



## Original Research Article

### Clinico-haematological profile and outcome of dengue fever in children

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#### ABSTRACT

#### Keywords

Dengue Fever;  
Children;  
Clinico  
Haemato-  
logical profile;  
Out come

To evaluate clinical features, disease severity, laboratory findings and outcome of serologically confirmed cases of dengue fever in children between May 2012 to October 2012. Dengue fever cases admitted in the Pediatric department of Alluri Sita Ramaraju Academy of Medical Sciences, Eluru. Eighty children with Dengue fever were hospitalized in the Pediatric department of ASRAM. Each case was evaluated and followed for various clinical manifestations and outcome. All the children were monitored and managed according to standardized WHO protocol. The mean age of patients is  $9.77 \pm 4.1$  with almost equal male to female ratio. Among 80 patients 32.5% had dengue fever, 3.75% had DHF1, 36.25% had DHFII, 21.2% had DHFIII and 6.25% had DHF IV. The common symptoms were fever (100%), abdominal pain(58%), vomiting(42%), myalgias(32%), itchy rash(28%). Bleeding manifestations were seen in 68.7% cases with petechiae (70%) being the most common followed by melena(23%), hematemesis (20%), epistaxis(7%), gum bleeds(6%), Haematuria (6%) and menorrhagia (3%). Hepatomegaly is seen in 33.75% cases, leak syndrome in 25% cases. Thrombocytopenia in 85% cases, among which 78% had haemorrhagic manifestations. Mean platelet count in DHF cases is  $40758 \pm 27180$ .Torniquet is positive in 38.7% of cases, The sensitivity of the tourniquet test for haemorrhagic manifestations is 56% and Specificity is 88%. 72% of cases of patients with thrombocytopenia had leucopenia (p value 0.009). The complications seen were liver dysfunction(17.5%), coagulopathy (7.5%), encephalopathy(2.5%) pancreatitis (1.25%) and ARDS (1.25%).Mortality in the study is 6.25% with DSS with coagulopathy(5%) being the lead cause followed by DSS with ARDS (1.25%). The common symptoms were fever, abdominal pain, vomiting, petechiae, GI bleeds. The incidence of bleeding is higher with increasing severity of thrombocytopenia. Tourniquet test is not a good screening test for haemorrhagic manifestations. Leucopenia is also a significant feature in patients with thrombocytopenia . Refractory shock and coagulopathy were main causes of mortality.

#### Introduction

Dengue is the most important emerging tropical viral disease in the world today.

The WHO estimates 50 million dengue infections occur annually and almost half

the world's population lives in countries where Dengue infection is endemic (W.H.O, 2008). Over the last 10 – 15 years Dengue Hemorrhagic Fever has become a leading cause of hospitalization and death among children in SEAR countries following Diarrheal and acute respiratory infections (W.H.O, 1999). Dengue Fever has been reported from India over a long time but DHF was first reported in 1963 from Calcutta city (Dengue report, 2007). Since then several outbreaks have been reported in India. The present study was conducted to evaluate the clinical features and outcome of dengue fever in children during the recent outbreak in and around Eluru.

## Materials and Methods

This study was conducted at the department of Pediatrics of Alluri Sita RamaRaju Academy of Medical Sciences, Eluru during the past two years. Data was collected from the patients admitted with Dengue fever from May 2011–October 2012. The patients who presented with febrile illness, fulfilling the diagnostic criteria of Dengue fever according to World Health Organization and serologically positive for IgM and IgG antibody capture ELISA for dengue were included in the study. Case definition of dengue fever is acute febrile illness of 2-7 days duration with any two of the following - head ache, myalgias, retro orbital pain, bleeding manifestations, thrombocytopenia, leucopenia (W.H.O, 1997). All the dengue fever cases with thrombocytopenia are thoroughly examined and classified according to the WHO grading system (W.H.O, 1997) as follows:

DHF I : Positive tourniquet test  
DHF II : Spontaneous bleeding

DHF III: Circulatory failure  
DHF IV: Undetectable blood pressure and pulse

Grades III and IV are classified as dengue shock syndrome (DSS).

Torniquet test, Hematocrit, platelet counts, total leucocyte counts were done serially in all the cases until they normalized. Liver function tests, chest X-ray, ultrasound abdomen, RFT, CT scan, ABG analysis were done according to clinical condition in selected cases. All children were monitored and managed with IV fluids; blood products according to standard WHO guidelines (WHO, 2009). Data of clinical profile, laboratory findings and outcome of these 80 patients were collected in a standard format and analyzed by chi-square test.

## Result and Discussion

Total of 80 patients were included in the study. Of these 39 were males and 41 were females. The youngest child was 6 month old and the oldest was 16 years with a mean age of 9.77 (SD 4.1) years (Figure 1). Among 80 cases 26(32.5%) were diagnosed Dengue fever 3(3.75%) cases belong to DHF I, 29(36.25%) to DHF II and 17 (21.25%) to DHF III and 5(6.25%) to DHF IV. Most patients with DHF belong to grade II. Most of the cases of DHF were 7-12 years old. DHF is more common in boys ( p value: 0.03).

Clinical features are summarized in figure 2. Fever was present in all children. 10 children had the typical biphasic pattern of fever with an afebrile period of 3-5 days. Abdominal pain was the next most common symptom in 57.5% children followed by Vomiting (42.5%) , myalgia(32.5%) , and rashes28.75%). In

most of the cases rash was seen during the convalescent phase of the disease which was macular with annular clear zones and pruritis.

Petechiae alone was seen in 26 (32.5%) cases, significant hemorrhagic manifestations seen in 29(36.25%) cases, GI bleeds in the form of either hematemesis or melena was the (27.5%) leading cause of significant bleeding. other manifestations include epistaxis(5%), gum bleeds(3.75%), haematuria (3.75%) and menorrhagia(2.5%).

The tourniquet test was positive in 34(42.5%) cases. Tourniquet test was positive in 11 of 29 significant bleeding cases. The sensitivity of tourniquet test for predicting significant bleeding was 38 % specificity was 23%. 20 petechiae at the end of 5 minutes were taken as positive for tourniquet test, but most of the cases were negative for tourniquet because of appearance of less than 20 petechiae. Hepatomegaly (33.75%) was the commonest clinical sign we detected followed by an evidence of increased capillary permeability in the form of ascites, pleural effusion and edema (25%), splenomegaly (5%) and Bradycardia (heart rate < 80/min)(13%). Bradycardia is observed during convalescent phase.

10 (12.5%) children developed complications including DIC (7.5%), encephalopathy (2.5%), pancreatitis(1.25%) and ARDS(1.25%). Disseminated intravascular coagulation was seen in 6 cases with mean platelet count of 22666 /cu mm. Among 6 cases complicated with DIC, 4 cases died. Two cases presented with encephalopathy of which first one had other complications including shock, DIC and hepatic dysfunction. Other case presented with

low glasgow coma scale and shock. One Patient presented with acute severe pain abdomen had pleural effusion, ascites, thrombocytopenia and leucopenia. On further evaluation CT abdomen showed bulky inflamed pancreas along with raised levels of amylase and lipase and hence diagnosed as pancreatitis which is a rare complication of Dengue fever. One child presented with refractory shock, pericardial effusion and ARDS.

68 cases had thrombocytopenia (Platelets < 100000/cu mm) with a mean platelet count of 55810 + 43079. With increasing severity of thrombocytopenia there is increasing incidence of bleeding manifestations (p value: 0.002). Leucopenia (TLC < 4000/cu.mm) was observed in 53 (66%) cases with a mean leukocyte count of 2376+ 1349. The leucopenia and thrombocytopenia are associated significantly (p value: 0.009). With increasing severity of leucopenia there is increased incidence of hemorrhagic manifestations including petechiae (p value 0.023). But there is no significant association of leucopenia with significant bleeding manifestations. Deranged liver function tests were present in 17.5% cases. Among them TSB values > 2 mg% was observed in 2 cases, both of which died.

## **Outcome**

Among 80 children 5 died. All were females with mean age of 9.2 years. Refractory shock and coagulopathy was present in 4 out of 5 cases. One child died of refractory shock with ARDS. Case fatality rate was 6%. A child with encephalopathy and other complications died and other case of encephalopathy with shock recovered without sequelae. Child with Pancreatitis recovered

**Table.1** Haematological features

<b>THROMBOCYTOPENIA</b>	<b>68 CASES</b>	<b>NO. OF CASES WITH BLEEDING</b>
50000 – 1 LAKH	26	16
2000 – 50000	26	22
10000 – 2000	16	15
<b>LEUCOPENIA</b>	<b>53 CASES</b>	<b>41 CASES</b>
3000 – 4000	26	16
2000 – 3000	21	19
1000 – 2000	6	6
<b>HAEMATOCRIT</b>	<b>80 CASES</b>	<b>55 CASES</b>
>40	33	19
30 – 40	43	34
<30	4	2

**Figure.1** Age and Sex distribution of Cases

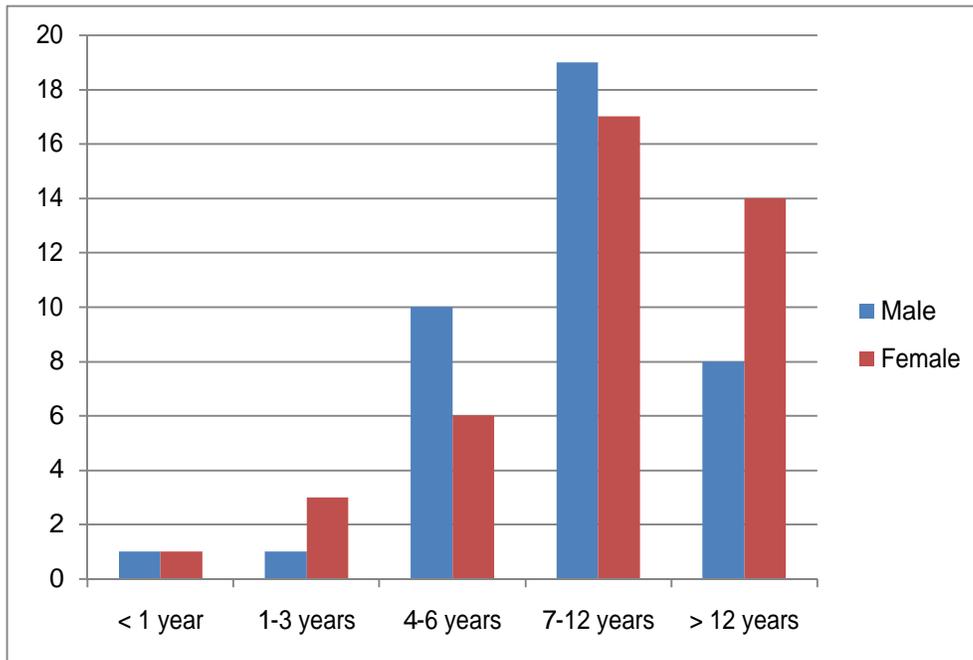


Figure.2 Clinical features

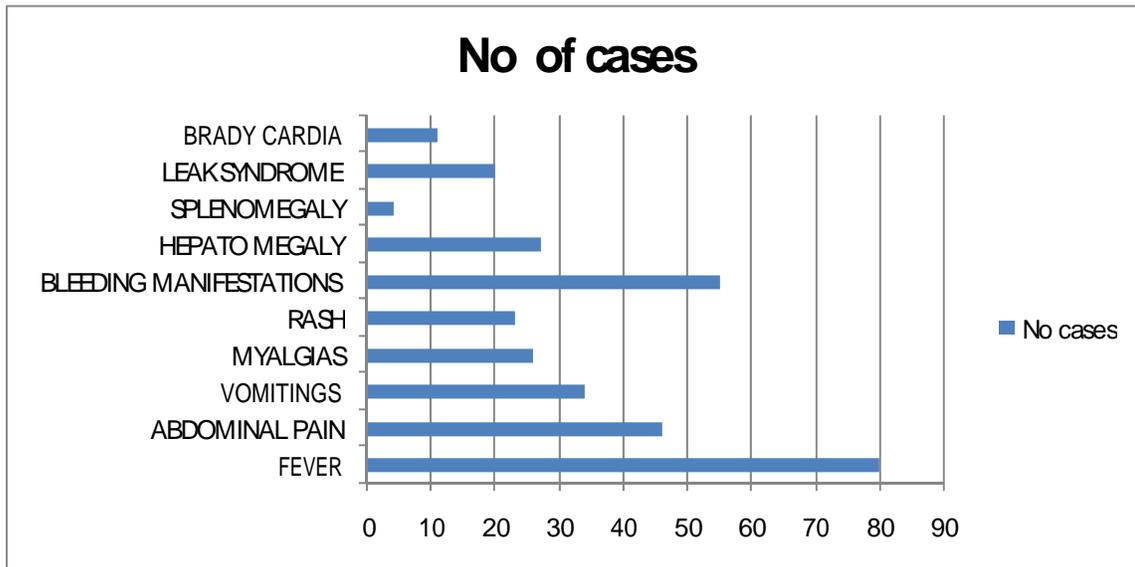
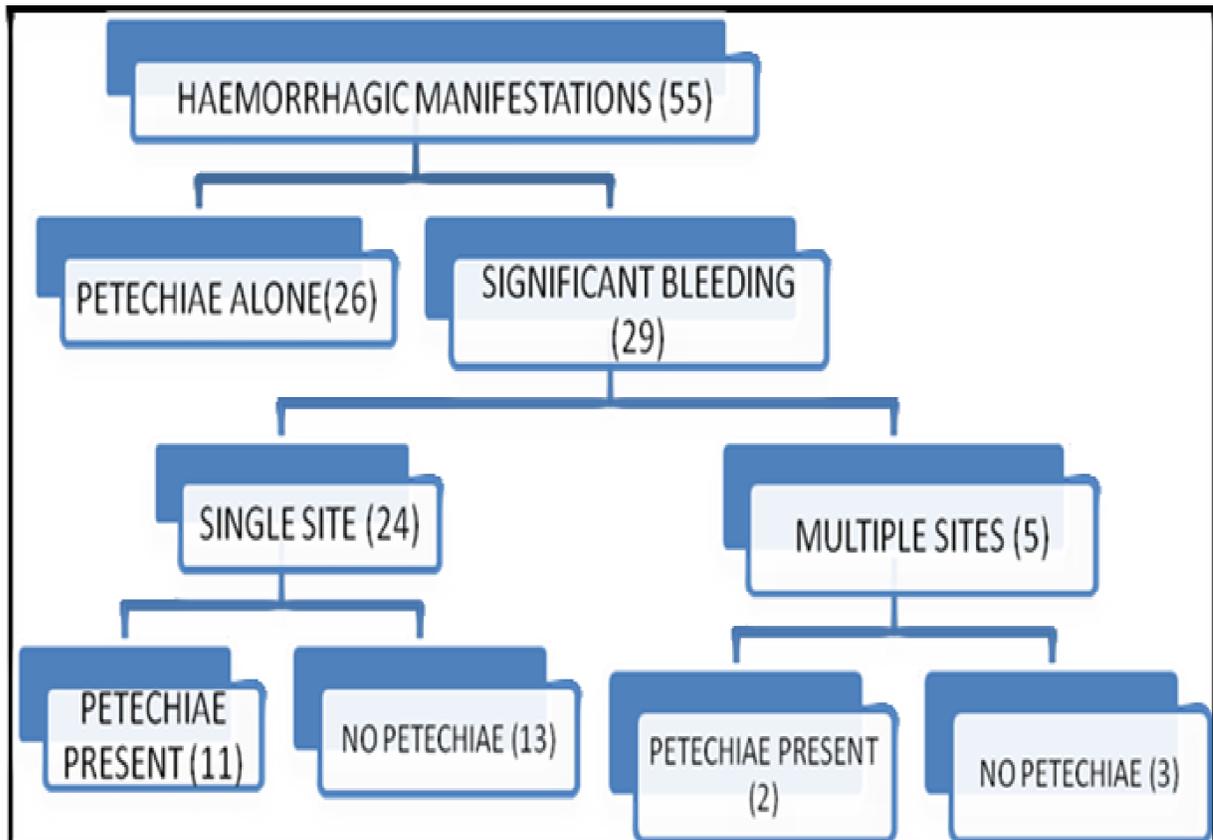


Figure.3 Details of hemorrhagic manifestations



clinically but features of pancreatitis on ultrasound were present at discharge recently and the child needs to be followed for resolution of pancreatitis.

In our study of 80 children the common age group affected were 9-12 years with almost equal male to female ratio. In a study by Kulkarni *et al.*, (2010) the commonest age affected was 6-12 years with male preponderance. In our study 68.5% of DHF were aged more than 6 years which was comparable to the study by Faridi *et al.*, (2008) where 76% DHF were aged more than 6 years. In a study by Anju *et al.*, (1998) 56% cases were aged more than 6 years. In a study by Dhooria *et al.*, (2008) 91% of DHF cases were less than 6 years. In our study Dengue fever was 32.5% , DHF was 40% , DSS was 27.5%. In a study by Ratageri *et al.*, (2005) DF was 18%, DHF was 60%, DSS 22%. In a study by Kulkarni *et al.*, (2010) DF was 58.3%, DHF 41.7%. In a study by Ahmed *et al.*, (2010) DF 40.7%, DHF I 27.8%, DHF II 16.7%, DHF III 3.7% and DHF IV 11.1%.

In our study the common symptoms were fever 100%, abdominal pain (57.5%), vomiting (42.5%), significant bleeding (36.25%) myalgia (32.5%) and rash (28.75%), A study by Dhooria *et al.*, (2008) the common symptoms described were fever 91%, vomiting 41%, abdominal pain 16%, poor intake 21%, significant bleeding 15%. According to Ratergeri *et al.*, (2005) the common symptoms were fever 100%, vomiting 82%, abdominal pain 61%, headache 22% (10), According to Rehman *et al.*, (2002) the common symptoms were headache 91% , myalgia 85%, vomiting 45%.

In our study the most common bleeding manifestation was petechiae in 70%, the

significant bleeding in the form of haematemesis (20%), malena 23%, epistaxis 7%, gum bleeds 5%, menorrhagia 3.6% , haematuria 5%. Ahmed *et al.*, (2001) observed gum bleeds in 16%, haematemesis in 19%, epistaxis in 12% , malena in 8%, subconjunctival hemorrhage 4%. In a study by Ratergeri *et al.*, (2005) GI bleeds were seen in 22%, petechiae in 18%. In our study Hepatomegaly was 33.75%, Splenomegaly was 4%, evidence of capillary leak in the form of ascites , pleural effusion and edema was seen in 25% cases and bradycardia during convalescence in 13%. According to Faridi *et al.*, (2008) hepatomegaly was in 54%, splenomegaly 32.4%. In a study by Benerjee *et al.*, (2008) hepatomegaly was in 15%, hepatosplenomegaly 7%. A study by Arif *et al.*, (2008) hepatomegaly 35%, splenomegaly 2%.

In our study Thrombocytopenia is seen in 85% Which was similar to the study by Kulkarni *et al.*, (2010) (84%). According to Ahmed *et al.*, (2001) thrombocytopenia was in 68.5% and by Benerjee *et al.*, (2008) thrombocytopenia was seen in 19%. In our study thrombocytopenia was further graded as 50000- 100000 /cu. mm in 38.2%, 20000-50000 /cu.mm in 38.2% and < 20000/ cu.mm in 23.6%. A study by Malavige *et al.*, (2007) the platelet counts between 50000- 100000 was 24.2%, 20000-50000 was 46% and < 20000 in 30%. In a study by Kamath *et al.*, (2006) platelets <50000/ cu mm were seen in 62.3%. our study results of thrombocytopenia were in comparable with other studies. In our study with increasing severity of thrombocytopenia there is increasing incidence of bleeding which was similar to the study by Benerjee *et al.*, (2008). But a study by Dhooria *et al.*, (2008) found poor correlation

between thrombocytopenia and bleeding diathesis. In our study leucopenia was observed in 66.2% . A study by Arif *et al.*, (2008) leucopenia was observed in 43 % . A study by Ratageri *et al.*, (2005) leucopenia was observed in 26% of cases. In our study the severity of leucopenia was further graded as 3000-4000/cumm in 49% of cases, 2000-3000 cu.mm in 39.6% and <2000 /cu.mm in 11.4%. In a study by Gener D.Rubio Jr *et al.*, (2007) the severity of leucopenia was graded as 4000-5000 in 23%, 3000-4000/cumm in 37%, 2000-3000 in 33%/cumm, <2000 in 7%. In our study the mean haematocrit was 36.8 % . In a study by Dhooria *et al.*, (2008) it was 35.5%. In our study haematocrit >40% was seen in 41.25%, 30 – 40% in 53.75 % and <30% in 5 % . In a study by Anju *et al.*, (1998) haematocrit >40% is seen in 18 % , >30 – 40% in 66 % and <30% in 16 % .

In our study hepatic dysfunction was seen in 17.5% children comparable to the study done by Dhooria *et al.*, (2008) in which it was seen in 14.8%. But in a study by Hayat *et al.*, (2010), it was seen in 40% of cases. In our study one patient presented with pancreatitis. There are isolated case reports highlighting Pancreatic involvement in Dengue Fever (Jusuf *et al.*, 1998; Chen *et al.*, 2004). 148 children with DHF and abdominal pain were enrolled in a study for sonographic evidence of pancreatic involvement. Enlarged pancreas and increased levels of serum amylase and lipase were found in 29% cases (Setiawan *et al.*, 1998). Pancreatic involvement might be due to the direct invasion of virus or due to shock in DHF (Sameer Gulati and Anu Maheswari, 2007). In our study 2 patients (2.5%) presented with dengue encephalopathy. Encephalopathy is known to occur in 0.5% of patients with DHF

(Cam *et al.*, 2001). Apart from cerebral hypo perfusion on account of shock other significant reasons for neurological presentations include cerebral edema, direct neurotropic effect of dengue virus resulting in encephalitis/ encephalopathy, or secondary to hepatic dysfunction and metabolic derangements such as hypoglycemia and hyponatremia (Kankirawatana *et al.*, 2005; Cam *et al.*, 2001; Thisyakorn *et al.*, 1999; Pancharoens and Thusyakorn, 2001). Malavige *et al.*, (2007) reported acute liver failure (73%), electrolyte imbalances (80%) and shock (40%) as factors contributing to encephalopathy. In our study coagulopathy was seen in 7.5% cases which is comparable with a study by Kamath *et al.*, (2006) where coagulopathy is in 8.6%. In contrary a study by Dhooria *et al.*, (2008) coagulopathy was in 1.2% . In our study ARDS is seen in 1 case which expired. In a study by Dhooria *et al.*, (2008) two patients had ARDS, both of which expired. Dengue associated ARDS is associated with a high mortality (Lum *et al.*, 1995).

Mortality in the present study was 6.25%. All patients who expired belonged to DSS. In the study by Anju *et al.*, (1998) mortality was 6%. In a study by Shah *et al.*, (2004) the three patients who died belong to DSS with a case fatality rate of 16.6%. Case fatality rate is high in females in our study similar to the study by Shekhar *et al.*, (1992-1993). Case fatality rate of SEAR countries in 2006 is < 1%. India, Indonesia, Bhutan and Nepal still have case fatality rates > 1 % (Dengue/DHF, 2007). In our study the presence of DSS, coagulopathy, hepatopathy ARDS are the risk factors for mortality. In a study by Dhooria *et al.*, (2008) the risk factors for mortality are coagulopathy, ARDS and hyponatremia.

Daniel *et al.*, (2005) suggested an association of abnormal AST with a worst outcome.

Commonest age affected in our study was 7-12 years. Most of the patients belong to DHF II. Incidence of DHF is high in males but case fatality rate is high in females. Neither Torniquet test nor presence of petechiae are good predictors of significant bleeding. With increasing severity of thrombocytopenia there is increasing incidence of hemorrhagic manifestations. The complications noted in our study are coagulopathy, hepatopathy, encephalopathy and ARDS. One of the rarest presentations of dengue fever observed in our study was pancreatitis. The presence of DSS, coagulopathy, hepatopathy ARDS are the risk factors for mortality.

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