack is nearly 15-fold higher than that of adults.<sup>3</sup> According to data from the National Guideline for Clinical Management of Dengue Syndrome, Government of People's Republic of Bangladesh, prior to 1970, only nine countries had experienced severe dengue epidemics and today the disease is endemic in more than 100 countries around the world.<sup>4</sup> In Bangladesh, the first outbreak was in the mid 2000 with total number of reported cases being more than 5000. The case-fatality rate (CFR) was 1.7%, with 93 reported deaths with percentage of death being higher than recent years.<sup>4</sup> According to WHO, the worst outbreak occurred in 2002, with 6,232 cases and 58 deaths.<sup>4</sup> From 2003 to 2015 there was a downward trend of dengue cases in this country but in the last 3 to 4 years the number of dengue cases has again started increasing in an alarming rate. In 2019 the total number of reported dengue cases was 101,354 and case fatality rate was 0.16%.<sup>5</sup> Over the last 10-15 years, dengue fever (DF) and dengue hemorrhagic fever (DHF) have become one of the leading causes of hospitalization and deaths among both children and adults in South-East Asian regions. So early evaluation of the cases is crucial in management of dengue to reduce the complications and mortality. Although children are the main group affected by dengue, little published data are available regarding dengue infections in children living in South Asia and data in Bangladesh is even more scarce.<sup>6</sup> Therefore, the objectives of this study were to see the clinical and laboratory profile and the hospital outcome of the children admitted in the paediatric ward of BIRDEM General Hospital 2.

### Methods

This cross-sectional study was done in department of Paediatrics, BIRDEM General Hospital 2 between June 2018 and August 2019. A total of 310 confirmed dengue cases either by Dengue NS1 or anti dengue IgM who were admitted in the paediatric ward during this study period were included. Detailed history and thorough physical examination was done in all the patients. Data were recorded in pretested structured questionnaire. Venous blood was taken and sent for complete blood count which included Hb%, hct, TC, DC, PC. S. ALT and S. AST were also sent. In some selected patients whose condition did not improve and showed features of plasma leakage, PT, INR, APTT were sent from 4<sup>th</sup> day onwards. The patients were classified according to WHO guideline into dengue fever (DF), dengue haemorrhagic fever (DHF

I,II ) and dengue shock syndrome (DSS/DHF III,IV). Comparison was made between clinical and laboratory findings with severity of dengue. Patients were managed according to the National Guideline for Clinical Management of Dengue Syndrome, 4<sup>th</sup> edition, Government of People's Republic of Bangladesh.<sup>4</sup> Close follow up was given in every patient. In DSS follow up was given every 2 – 4 hourly. In refractory hypotension extended measures ( platelet, plasmasol, albumin) were given with the support of intensive care unit (ICU). When patients were improved intravenous fluid was decreased and oral fluids were encouraged. Patients were discharged once clinically stable. Statistical analysis was done by epi info 3.5.4. P value <0.05 was taken to be statistically significant.

### Results

Out of the 310 patients, 198 (63.9%) had dengue fever, 58(18.7%) had DHF (I,II) and 54 (17.4 %) had DSS ( DHF III and IV). The mean age of the 310 patients was 5.6±3.8 years. The youngest patient was 2.5 months of age and the oldest being 14 years of age. The male : female ratio was 1:1. The mean duration of illness at presentation was 4.3±1.9 days.

On analysis of the frequency of symptoms, the commonest complaint was fever (100%), followed by vomiting ( 40%), ascites and skin rash in 21 %, pleural effusion in 20 %. Abdominal pain was present in 14 % of the patients and 12.2 % of the patients came with shock. Headache and bodyache was present in 8% and 9% each. Haematemesis was present in 2.2 % and melena in 2.5% (Table I).

**Table I** Clinical profile of dengue patients (N=310)

Clinical features	Number (%)
Fever or H/O fever	310( 100)
Vomiting	123( 40 )
Ascites	66(21)
Skin rash	66(21)
Pleural effusion	62(20)
Abdominal pain	44(14)
Shock	38(12.2)
Bodyache	29(9)
Headache	26(8)
Haematemesis	7(2.2)
Melena	8(2.5)

*More than 1 feature present in each patient*

Comparison was made between the clinical profile of the patients and severity of dengue.(Table II).It was seen that gastrointestinal symptoms like vomiting, abdominal pain, haematemesis and melena were more in DHF with significant p value.

**Table II** Comparison between clinical profile and severity of dengue fever (N=310)

	Dengue Fever (N=198)	DHF (I,II,III,IV) ( N=112)	P value
Vomiting	65 (32.8%)	58( 51.8%)	0.005
Skin rash	37(18.7%)	29(26.1%)	0.06
Abd.pain	20(12.1%)	24(21.6%)	0.015
Bodyache	17(8.5%)	12(10.7%)	0.3
Headache	17(8.6%)	9 (8.1%)	0.4
Hematemesis	0 (0%)	7 (6.3%)	0.002
Melena	0 ( 0%)	8 (7.2 %)	0.001

Table III shows the comparison between the laboratory findings and severity of dengue fever which showed that thrombocytopenia, raised Hct, raised AST and raised ALT were statistically significant in DHF.

**Table III** Comparison between laboratory findings and severity of Dengue (N=310)

	DF (N=198)	DHF (N=112)	P value
Leukopenia	61 (30.8%)	43 (38.4%)	0.08
Thrombo- cytopenia	73 ( 36.9%)	76 (67.9%)	0.001
Raised Hct	31 (15.7%)	47 (42%)	0.002
Raised AST	63 (31.8%)	62 (55.4%)	0.003
Raised ALT	28 (14.1%)	35(31.3%)	0.002

In this study PT, APTT and INR were sent in 95 selected cases and compared between DF and DHF. Prolonged PT and APTT were significantly associated with DHF. (Table-IV).

**Table IV** Comparison between the coagulation profile and severity of dengue ( N=95)

	DF(N=64)	DHF (N=31)	P value
Prolonged PT	2 ( 3.1 %)	4 (12.9 %)	0.049
Prolonged INR	3 (4.7%)	2 (6.5%)	0.5
Prolonged APTT	7 (10.9%)	17 (54.8%)	0.005

Out of the total 310 patients, 36 were critically ill of which 3 children did not survive. Thus the overall mortality was 0.9%.

## Discussion

In this study 310 patients were taken out of which 63.9% had DF, 18.7 % DHF and 17.4% had DSS. In a study conducted on children in Bangladesh, 40.7% were found to have DF and 27.8% had DHF.<sup>6</sup> However more recently published article by Shultana K et al in Dhaka city showed that 74.15% had DF, 6.74% DHF and 19.10% had DSS which was similar to our findings.<sup>1</sup> The mean age of the patients in this study was 5.6±3.8 years with age range of 2.5 months to 14 years. Similar results were reported by Alam et al and Ahmed et al. Alam et al found the mean age of the patients to be 6.5±3.5 years with age range of 6 months to 15 years and Ahmed et al found mean age 9.0±2.8 years with a age range of 2.5-12 years and.<sup>6,7</sup>

This study showed that 100 % of the children had fever or came with history of fever. The other common clinical features were vomiting in 40 % of the children, abdominal pain in 14% and these features were significantly more common in DHF. Agarwal et al in their study in Delhi showed fever, abdominal pain and vomiting as the most frequently occurring symptoms.<sup>8</sup> In another study by Wang et al, vomiting (60.5%) and abdominal pain (32.5%) were the common presenting symptoms in dengue infected children.<sup>9</sup> Ascites (21%) was the most common finding of plasma leakage in this study followed by pleural effusion (20%). Srikiatkachorn et al in their study found that pleural effusion(62%) and ascites (52%) were the most common ultrasonographic findings of plasma leakage in DHF.<sup>10</sup> Skin rash was present in 21 % of the children. Typical features like headache(8%) and bodyache(9%) were less common in our study the results of which were consistent with a study conducted at Dhaka city by Shultana et al.<sup>1</sup> Haemorrhagic manifestations like haematemesis and melena were present in 2.2 % and 2.5 % cases each and were significantly associated with DHF. Less than 1% patients had menorrhagia. Alam et al in their study among children showed haematemesis (19%), epistaxis (12%), melena (8%) as the common haemorrhagic manifestations.<sup>6</sup> Among the less common features convulsion was present in 1.6 % children. Shock was present in 12.2% of our cases which was less when compared to other studies by Horvath from Australia

and Sharma from India who reported 63% and 69% respectively.<sup>11,12</sup> However a study by Selvan et al showed results similar to our one, where 0.8 % had convulsion and 18.6 % had shock.<sup>13</sup>

In this study it was seen that thrombocytopenia and raised hct levels were significantly more common in DHF when compared to DF which were similar to studies by Kumar SK et al<sup>14</sup> and Ratageri VH et al.<sup>15</sup> Liver involvement in the form of increased transaminases was observed in this study and was significantly higher in DHF. Mohan B et al also found that the cases with DSS and DHF had raised AST, ALT levels and the mean levels of these enzymes were significantly higher ( $p < 0.05$ ) as compared to DF.<sup>16</sup> Further more, a study by Farhana Afroz et al showed that rise of hepatic enzymes was also more in adults with dengue haemorrhagic fever (DHF III).<sup>17</sup> Studies by Huang et al and Kulasingheln S et al observed that prolonged APTT was significantly associated with DHF and shock.<sup>18,19</sup> The present study also showed a significant association between prolonged PT and APTT with DHF.

### Conclusion

From this study it could be concluded that more than one – third of the children presented with haemorrhagic manifestations including shock. Gastrointestinal symptoms like vomiting and abdominal pain were the most common presentations apart from fever. Thrombocytopenia and raised Hct levels were significantly more common in DHF. Levels of raised AST, ALT, Prolonged PT and APTT were significantly higher in DHF. In this study the mortality was <1% making early recognition and careful treatment at the right time a crucial factor for management of dengue fever.

**Conflicts of interest:** Nothing to declare.

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