

Original Research Article

Clinical and laboratory profile of children with dengue fever admitted at a tertiary care hospital in Mangalore, Karnataka, India: a retrospective study

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ABSTRACT

Background: Dengue fever caused by dengue virus is a self-limiting acute febrile illness transmitted by *Aedes aegypti*, a daytime biting mosquito. Dengue virus belongs to family of *Flaviviridae* and there are 4 serotypes. A fifth serotype DENV-5 was isolated in 2013 which was said to cause mild form of the disease. In 2019 total numbers of dengue cases are 10,524 in Karnataka which is 138% increase over 2018 (4,427 cases).

Methods: A retrospective conducted in Yenepoya Medical College hospital from January 2017 to July 2019 for a period of 2½ years. Medical records of children who were diagnosed with dengue fever were retrieved and analyzed. Clinical and laboratory findings were noted down. Clinical course and outcome were noted down from the case sheet and cases were classified as per WHO 2011 classification.

Results: 97 children diagnosed with dengue fever were included in the study. Common age group was 5-15 years. 49.5% had dengue fever, 40.2% had dengue haemorrhagic fever (DHF) and 10.3% had expanded dengue syndrome. Fever was the main complaint. Children with dengue fever presented with vomiting, abdominal pain, myalgia, arthralgia in descending order of frequency. Children with DHF, petechiae were seen in 38% patients. Among bleeding manifestations, epistaxis was more common. Children with expanded dengue syndrome had atypical manifestations.

Conclusions: Dengue fever like any other viral illness, presents with prodromal symptoms which should be picked up at the earliest with high index of suspicion in children coming from endemic area. Identification of atypical manifestations and co-infections at the earliest and prompt treatment avoids serious life-threatening complications.

Keywords: Dengue fever, Dengue WHO 2011 classification, Dengue haemorrhagic fever, Dengue in children

INTRODUCTION

Dengue fever caused by dengue virus is a self-limiting acute febrile illness transmitted by *Aedes aegypti*, a daytime biting mosquito. The incidence of dengue has increased. The actual numbers of dengue cases are under-reported and many cases are misclassified. One recent estimate indicated 390 million dengue infections per year globally, of which 96 million manifest clinically.¹ In

2019 total numbers of dengue cases are 10,524 in Karnataka which is 138% increase over 2018 (4,427 cases). According to the ministry of health and family welfare, of the 5 worst hit states, 4 are in south India, Karnataka, Tamil Nadu, Telangana and Kerala.²

Dengue virus belongs to family of *Flaviviridae* and there are 4 serotypes DENV-1, DENV-2, DENV-3 and DENV-4. All 4 serotypes can cause the full spectrum of disease,

from subclinical infection to a mild self-limiting disease and a severe disease that vary from epidemic to epidemic with atypical manifestations reported more recently. A fifth serotype DENV-5 was isolated in 2013 October in Sarawak state of Malaysia which was said to cause mild form of the disease.³ Dengue fever is classified according to revised WHO classification 2011 as dengue fever, dengue haemorrhagic fever and Expanded dengue Syndrome.⁴

METHODS

A hospital-based retrospective time-bound observational study conducted in Yenepoya Medical College hospital from January 2017 to July 2019 for a period of two and a half years. Study was approved by institutional ethical committee. All children from 6 months to 16 years of age diagnosed with dengue fever are included in the study. Medical records of children who were diagnosed with dengue fever during the period of January 2017 to July 2019 were retrieved and analyzed. Clinical and laboratory

findings were noted down. Clinical features, CBC, LFT, RFT, Serum electrolytes, dengue serology (rapid immunochromatographic test and ELISA method) were noted down from the case sheet. Findings in USG abdomen and chest x-ray if done were noted down to look for evidence of plasma leakage. Additional investigations based on clinical presentation were also noted. Clinical course and outcome were noted down from the case sheet and forms of dengue were also classified according to WHO classification 2011. Data obtained was tabulated analyzed using Excel software.

RESULTS

Ninety seven children diagnosed with dengue fever were included in the study. 67 (69%) were boys and 30 (31%) were girls with a ratio of 2.2:1. Commonest age group was between 5-15 years with mean age of 10 years. Table 1 shows the distribution of age with respect to severity of dengue fever. Expanded dengue syndrome was more common in children between 10-15 years.

Table1: Age-wise distribution of dengue cases as per revised WHO classification 2011.

Age group	Dengue fever (48)	Dengue haemorrhagic fever (39)	Expanded dengue syndrome (10)	Total (97)
<1 year	0	0	1 (1.03%)	1 (1.03%)
1-5 years	9 (9.2%)	5 (5.1%)	3 (3.09%)	17 (17.5%)
5-10 years	15 (15.4%)	9 (9.2%)	1 (1.03%)	25 (25.7%)
>10 years	24 (24.7%)	25 (25.7%)	5 (5.1%)	54 (54.6%)
Total	48 (49.5%)	39 (40.2%)	10 (10.3%)	97 (100%)

Table 2: Frequency of clinical signs and symptoms according to the types of dengue fever.

	Dengue fever (48)	Dengue haemorrhagic fever (39)	Expanded dengue syndrome (10)	Total (97)
Arthralgia	14 (14.4%)	8 (8.3%)	2 (2%)	24 (24.7%)
Myalgia	17 (17.5%)	8 (8.3%)	3 (3%)	28 (28.8%)
Headache	9 (9.2%)	10 (10%)	1 (1.08%)	20 (20.6%)
Pain abdomen	9 (9.2%)	27 (27.9%)	4 (4%)	40 (41.3%)
Vomiting	24 (24.7%)	28 (28.9%)	7 (7%)	59 (60.8%)
Rash	7 (7.2%)	39 (40%)	1 (1.08%)	47 (48%)
Bleeding	0	8 (8.3%)	1 (1.08%)	9 (9.2%)
Ascites	2 (2%)	6 (6.2%)	1 (1.08%)	9 (9.2%)
Pleural effusion	0	5 (5.1%)	1 (1.08%)	6 (6.18%)
Hepatomegaly	1 (1.03%)	0	5 (5%)	6 (6.18%)
Petechiae	0	37 (38%)	1 (1.08%)	38 (39.1%)

Fever was the main complaint in all the patients with mean duration of illness of 4 days. Other complaints with which patients presented were vomiting (60.8%), rash (48%), pain abdomen (41.3%), myalgia (28.8%), arthralgia (24.7%), headache (20.6%), bleeding manifestation (9.2%).

Epistaxis and gastrointestinal bleeding (melena) were the common bleeding manifestations noted along with petechiae, gum bleeding and haematuria. Other

complaints were respiratory distress (5 children), altered sensorium and seizures (1 child) and weakness of bilateral lower limbs (1 child). Table 2 shows frequency of signs and symptoms in dengue fever observed during the study period.

Pleural effusion was found in 6.18% patients, erythematous maculopapular rash with facial flushing was found in 48.4% patients. Many patients were found to have bradycardia and pruritus during recovery phase.

Depending on the above symptoms and signs and following investigations, 49.5% cases were classified as dengue fever, 40.2% as dengue haemorrhagic fever (DHF) and 10.3% as expanded dengue syndrome. Table 3 shows the distribution of dengue cases as per revised WHO classification 2011.

Table 3: Distribution of dengue cases as per revised WHO classification 2011.

Classification	Number of cases
Dengue Fever	48 (49.5%)
Dengue haemorrhagic fever	39 (40.2%)
Expanded dengue syndrome	10 (10.3%)
Total	97 (100%)

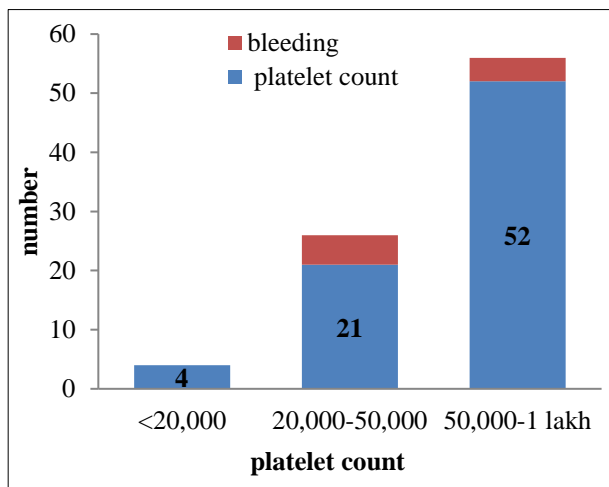


Figure 1: Relationship between thrombocytopenia and bleeding manifestation.

Among 39 patients with dengue haemorrhagic fever 79.5% had grade 1 DHF (positive tourniquet test and evidence of plasma leakage), 18% had grade II DHF (grade I plus spontaneous bleeding) and 2.5% had grade III DHF (grade I and II plus circulatory failure). Total 49.5% patients had hemoconcentration with mean PCV of 36.5%. Thrombocytopenia was present in 82% of the patients with 4.1% having count $<20,000/\text{mm}^3$, 26.8% patients had platelet count between 20,000 and 50,000 and 57.7% patients had platelet count between 50,000-1,00,000. Table 4 shows distribution of platelet with respect to severity of dengue cases. None of the patients with platelet count $<20,000$ had bleeding manifestation and 19.2% of patients with platelet count between 20,000-50,000 and 7.14% patients with platelet count between 50,000-1,00,000 had bleeding manifestation. Figure 1 shows relationship between thrombocytopenia and bleeding manifestation.

USG abdomen showed features suggestive of dengue in 16.4% of the cases with gall bladder wall oedema. 2% were seen in dengue fever, 10.3% were seen in dengue haemorrhagic fever and 4.1% were seen in expanded dengue syndrome cases. Liver function test was abnormal in 7.21% cases of which 4.1% were seen in expanded dengue syndrome, 3% with dengue haemorrhagic fever and 1% with dengue fever. Table 4 shows the laboratory parameters in patients with dengue fever based on WHO 2011 classification. Among children diagnosed with expanded dengue syndrome, 4% had hepatitis, 3% had acute respiratory distress syndrome and one child each had acute kidney injury, encephalopathy and meningoencephalitis with Guillain Barre syndrome respectively.

Table 4: Laboratory parameters in dengue fever.

Laboratory parameters	Dengue fever (48)	Dengue haemorrhagic fever (39)	Expanded dengue syndrome (10)	Total (97)
Leucopenia ($\text{TLC} < 4000/\text{mm}^3$)	22 (22.7%)	12 (12.4%)	3 (3%)	37 (38.1%)
Thrombocytopenia (50,000-1lakh/ mm^3)	29 (29.9%)	19 (19.6%)	8 (8.2%)	56 (57.7%)
Platelet count (20,000-50,000/ mm^3)	9 (9.3%)	15 (15.4%)	2 (2%)	26 (26.8%)
Platelet count $<20,000/\text{mm}^3$	0	4 (4.1%)	0	4 (4.1%)
Hypoalbuminemia ($<3\text{g/dl}$)	2 (2%)	5 (5.1%)	2 (2%)	9 (9.2%)
Gb wall oedema on USG	2 (2%)	10 (10.3%)	4 (4.1%)	16 (16.4%)
Abnormal LFT	1 (1%)	3 (3%)	4 (4.1%)	8 (8.24%)
Deranged RFT	0	0	1 (1%)	1 (1.03%)
Abnormal coagulation profile	0	1 (1%)	0	1 (1.03%)

Co-infection was found in 4.1% of the cases were 2 cases had associated typhoid fever and 1 case each had malaria and leptospira respectively.

DISCUSSION

In this retrospective study, 97 children diagnosed with dengue were included. Maximum number of cases was

between 5-15 years of age, which was similar to other studies.⁵⁻⁷ Expanded dengue syndrome (with atypical manifestations) was more common in the age group of 10-15 years. In a study by Pothapregada S et al common age group was between 6-12 years of age.⁸ More number of boys were affected than girls with the ratio of 2.2:1 which was similar to other studies.^{5,6,9} This could be due to covered dress worn by female children and male

children spending more time outdoors when compared to female children. In contrast, in a study done by Prasad et al, there was equal distribution with males and females.⁷

Fever was the main complaint in all the cases, which was similar to other studies.^{5,9}

High haematocrit [(89.7%) PCV>10% in dengue fever and >20% in dengue haemorrhagic fever], low platelet count (88.6%), rash (48%) and leucopenia (38.1%) were observed which are the important clues to the diagnosis of dengue fever were observed in our study similar to other studies.⁵⁻⁷ Gall bladder wall edema was the most common ultrasound finding observed in 16.4% patients similar to other studies.^{5,6}

As per WHO classification 2011 Children with dengue fever presented with vomiting, abdominal pain, myalgia and arthralgia in descending order of their frequency, which was similar to other studies.¹⁰

In children with dengue haemorrhagic fever, signs of plasma leakage like ascites were found in 6.2% cases and pleural effusion was found in 5.1% case similar to other studies.^{5,9} Liver involvement in the form of abnormal liver function test was found in 3% of the cases. As such no cases had hepatomegaly. Petechiae were seen in 38% patients.¹¹ Among bleeding manifestations that occurred, epistaxis was more common followed by melena and haematuria in contrast to the gastrointestinal bleeding as most common manifestation in other studies.¹²⁻¹⁴ Bleeding manifestation did not vary significantly with platelet count, most probably due to involvement of multiple factors and low platelet count was one of them.

In 10.3% children who presented with expanded dengue syndrome, unusual manifestation due to isolated organopathy, 4% had hepatitis (hepatomegaly with abnormal liver function test) where etiology could be explained by active viral replication, direct cytopathic injury, hypoxia and tissue ischemia due to prolonged shock, haemorrhage and metabolic acidosis.^{8,15} 3% had Acute respiratory distress syndrome (ARDS) which is explained by increased alveolar-capillary membrane permeability leading to interstitial and alveolar edema and pulmonary dysfunction.¹⁶ Acute kidney injury (1 child) could be due to acute tubular necrosis induced by shock.^{8,15}

Neurological manifestations like encephalopathy (1 child), meningoencephalitis with GB syndrome (1 child) could be due to direct tissue invasion by the viruses, damage to the blood brain barrier, or cerebral hypoperfusion due to prolonged shock.^{8,17} Co-infections were seen in 4.1% of the cases. Typhoid fever was the associated co-infection in 2% of the cases and 1 child each had leptospirosis and malaria respectively. Co-infection can modify the clinical presentation and result in missed or delayed diagnosis and treatment.

CONCLUSION

Dengue fever like any other viral illness, presents with prodromal symptoms which should be picked up at the earliest with high index of suspicion in children coming from endemic area. Identification of atypical manifestations and co-infections at the earliest and prompt treatment avoids serious life-threatening complications.

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