

## Original Research Article

# Clinico-epidemiological profile of dengue cases in a Medical College Hospital, Bengaluru, Karnataka, India

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## ABSTRACT

**Background:** Medical college hospital being a tertiary care center receives a significant number of dengue cases from within and outside the catchment area and provides a good opportunity to study the clinical and epidemiological features of dengue infection, its prognosis and outcome so as to institute prompt preventive and control measures. The objective was to describe the clinico-epidemiological features of dengue cases admitted to pediatric ward at a Medical College Hospital, Bengaluru, Karnataka, India.

**Methods:** Cross-sectional study of 140 cases positive for NS1Ag, IgM and/or IgG by dengue rapid immunochromatographic card test, admitted in pediatric ward during June to August 2013 at Rajarajeswari Medical College and Hospital.

**Results:** Majority of the patients were from rural area. Fever was present in all 140 cases. Vomiting followed by headache were the common presenting symptoms. Of the 140, 50% cases were classified as dengue fever without warning signs, 46.4% as dengue fever with warning signs and 3.6% as severe dengue. Thrombocytopenia was present in 77.1%, leucopenia in 47.9%, and raised haematocrit in 52.1% of cases. Mortality rate was 0.71%.

**Conclusions:** Children above 5 years of age were most commonly affected age group. About 5 (3.6%) of the patients belonged to severe dengue category according to revised WHO Dengue Case Classification.

**Keywords:** Dengue fever, Thrombocytopenia, WHO dengue case classification

## INTRODUCTION

Dengue is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas. Severe dengue is a leading cause of serious illness and death among children in some Asian and Latin American countries. The incidence of dengue has grown dramatically around the world in recent decades. The actual numbers of dengue cases are underreported and many cases are misclassified. One of the recent estimates indicates 390 million dengue infections per year, of

which 96 million manifest clinically. Early detection and access to proper medical care lowers fatality rates below 1%.<sup>1</sup> In the last 50 years, incidence has increased 30-fold with increasing geographic expansion to new countries and, in the present decade, from urban to rural settings. Dengue is an example of a disease that may constitute a public health emergency of international concern with implications for health security due to disruption and rapid epidemic spread beyond national borders.<sup>2</sup> Dengue is one disease entity with different unpredictable clinical evolution and outcomes.<sup>3</sup> Indian sub-continent has

encountered recurrent dengue outbreaks from time to time with significant mortality and morbidity.<sup>4</sup>

In the year 2012, of the 50,222 cases and 242 deaths reported due to dengue in India, 3924 cases and 21 deaths were from Karnataka which accounted to around 8% of the cases and 8.6% of the total deaths reported. As of 2015 statistics, 99,913 cases and 220 deaths due to dengue were reported in India. The highest 15867 number of cases were reported from Delhi. 5,077 of the cases and 9 deaths were reported from Karnataka.<sup>5</sup>

Adult segment is the most affected with dengue infection, but the same in children has increased in recent years, which suggests that the clinical and epidemiological profiles of dengue have changed and reflects a stronger relationship between its most serious forms and younger age groups.<sup>6</sup> Early diagnosis is the key to successful management of all forms of dengue fever. Medical college hospital being a tertiary care institution receives significant number of cases from within and outside the catchment area and provides a good opportunity to study the clinical and epidemiological features of dengue infection, prognosis and outcome so as to institute prompt preventive and control measures. The present study aims to describe the Clinico-Epidemiological profile of dengue cases admitted to pediatric ward at RajaRajeswari Medical College and Hospital, Bangalore, Karnataka, India.

**METHODS**

A cross-sectional descriptive study of all the cases admitted to pediatric ward at RajaRajeswari Medical College and Hospital, Bangalore, Karnataka, India during June-August 2013 with dengue rapid immunochromatographic card test (RICT) positive for NS1Ag, IgM and/or IgG was done. The total numbers of cases during the study period were 140. Based on the presenting symptoms, signs and investigations, cases were classified according to revised WHO dengue case classification by severity as dengue fever without warning signs, dengue fever with warning signs and severe dengue.<sup>2,7</sup> Clinico-epidemiological data was collected by reviewing the records and by interviewing the parents using a pre-designed and semi structured questionnaire. Laboratory parameter details during the period of hospital stay were noted from the records.

**Statistical analysis**

The data collected was entered in MS excel sheet and analysed using Statistical Package for Social Sciences version 20.0. Results are expressed as percentages and proportion. Chi-square test was applied to find association between variables. Kruskal-Wallis test was applied to compare means of variables between the groups. P<0.05 is considered to be statistically significant.

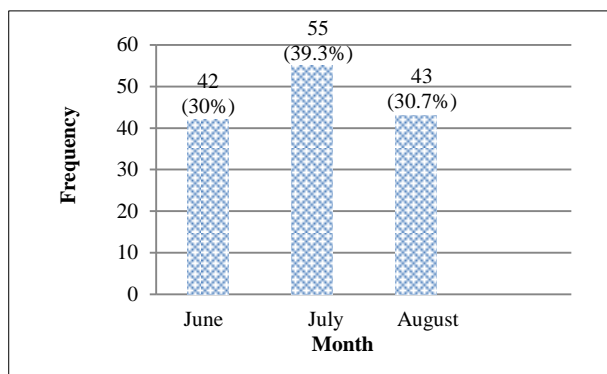
**RESULTS**

Of the 140 cases, majority of cases (72.2%) were in the age group of 6-15 years. Mean age of cases was 9.7 years±4.5 and 50.7% of study subjects were male children. Mean duration of hospitalization was 4.85±2.3 days. Majority of the cases, 92 (65.7%) were from rural area.

**Table 1: Distribution of dengue cases according to age and gender.**

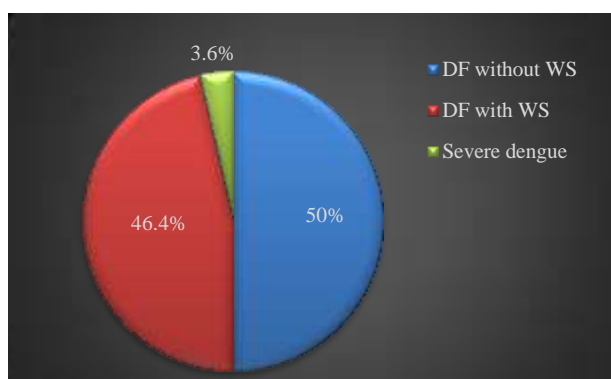
Age (years)	Gender		Total
	Male	Female	
<1	4 (2.9)	2 (1.4)	6 (4.3)
1-5	12 (8.6)	8 (5.7)	20 (14.3)
6-10	27 (19.3)	26 (18.6)	53 (37.9)
11-15	18 (12.9)	30 (21.4)	48 (34.3)
16-18	10 (7.1)	3 (2.1)	13 (9.3)
Total	71 (50.7)	69 (49.3)	140 (100)

Note: Numbers in parenthesis indicate percentage.



**Figure 1: Month-wise distribution of dengue fever cases.**

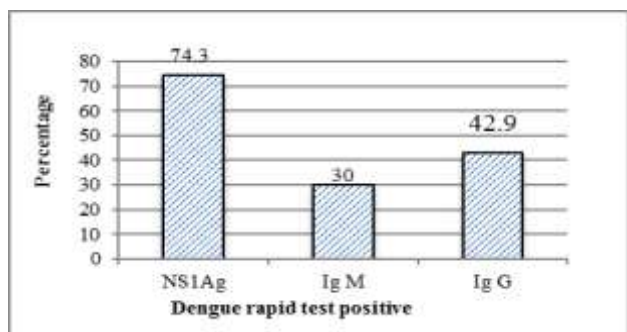
During the study period, most of the cases (39.3%) were seen in the month of July.



**Figure 2: Distribution of cases according to WHO dengue case classification.**

As per revised WHO dengue case classification, 70 (50%) of cases were classified as having dengue fever

(DF) without warning signs (WS), 65 (46.4%) had dengue fever with warning signs (WS) and 5 (3.6%) had severe dengue.



**Figure 3: Distribution of cases according to dengue rapid test positivity.**

Majority of the cases showed NS1Ag positivity.

All the cases had complaints of fever. Common presenting symptoms were Vomiting (53.6%) followed by headache (31.4%) and pain abdomen (27%). Hepatomegaly was present in 23 (17.1%) of cases while retro-orbital pain (4.3%), rash (7.9%) and bleeding (2.1%) was present only in few cases. Investigations revealed thrombocytopenia in 108 (77.1%), leucopenia in 67 (47.9%), and raised haematocrit in 73 (52.1%) of cases. Platelets <20,000 was present in 20.7% of cases. Majority (62.9%) of cases of DF without WS, 90.8% cases of DF with WS and all severe dengue cases had thrombocytopenia. A statistically significant association was observed between thrombocytopenia and dengue case classification ( $p < 0.001$ ).

**Table 2: Frequency of clinical features and investigation details according to dengue case classification.**

Findings	DF without WS (n=70)	DF with WS (n=65)	Severe dengue (n=5)	Total
Fever	70 (100)	65 (100)	5 (100)	140 (100)
Vomiting	28 (40)	43 (66.2)	4 (80)	75 (53.6)
Headache	18 (25.7)	24 (36.9)	2 (40)	44 (31.4)
Pain abdomen	0	35 (53.8)	3 (60)	38 (27.1)
Myalgia	13 (18.6)	14 (21.5)	1 (20)	28 (20)
Cough	10 (14.3)	6 (9.2)	2 (40)	18 (12.9)
Rash	8 (11.4)	3 (4.6)	0	11 (7.9)
Retro-orbital pain	3 (4.3)	3 (4.6)	0	6 (4.3)
Arthralgia	2 (2.9)	1 (1.5)	0	3 (2.1)
Bleeding	0	3 (4.6)	0	3 (2.1)
Splenomegaly	4 (5.7)	9 (13.8)	1 (20)	14 (10)
Hepatomegaly	0	23 (35.4)	1 (20)	23 (17.1)
Pleural effusion	0	25 (38.5)	5 (100)	30 (21.4)
Ascites	0	34 (52.3)	5 (100)	39 (27.9)
Thrombocytopenia	44 (62.9)	59 (90.8)	5 (100)	108 (77.1)
Leucopenia	39 (55.7)	26 (40)	2 (40)	67 (47.9)
Raised haematocrit	31 (44.3)	38 (58.5)	4 (80)	73 (52.1)

Note: Numbers in parenthesis indicate percentage.

**Table 3: Age wise distribution of cases according to WHO dengue case classification.**

Age (years)	Case classification			Total, N (%)
	DF without WS, N (%)	DF with WS, N (%)	Severe dengue, N (%)	
<1	2 (2.9)	3 (4.6)	1 (20)	6 (4.3)
1-5	15 (21.4)	5 (7.7)	0	20 (14.3)
6-10	20 (28.6)	30 (46.2)	3 (60)	53 (37.9)
11-15	25 (35.7)	22 (33.8)	1 (20)	48 (34.3)
16-18	8 (11.4)	5 (7.7)	0	13 (9.3)
Total	70 (100)	65 (100)	5 (100)	140 (100)

$\chi^2 = 9.631$ ,  $df = 4$ ,  $p < 0.05$ . Note: DF with WS and severe dengue were clubbed for analysis.

Most (46.2%) cases of DF with warning signs and majority (60%) of severe dengue cases were in the age group of 6-10 years. A statistically significant association

was observed between age groups and dengue cases classified by severity ( $p < 0.05$ ). Platelet values of  $< 50000/\text{mm}^3$  was present in 28.6% cases of DF without

warning signs, 66.2% cases of DF with warning signs and all cases of severe dengue. A statistically significant

association was observed between platelet values and dengue cases classified by severity ( $p < 0.001$ ) (Table 4).

**Table 4: Distribution of platelet values according to WHO dengue case classification.**

Platelet values	DF without WS, n (%)	DF with WS, n (%)	Severe dengue, n (%)	Total, N (%)
<20,000/mm <sup>3</sup>	6 (8.6)	20 (30.8)	3 (60)	29 (20.7)
20,000-50,000/mm <sup>3</sup>	14 (20)	23 (35.4)	2 (40)	39 (27.9)
50,000-1 lakh/mm <sup>3</sup>	24 (34.3)	16 (24.6)	0	40 (28.6)
1-1.5 lakh/mm <sup>3</sup>	14 (20)	2 (3.1)	0	16 (11.4)
>1.5lakh/ mm <sup>3</sup>	12 (17.1)	4 (6.2)	0	16 (11.4)
Total	70 (100)	65 (100)	5 (100)	140 (100)

$\chi^2 = 27.668$ ,  $df = 4$ ,  $p < 0.001$ . Note: DF with WS and severe dengue were clubbed for analysis.

**Table 5: Median values of variables according to WHO dengue case classification.**

Variable	DF without WS Median (IQR)	DF with WS Median (IQR)	Severe dengue Median (IQR)	P-value
Age (years)	10 (5.7-14)	10 (8-12)	8 (3.8-11.5)	0.56
Duration of hospitalization(days)	4 (2-5)	5 (4-7)	6 (5-8.5)	0.002
Leucocyte values ( $\times 10^3$ /cumm)	3.6 (2.9-5.9)	4.7 (3-6.8)	4.3 (3.4-15)	0.14
Platelets ( $\times 10^3$ /cumm)	0.79 (0.45-1.18)	0.35 (0.17-0.69)	0.09 (0.03-0.39)	0.001
Haematocrit (%)	39.9 (37.9-42.4)	41.2 (38.4-44.5)	50.7 (37.2-57.2)	0.07

No significant difference was observed in the mean age with respect to dengue cases according to severity. The duration of hospitalization was highest among cases of severe dengue followed by cases of DF with warning signs also mean platelet values were low among severe dengue cases compared to the other groups. These differences were found to be statistically significant. There was death of an 8-year-old male child with severe dengue accounting to mortality rate of 0.71%.

## DISCUSSION

Dengue infection is a systemic and dynamic disease. It has a wide clinical spectrum that includes both severe and non-severe clinical manifestations.<sup>2</sup> Early diagnostic confirmation of dengue virus infections in patients is needed, as it allows for timely clinical intervention, etiologic investigations, and disease control. Hence, diagnosis of dengue disease during the acute phase should be a priority for patients and for public health reasons.<sup>8,9</sup> RICTs can be performed within a short time of 20 min compared to ELISA, cost effective, easy to perform and interpret in any resource limited setting. The RICT detects NS1 antigen and IgM and IgG antibodies against dengue. Detection of any one component is considered to be positive test.<sup>8</sup>

Majority of the cases were from rural area. This could be due to location of the hospital. Majority were male children. Majority of the cases were of age above 5 years. Similar findings were observed in other studies.<sup>4,10-12</sup>

Mean age of hospitalized children was 9.7 years. Similar results were seen in other study.<sup>13</sup> Fever followed by vomiting, headache, pain abdomen were the most common presenting symptoms.<sup>10,13</sup> Among the 140 cases, retro-orbital pain (4.3%), rash (7.9%) and bleeding (2.1%) were less commonly present. In the study by Pratyusha et al, 36.25% had bleeding manifestations and 28.7% had rash, while in other study<sup>10</sup>, 16% had bleeding and in study by Kulkarni et al<sup>4</sup>, 44.5% had bleeding manifestations.<sup>4,10,13</sup> Warning signs usually precede the manifestations of shock and appear towards the end of the febrile phase.<sup>7</sup> Pain abdomen followed by hepatomegaly, ascites and pleural effusion were the most common warning signs noted in this study. This is in accordance with other studies.<sup>10,14</sup>

Among the 140 cases with dengue infection, 70 (50%) were observed to have DF without warning signs, 45 (46.4%) had DF with warning signs and 5 (3.6%) had severe dengue according to the WHO dengue case classification by severity. All the cases of severe dengue and 66.2% cases of DF with WS had platelet values <50,000/cumm. A significant association was observed between platelet values and dengue cases classified by severity. Severity of dengue infection was higher among cases with very low platelet values of <20,000/cumm. This is in accordance with findings in study done by Jagadish et al.<sup>11</sup> Of the severe dengue cases (60%) and 46.2% of cases of DF with WS were in the age group of 6-10 years. Thrombocytopenia was documented in 77.1% of cases, 52.1% had haemoconcentration and 47.9% cases had leucopenia in present study. Similar results were

observed in other studies where in majority of subjects had thrombocytopenia and haemoconcentration.<sup>4,10,13</sup> While in a study done in Odisha, India, findings of thrombocytopenia, raised haematocrit and leucopenia was observed in 27.83%, 34.2% and 25.7% respectively.<sup>14</sup> The rising haematocrit and rapid onset of thrombocytopenia or the warning signs, indicate the onset of plasma leakage.<sup>7</sup> Mortality rate is less in this study compared to other studies. This could be due to early diagnosis facilitated by RICT's and prompt treatment of cases.

## CONCLUSION

Cases of fever with vomiting, headache and/or pain abdomen should arouse high suspicion of dengue fever. Higher proportion of dengue cases was among children aged above 5 years. In this study it was observed that majority of patients were from rural areas. About 5 (3.6%) of the patients belonged to severe dengue category according to Revised WHO Dengue Case Classification. Public awareness regarding symptoms of dengue can help in seeking health care at an early stage and further prevention of progression of disease to late stages, thereby further reducing mortality.

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