# **Original Research Article**

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# A clinical and biochemical laboratory profile to measure the severity of dengue fever and their outcome

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#### **ABSTRACT**

**Background**: To identify various manifestations of dengue fever, complications, and to measure their association with laboratory findings.

**Methods**: 100 cases of suspected adults between 20-70 years of age with clinical features suggestive of dengue infection and patients presenting with fever of acute onset (<2 weeks), pain abdomen, vomiting, rash, flushed appearance and bleeding manifestation were studied. All cases were followed up for the clinical and laboratory parameters and treated according to WHO guidelines.

**Results**: 36 were classified as classical dengue fever, 33 as dengue haemorrhagic fever (DHF), 15 as dengue shock syndrome (DSS), and 16 as dengue-like illness (DLI) and the common age group was 30-40 year (50%). Most (66%) of the patients were male. The common presenting symptoms was fever 65%, vomiting (40%), abdominal pain (40%), myalgia (7%), etc. Hepatomegaly (53%), ascites (1%), splenomegaly (8%) was noted. The mean platelet in the present study was 41870 cells/cu mm. Elevated liver enzymes and elevated serum creatinine was found in complicated forms of disease. The prothrombin time ranged from 11-60 sec with a mean of 19.5 sec.

**Conclusions**: The treatment of dengue is mainly supportive, but early institution and meticulous monitoring are the important steps for positive outcome. Much more awareness, vigilance and research in the diagnostic modalities are further needed to avoid unnecessary panic and platelet transfusions.

Keywords: Thrombocytopenia, Dengue fever, Liver enzymes, Haematocrit

## INTRODUCTION

According to the reports of world health organization (WHO), there are about 390 million cases of dengue fever being reported worldwide, and of the total number of cases, 96 million require medical treatment. India also has witnessed a doubling up of cases of dengue from 2014 to 2015; among that the worst hit city was Delhi with more than 1800 cases of the fever. Clinical expression of dengue virus infection varies widely from no symptoms to severe dengue. Nearly 100 million cases of DF and between 250,000 and 500,000 cases of DHF are annually reported to the WHO. In India it has been on increasing trend, as in 28292 cases in 2010 and in 2015 it

is 99913, it may be higher because of not proper notification and documentation system in India.<sup>1</sup>

Dengue is a fast emerging and rapidly spreading systemic viral infection with global estimates of 390 million infections per year, of which 96 million are apparent infections and 3.97 billion people in 128 countries are at risk of dengue infection.<sup>2,3</sup>

DF is characterized by fever, headache, muscle and joint pains, rash, nausea and vomiting. Some infection results in dengue hemorrhagic fever (DHF).DF and DHF are caused by the four dengue viruses DEN 1, 2, 3 and 4, which are closely related antigenically.<sup>4</sup> Estimates suggest that

annually 100 million cases of dengue fever and half a million cases of DHF occur in the world with a case fatality in Asian countries of 0.5-3.5%. 90% of DHF subjects are less than 15 years of age. Early recognition and prompt initiation of treatment are vital if disease related morbidity and mortality are to be controlled.<sup>5</sup>

With the direct and indirect evidence of biochemical alterations that are related to severity of dengue. Studies had reported that patients with DHF have elevated serum levels of transaminases (aspartate aminotransferase [SGOT] and alanine aminotransferase [SGPT]), lactate dehydrogenase (LDH), and creatine kinase (CK). <sup>6-8</sup> With the direct and indirect evidence of biochemical alterations that are related to severity of dengue.

#### **METHODS**

#### Source of data

Suspected cases of dengue fever in outpatients and admitted as Inpatient in department of general medicine, Narayana medical college, Nellore.

#### Method of collection of data

100 cases of suspected dengue fever who fulfilled the inclusion criteria were selected. Blood samples were collected from all suspected dengue infection for complete blood count, liver function tests, prothrombin time, APTT, dengue viral Ag, IgG and IgM investigations.

WHO classification and case definition were used to classify dengue fever, DHF, DSS and DLI.

#### Inclusion criteria

All patients between 20-70 years of age with clinical features, suggestive of dengue infection admitted as

inpatients and outpatients in department of generalmedicine.

#### Exclusion criteria

Febrile illness of >2 weeks duration. Patients with any identified infections like malaria, typhoid, UTI, etc.

### Investigations

Complete blood count, serology for dengue, urine routine, serum electrolytes, QBC for MP, WIDAL, liver enzymes, serum albumin, chest X-ray, ultrasound abdomen, PT, blood urea, and serum creatinine.

#### Statistical analysis

One-way analyses of variance (ANOVA) were used to test the difference between groups.

#### **RESULTS**

Out of total 100 cases studied, 36 patients met WHO specified criteria for DF, 33 patients with DHF, 15 patients with DSS and 16 patients with DLI.

**Age and gender:** The highest number of cases were found in age group of 30-40 (50%), followed by age group 20-30 years (20%), age group 41-70 years (30%) (p=0.198). 66 were male and 34 were female with the ratio of M:F=1.94:1 was recorded.

**Temperature:** 65% of patients had fever and remaining 35% were non-febrile.

**Symptomatology**: 65 patients presented with fever as predominant complaint followed by vomiting 40%, abdominal pain 40%, headache 12%, cough 10%, diarrhoea 7%, myalgia 7%, joint pain 4%, oedema 3, cold 3%, convulsion 2 %, retro orbital pain 1%, menorrhagia 1%.

Table 1: Distribution of signs according to clinical spectrum.

Signs	DF (N=36) N	DHF (N=33) N	DLI (N=16) N	DSS (N=15) N	P value
Conjunctival congestion	3	8	1	6	0.023
Facial Puffiness	2	14	1	11	< 0.001
Pedal oedema	1	11	1	8	< 0.001
Temp (Febrile)	6	0	4	2	0.050
Hepatomegaly	13	25	5	10	0.002
Splenomegaly	3	3	1	1	0.984
Ascites	1	7	1	4	0.038

**Signs:** The most common signs were hepatomegaly 53%, followed by facial puffiness 28%, pedal oedema 21%, conjunctival congestion 18%, ascites 13%, splenomegaly 8%.

**Relationship between various sites of bleeding:** Bleeding was noted in 10% of cases. The skin bleeds were the most common manifestation noted and gum bleeds in 2 cases. The bleeding manifestations were more in DHF, DSS group.

**Skin rashes:** Most common type of skin rash observed in the present study was flushing 50%, followed by petechiae, macular rash and ecchymosis in 11% of cases.

#### Dengue serology

Dengue Ag was positive in 43 cases, IgM was positive in 58 cases and IgG was positive in 22 cases.

**Chest X-ray:** 38% was pleural effusion in the DHF and DSS group the number of cases were more compare to DF and DLI group.

**Ultrasonography:** About 25 patients had gall bladder wall thickening, 18 patients had pleural effusion, and 1 patient had ascites.

**Platelet count:** A mean value of Platelet count was 41870 cells/cu mm. The WHO criteria of low platelet count of <1,00,000 cells/cu mm was observed in the cases (70%). Maximum number of cases having platelet count in the range of <20000 cells/cu mm in DHF and DLI groups.

**Hemoglobin levels (Hb g%):** The hemoglobin level ranges from 6.5 to 18.9 gm%, with a mean level of 12.721 gm%.

**Hematocrit (PCV %):** The hematocrit ranged from 18.7 to 54.2% with a mean value of 37.8.

**Total leucocyte count:** The range of total leukocyte count varied from 1400 to 22000 cells/cumm with a mean count of 6014.5 cells/cu mm. 36 patients had leucopenia.

**Prothrombin time:** The prothrombin time ranged from 11-60 sec with a mean of 19.5 sec.

**APTT:** The activated partial thromboplastin time ranged from 29-65 sec with a mean of 45.5 sec.

**Blood urea:** The blood urea was 14-145 mg/dl with a mean of 42.5 mg/dl.

**Serum creatinine (in mg/dl):** The serum creatinine was 0.4-1.8 mg/dl with a mean of 0.654 mg/dl.

**Liver function test:** The SGOT was 10 to 1070 IU with a mean of 145.5 IU. The range of SGOT was 20 to 900 IU with a mean of 95.2 IU.

**Serum albumin** (**g/dl**): The range for serum albumin was 1.0 to 4.5 gm% with a mean of 3.5 gm%.

**Serum electrolytes:** The range for serum sodium was 122-148 meq/l with a mean of 134.85 meq/l. The range for serum potassium was 2.8-6.3 meq/l with a mean of 4.35 meq/l. The range for serum chloride was 90-107 meq/l with a mean of 98.55 meq/l.

#### DISCUSSION

In our study, 36% cases of DF, 33% cases of DHF, 15% cases of DSS group and 16% cases of DLI.

The 30-40-year age group dominated, accounting for 50% in the total. Among the subgroup, there is a tendency for DSS to occur at younger age.

According to a study conducted in those in between the age of 20 to 40 are more prone for dengue hemorrhagic fever.<sup>9</sup>

In the months of March and April pre-monsoon increase in the number of cases was also noted due to the stagnation of water, especially after a few bouts of pre-monsoon rainfall.

However previous studies have not noted any difference in age between dengue with or without shock.

The incidence of males was affected more in our study than female.

In the present study fever (65%) was the predominant symptoms, followed by vomiting (40%), abdominal pain (40%), myalgia 7%, diarrheal 7%.

Similar studies in India and other neighbouring regions have also substantiated fever as being the most common presenting symptom. 10-13

The evaluation of immediate environments of the patient's habitat revealed following observations. Storage of water in containers, the scope for mosquito breeding was present. These patients got infected in immediate monsoon or post monsoon months. Efforts were made to educate the patient about disease and the possible modes of risk factors that responsible, keeping surrounding clean using mosquito curtain etc, as a long-term measure.

In the present study bleeding manifestations were found in 10% of cases.

Apart from petechiae, which usually associated with bleeding manifestations, Hematemesis and epistaxis were the predominant modes of bleeding. Hepatomegaly was been in 53 in our study.

Thrombocytopenia and dysfunctional platelets remain a central hallmark of dengue fever, surprisingly little is known about the interaction of dengue virus with platelets.<sup>14</sup>

Platelets counts carry one of the most important keys for diagnosis. 85% had thrombocytopenia in the present study. The platelet counts at the admission was neither an indicator of prognosis nor of bleeding tendencies or progression of the disease. This suggests that other

factors like platelet dysfunction or disseminated intravascular coagulation may have role in bleeding in dengue. However, studies which include only DHF cases shows correlation between low platelet count and bleeding manifestations.

The present study findings concurred with the previous studies and we found that thrombocytopenia was the most commonly associated finding. 15-17

The present study demonstrates a significant difference in the LFT's between the clinical subgroup of dengue. The high incidence of vomiting, hepatomegaly and elevated liver enzymes can score as markers of suspicion of dengue during an epidemic.

Plasma leakage, which indicates that dengue causes hypoalbuminemia, is an indicator of severity. In our study, albuminuria lesser than 3.5 g/dL was associated with higher incidence of DHF. High values of albuminuria may reflect the integrity of the vascular endothelium, whereas albumin levels less than 3.4 g/dL may be an early indicator of vascular permeability alteration. Therefore, this parameter may be an early indicator of plasma leakage and a useful prognostic marker.

Affliction of liver in form of deranged liver function tests is common and may include mild elevations in serum bilirubin, elevated transaminases and hypoalbuminemia. Although asymptomatic in most of the cases, clinical manifestations like jaundice and acute liver failure (ALF) can complicate the clinical picture. Indeed, dengue has been reported as an important cause of ALF in endemic countries.

The most striking USG- Abdomen finding in our study population was GB wall thickening/edema that was seen in 25 patients. Splenomegaly, hepatomegaly and ascites were also seen.

#### **CONCLUSION**

Those between the ages of 30-40 are affected more. The febrile period usually lasted less than a week. Abdominal pain, vomiting, lethargy, hemorrhagic manifestations are common in dengue fever. The complications like myocarditis, encephalopathy is uncommon in dengue but not rare. Abdominal pain, vomiting, lethargy, hemorrhagic manifestations are common in dengue fever. The complications like myocarditis, encephalopathy is uncommon in dengue but not rare. The patients who had complications should have at least a week of hospitalization that is associated with good prognostic outcome.

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Institutional Ethics Committee

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