# Study of clinical and hematological profile in children with dengue fever in a teaching hospital in Telangana

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## Abstract

**Introduction:** The aim of the study was to determine the clinical and hematological profile in patients with Dengue fever. **Materials and Methods:** This was a prospective study done at Malla Reddy Medical College for Women, Telangana, for a period of six months. A total of 110 cases of dengue infection were studied. The patient demographics, clinical symptoms, hematological characteristics such as hemoglobin, total leucocyte count, platelet count, serological studies and abdominal ultrasound findings were noted. **Results:** In the present study, 85/110 (77.2%) cases were of dengue fever, 20/110 (18.1%) were dengue hemorrhagic fever (DHF) and 05/110 (4.5%) were of dengue shock syndrome (DSS). Patient age ranged from 0- 12 years. Majority, 55/110 (50%) were among 6-8 years. Males were affected more than females (59% boys and 41% were girls). Moderate thrombocytopenia was seen in 54.5% of cases and raised hematocrit (>47%) was observed in 22.7% cases. Most of the cases 75 (68.1%) were noted in September and October. **Conclusion:** Dengue is a common viral infection which may have serious consequences especially in children. Simple haematological parameters along with serological tests and ultrasound of abdomen are helpful in the diagnosis and appropriate management of these patients.

**Keywords:** Dengue fever in children,Platelet count, Thrombocytopenia, NS1Ag

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## Introduction

Dengue infection is an emerging disease of international concern and is a major health problem in India. Globally the incidence of dengue has increased in the recent years. The WHO estimates that presently about two fifths of the world population is at risk for this viral infection [1]. Dengue fever was first reported by Benjamin Rush in 1780 as "break bone fever." It is a mosquito borne viral infection with four serotypes. It commonly presents as dengue without warning signs, dengue with warning signs and severe dengue [2].

Dengue infection is frequently confounded with other febrile illnesses (OFI), presenting with non-specific clinical symptoms and clinical features analogous to OFI. During the early stages of dengue, the presence of non-specific febrile illness makes precise diagnosis very difficult, resulting in inefficient treatment thereby increasing the morbidity and mortality of this disease [3,4]. Severe dengue fever, if not appropriately

managed, may lead to rapid death, particularly in children [5,6]. Dengue is an acute febrile disease caused by a flavivirus with four known serotypes (DENV-1, DENV-2, DENV-3, and DENV-4). The four serotypes can lead to variable clinical presentations, ranging from asymptomatic to severe forms [7].

Children represent more peculiar characteristics since dengue diagnosis, and recognition of severe forms are both more difficult to find than in adults. The common signs and symptoms are fever, headache, myalgia, arthralgia, and bleeding manifestations. The exact clinical profile is necessary for the patient's management and hence, crucial for saving life [8].

**Aim of the study:** To study clinical and hematological profile in children with dengue fever.

## Materials and Methods

No ethical issues were involved in the study. This was a prospective observational study done in the department of Paediatrics at Malla Reddy Medical College for

Women,Telangana over a period of 6 months from July 2018 to January 2019. Blood samples were collected in EDTA anticoagulant for hematological investigations, and in plain tubes/vacutainers for microbiological and biochemical investigations. No surgical interventions were done in any of the patients. Statistical analysis was done by taking the percentage of the cases. All the suspected cases of dengue etiology who presented with fever and with or without rashwere admitted in the department of pediatrics.

### Inclusion criteria

1. Age group of 0 to12 years
2. Both genders
3. Patients with NS1 Ag positive
4. Serologically confirmed IgM positive dengue fever

### Exclusion criteria

1. Age group >12 years
2. Preexisting chronic diseases

Complete clinical history was taken from parents of children admitted in pediatric ward.  Local and systemic examination in all cases was done thoroughly.

All the routine investigations were asked such as complete blood count (CBC), peripheral blood smear examination, random blood sugar, complete urine analysis, microbiological investigations included NS1 dengue serology.

Dengue serology was done by ELISA method in all the cases. Ultrasonography of abdomen was done in all the cases.

For routine investigations venous blood was collected from cubital vein from all patients admitted with symptoms suggestive of dengue fever.

Hematological parameters were evaluated including hemoglobin percentage, hematocrit, platelet count, total leucocyte count, differential leucocyte count.

## Results

A total of 110 children were included in the present study during period of 6 months. In the present study, 77.2% (85/110) cases were of dengue fever, 18.1% (20/110) were dengue hemorrhagic fever and 4.5% (5/110) were of dengue shock syndrome.

**Table-1: Age-wise distribution of cases.**

| Age | No. of cases | Percent (%) |
|---|---|---|
| 0-2 years | 05 | 4.5% |
| 3-5 years | 15 | 13.6% |
| 6-8 years | 55 | 50% |
| 9-11 years | 27 | 24.5% |
| 11-12 years | 08 | 7.2% |
| Total | 110 | 100% |

In the present study, age group distribution included from 0 to12 years. Majority of the cases were among 6-8 years age.

**Gender-wise distribution of cases:** in the present study, there were 65 (59%) boys and 45 (41%) girls and the male to female ratio was 1.4:1.

**Table-2: Clinical symptoms of the cases.**

| Clinical Symptoms | No. of cases | Percent (%) |
|---|---|---|
| Fever | 110 | 100% |
| Myalgia | 70 | 63.6% |
| Fever and myalgia | 90 | 81.8% |
| Fever with rash | 20 | 18.1% |
| Petechiae | 20 | 18.1% |
| Abdominal pain | 45 | 40.9% |
| Nausea and vomiting | 70 | 63.6% |
| Ascites | 10 | 9.09% |
| Shock | 02 | 1.8% |

In the present study, fever was present in all 100% of the cases.

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### Hematological Parameters

**Table-3: Hemoglobin range.**

| Hb | No. of cases | Percent (%) |
|---|---|---|
| < 5gm% | 04 | 3.6% |
| 5-10 gm% | 40 | 36.3% |
| 10-15 gm% | 56 | 50.9% |
| >15 gm% | 10 | 9.0% |
| **Total** | **110** | **100%** |

Present study showed hemoglobin range from less than 5 gm% to more than 15 gm%. Almost half (50.9%) cases showed hemoglobin value between 10-1 5 gm%.

**Table-4: Hematocrit value.**

| Hematocrit | No. of cases | Percent (%) |
|---|---|---|
| 26-36% | 05 | 4.5% |
| 37-47% | 80 | 72.7% |
| >47% | 25 | 22.7% |
| **Total** | **110** | **100%** |

Raised hematocrit (>47%) was observed in 22.7% cases (25/110).

**Table-5: Total leukocyte count and platelet count.**

| TLC/ cumm | No. of cases | Percent (%) | Platelet count/cumm | No. of cases | Percent (%) |
|---|---|---|---|---|---|
| < 4000 | 20 | 18.1% | <20000 | 15 | 13.6% |
| | | | 20000-50000 | 60 | 54.5% |
| 4000-11000 | 85 | 77.2% | 50000- 1.4 lakhs | 25 | 22.7% |
| >11000 | 05 | 4.5% | >1.4 lakhs | 10 | 9.0% |
| **Total** | **110** | **100%** | **Total** | **110** | **100%** |

Total WBC count was within normal limits (4000-11000/cumm) in 77.2% cases. Moderate thrombocytopenia (50000-1.4 lakh/cumm), was seen in 22.7% (25/110) and severe thrombocytopenia was seen in 13.6% (15/110) cases.

Liver enzymes were elevated in 60 (54.5%) cases and were normal in 50 (45.4%) cases.

**USG findings:** Ultrasound of the abdomen showed hepatomegaly in 60 (54.5%) of the cases, ascites in 18.1% and pleural effusion in 18.1% cases.

**NS1 Ag:** NS 1 antigen test was positive in 90% of cases, serum dengue IgM in 60% and dengue IgG was positive in 40% of cases.

**Seasonal Variation:** Most of the cases 75 (68.1%) were noted in September and October months and 35 (31.8%) cases were recorded in November and December.

## Discussion

In the present study, 85/110 (77.2%) cases were of dengue fever,20/110 (18.1%) were dengue hemorrhagic fever (DHF) and 05/110 (4.5%) were of dengue shock syndrome (DSS). In the study by Mishra et al[9] the total number of cases was 97, out of which 84 were cases of non-severe dengue (undifferentiated fever, dengue fever withwarning signs, and dengue fever without warning signs) and 13 were cases of severe

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dengue (DHF and DSS). Srinivasa et al[10] studied 200 confirmed dengue cases. Jain et al [11] studieda total of 65 children in which as per WHO classification, 42 (64%) cases belonged to dengue with warning signs, 8 cases had severe dengue and 15 cases had dengue without warning signs.

Kumaret al [12] studied a total of 306 children admitted with a diagnosis of dengue fever during their study period. Alam et al[13]in their study observed that over 40% of the patients presented with dengue fever,27.8% had DHF grade-l, 16.7% DHF grade-2, 3.7% grade-3 and 11.1% grade-4.

In the present study, age group for dengue fever studied was from 0- 12 years. Majority of the patients, almost 50% were among 6-8 years, next common age group was among 9-11 years having 24.5% cases, 3.6% (15/110) in the age group of 3–5 years, and 4.5% (5/110) were infants.

Mishra et al[9]in their study observed that the mean age of hospitalized patients was 8.7 years. 63.9% of patients were admitted in the hospital for 3–6 days. Seven children out of 13 severe dengue patients were admitted for more than 6 days.The mean tenure of hospitalization was 3.8 days.

In the study by Alam et al [13]the age ranged from 6 months to 15 years with a mean of 6.5± 3.5 years and about half (51.9%) of them were between 5-10 years age.

In the study by Srinivasa et al [10]the most common affected age group was that of school going children (42%) and adolescents (36%).

In the study by Kumar et al[12] majority 175 (57%) were in the age group of 6–12 years, 84 (27%) in the age group of 1–5 years, and 47 (16%) were infants. The mean age of the study population was estimated to be 7.8±3.2 years. In the study by Jain et al[11] the most common age group was between 5 to 10 years (46%) followed by 1-5 year age group. Infants were only 7.6% and the youngest one was 7 months old. Our findings compare well with the above observations.

In the present study, majority of the patients were boys 59% (65/110) compared to girls 40.9% (45/110). In the study by Mishra et al[9] there were 75 (77.31%) males and 22 (22.68%) females. For both the groups of severe and non-severe dengue, males had higher incidence. The male-tofemale ratio was 3.4:1. The male to female ratio was 1.1:1, and 1:1 in the studies by Srinivasa et al

[10] and Alam et al respectively.[13]. In the study by Jain et al [11]35 (53%) were boys and 30 (47%) were girls. Male to female ratio was 1.16:1. Similarly, in the study by Kumaret al [12] males were more in number (158) than females (148) with a male: female ratio of 1.06:1.

**Seasonal distribution:** In our study, most of the cases 75 (68.1%) were recorded in the month of September and October and slightly less number, 35(31.8%) were seen in November and December. Mishra et al [9] observed that most of their cases were admitted in the rainy and winter seasons between the months of July and November. The peak of admission was seen in the month of September with 59 cases (60.8%). The least admissions were seeninthe summer season, specifically in the month of April, consisting of 4 cases (4.1%).

**Clinical features**: In the present study, fever was present in 100% of the cases; myalgia (63.6%), fever with myalgia in 81.8% and fever with rash in 18.1%.

Mishra et al [9] also observed fever in 100% of the cases, myalgia in 76.8% and abdominal pain in 54.3% cases. The most common bleeding manifestations in both severe and non-severedengue were petechiae seen in 22.1% cases.

Srinivasa et al[10] studied 200 cases andobservedthat all the cases all had fever (100%),144 (72%) had vomiting, 92(46%) had abdominal pain, 67(33.5%) had hepatomegaly, 21 (10.5%) had rashes, 4(2%) had splenomegaly, 26(13%) had bradycardia and 47(23.5%) developed hypotension and shock. The mostcommon bleeding manifestation was petechiae (6.2%) followed by hemetemesis in 4.1% and epistaxis in 3.6% cases.

Jain et al [11] observed fever in all dengue patients with mean duration of 5.6 days. The common presentation by these children included headache (64%), myalgia (63%), bleeding (58%) and decreased urine output (53%).

Among the clinical findings, hepatomegaly and splenomegaly were noted in 90% and 26% of the cases respectively. Clinical fluid accumulation in form of ascites and pleural effusion with reduced air entry were observed in 40% and 43% of cases.

Kumar et al [12 ]observed fever in all of their patients, with the duration of hospital stay <5 days in 205 (72%) and 5–10 days in 75 patients (25%). The most common symptoms were vomiting in 168 (54.90%), abdominal pain in 111 (36.3%), bleeding manifestation in

43(14.05%), headache in 41(13.40%), myalgia in 32 (10.5%), and lethargy (9.8%). The other symptoms observed in their study were arthralgia (9.5%), altered sensorium (7.8%), rash (7.2%), diarrhea (6.5%), oliguria (6.5%), cough/rhinitis (5.2%), anorexia (3.9%), and retro-orbital pain (1.3%).

Alam et al[13] observed fever >5 days duration in 63% children with continued type of fever beingpredominant (75.9%). About 60% of patients had abdominal pain, 57% vomiting, 46.3% myalgia, 31.5% had headache, 18.5% arthralgia, 14.8% retro-orbital pain, 9.3% loose stool and 3.7% had runny nose/cough.

**Haematology findings**: The present study observed hemoglobin range of less than 5 gm% to more than 15 gm%. Hemoglobin of 5- 10gm% was seen in 36.3% cases and 10-15gm% range was seen in 50.9% cases. Raised hematocrit (>47%) was observed in 22.7% cases (25/110).

The total WBC count was within normal limits (4000-11000/cumm) in 77.2% cases and leucopenia of less than 4000 cells/cumm was seen in 18.1% (20/110) cases. Only 4.5% cases had leukocytosis with more than 11000/cumm count. Mild, moderate and severe thrombocytopenia were seen in 22.7%, 54.5% and 13.6% cases respectively.

Mishra et al[9] in their study reported that 58.76% of the cases had normal leukocyte count, while leucopoenia was seen in 25.77% and leukocytosis in 15.46% of the cases. Among the liver enzymes, SGOT was elevated in a larger proportion (47.42%) of patients when compared to alanine aminotransferase (SGPT) which was 30.92%.

According to the study by Srinivasa et al [10]out of 200 cases, 194(97%) had thrombocytopenia, 189(94.5%) had hemoconcentration, 126(63%) had leucopenia< 4000/cumm and 83(41.5%) had raised liver enzymes Jain et al [11] observed evidence of raised hematocrit (>35%) in 84% of cases.

Thrombocytopenia (<1 lakh) was observed in 80% of cases with 10% of patients having platelet count <20,000/ mm, most of the cases had platelet count between 50,000 and 1-lakh. Leucopenia (<5000) was observed in 44% of cases. Abnormal liver enzymes were observed in 38% of patients. Kumaret al[12] observed 14.1% of their patients had a platelet count <20,000 and low platelet count had significantly correlated with the severity of dengue. The mean platelet recovery time was 2–5 days.

The liver enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were elevated significantly. Prolonged activated partial thromboplastin time (aPTT) was seen in 102 (33.3%) children while 64 (20.9%) had elevated prothrombin time.

In the study by Alam et al [13] about one-third (32%) of the patients had positive tourniquet test. Five (9.3%) had low WBC count. Onethird (33%) of patients had platelet count, 51000 to 1 lakh, 25.9% had between 21000 to 50000 and 9.3% had <20000 platelet count and 31.5% patients had platelet count > 1 lakh.

All children exhibiting a packed cell volume (PCV) of less than 45% and over 40% had raised serum alanine aminotransferase (ALT).

**Comparative studies based on USG:** In the present study, Ultrasound of the abdomen showed hepatomegaly in 60 (54.5%) of the cases, followed by ascites in 18.1% cases and pleural effusion in 18.1% cases.

Mishra et al [9] in their study observed that the Ultrasound of the abdomen detected hepatomegaly in 52.75% of the cases, which was the most common finding followed by ascites (25.77%) and gall bladder wall edema in 2.06% cases.

Srinivasa et al [10] also reported the ultrasonographic findings of hepatomegaly in 84 (42%), splenomegaly in 33, gall bladder wall thickening in61, pleural effusion in 93 and ascites in 74 cases.

Jain et al [11]observed (n=31) the most common USG finding to be gall bladder edema (84%), pleural effusion (70%), and ascites (78%).

**NS 1 Ag and serology:** In the present study, NS 1 antigen test was positive in 90% of cases, IgM in 60% and dengue IgG was positive in 40% of cases.

Alam et al[13] observed IgM and IgG antibodies for dengue virus were positive in 40.7% and 24.1% of their patients respectively, both IgG and IgM were positive 31.5% cases and serological tests were negative in 3.7% cases.

In the study by Mishra et al [9] the majority of the patients were positive for NS1 followed by IgM as a large number of patients presented within 4 days of fever. Serum IgG was estimated in those children who presented with history of 7 days. Tourniquet test was found to be negative in majorityof the patients.

## Conclusion

Dengue is a common viral infection which may have serious consequences especially in children.

Simple haematological parameters along with serological tests and ultrasound of abdomen are helpful in the diagnosis and appropriate management of these patients.

**Funding:** Nil, **Conflict of interest:** None initiated, **Perission from IRB:** Yes

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