

A Study On Clinical Profile Of Dengue Fever During An Outbreak In Bihar

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Abstract:

Introduction: Dengue is a mosquito born illness endemic in tropical and temperate climatic zones which receive heavy rainfall. It has become a menace in South East Asia Region. Several epidemics have been observed in recent years in India.

Aim: To study the clinical and hematological profile of dengue fever alongwith the outcome of patients.

Materials and Methods: This was a prospective observational study done at Department of Pediatrics, Nalanda Medical College and Hospital, Patna, Bihar for a duration of 6 months. A total of 118 cases of dengue fever were studied. The patients' demographics, clinical features, blood parameters (TLC, Hb, Platelets, PT/INR, LFT, KFT, Dengue serology) and radiological findings were noted.

Results: This study was done on 118 cases diagnosed as dengue fever. The mean age of patients was 9.5 ± 1.5 years with male to female ratio 1.5:1. Patient age group ranged from 6 months to 14 years with majority in the age group of 6-14 years. Out of 118 cases, 65(55%) were of dengue without warning sign, 45(38%) of dengue with warning signs and 8(7%) were of severe dengue. Fever was present in almost all cases (98%), itchy rash in 75(63.5%), bleeding manifestations in 30(25%) and tourniquet test positive in 34(29%) cases. Leukopenia was seen in 26(22%) while leukocytosis was seen in 12(10%) patients. Thrombocytopenia was present in majority (68%) of patients and deranged LFT was seen in 45% of patients. Three patients died during treatment who were diagnosed as severe dengue with shock and DIC. Case fatality rate was 2.5%.

Conclusion: Dengue is a common viral illness which can complicate to life threatening conditions. Fever with rash, abdominal pain, vomiting and bleeding manifestations point towards dengue. A high index of suspicion needed in endemic areas. Early diagnosis and treatment help reduce the severity and complications of the illness.

Keywords: dengue virus, fever, thrombocytopenia, NS1, shock, DHF

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I. Introduction

Dengue is a rapidly spreading mosquito-borne disease, prevalent in tropical and subtropical regions. It affects half the global population and is a major public health concern. Annual new infections reach 50-100 million in over a hundred endemic countries, with a significant rise in the number of affected nations[1]. A significant proportion of those affected are children under five years old, and the mortality rate is around 2.5%. During epidemics, infection rates can reach 40-90%, and *Aedes aegypti* is the primary vector [2]. Dengue presents as an acute febrile illness with symptoms such as fever, myalgia, headache, rashes, thrombocytopenia, and leucopenia [3]. Dengue hemorrhagic fever (DHF) is characterized by high fever and haemorrhagic manifestations like petechiae and easy bruising, leading to hypotensive shock due to plasma leakage. DHF most commonly occurs in children with secondary dengue infections and is more severe in resource-limited settings. Various studies have been conducted to understand the clinical profile and manifestations of dengue viral infection in different regions. Prompt recognition and management are essential to save lives. DF and DHF have become a global public health issue, particularly in the South-East Asia region [4]. Severe disease is more common in infants and young children and is associated with severe plasma leakage, haemorrhage, or organ impairment. Early detection based on clinical suspicion and laboratory evidence is crucial for limiting complications. With an increasing number of cases, understanding the basic clinical and haematological aspects of the disease is essential [5]. The incidence of dengue is high in India, with annual estimates ranging from 7.5 to 32.5 million. Severe dengue infection can have a case fatality rate as high as 44%, but with early intervention, mortality is less than 1%. Reinfection is more severe in children due to immunological factors [6]. In conclusion,

dengue remains a major global health concern, particularly in tropical and subtropical regions. The disease's impact on children, the lack of a specific vaccine, and the rising incidence require continuous efforts in research, surveillance, and public health programs to control and manage the disease effectively.

II. Materials and Methods

This was a hospital based prospective observational study done in Department of Pediatrics at Nalanda Medical College & Hospital, Patna for a period of 6 months from July to December 2022. All the patients of fever with dengue NS1 or dengue IgM positive results admitted in the hospital were studied. A total of 118 cases were studied who fulfilled the inclusion criteria.

Inclusion criteria

1. Age group of 6 months to 14 years
2. Patients with dengue NS1 Ag positivity
3. Serologically confirmed IgM positive dengue fever

Exclusion criteria

1. Age group > 14 years
2. Preexisting chronic diseases in the patients

Detailed clinical history was taken from the parents of admitted patients. Complete clinical examination was done thoroughly. All the routine investigations were done like complete blood count (CBC), peripheral blood smear examination, random blood sugar, complete urine analysis. Specific tests for dengue were NS1 antigen and 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, liver function test (LFT) and kidney function test (KFT). Cases were followed up daily for the clinical and laboratory parameters. Blood parameters were monitored every day till remarkable improvement seen clinically and haematologically. Averages of TLC, TPC, Hb, haematocrit, and so forth were calculated for each patient and recorded. Daily vitals were monitored with tourniquet test. Chest X-ray, ultrasonography, and liver function tests were done on day 3 of admission on all the patients. The patients were treated with oral paracetamol, intravenous fluids, blood products, and inotropes as per the recent WHO dengue guidelines. The frequency of various signs and symptoms and the laboratory tests were compared between the non-severe and severe disease. The results were tabulated and correlated. The outcomes were recorded. The clinical manifestations and laboratory findings like haemoglobin estimation, total platelet count, haematocrit estimation, NS1 antigen, and IgM antibody of each group of illness were compared using Fisher's exact test for proportions. SPSS version 22.0.0.0 software was used for data entry and analysis. P value below 0.05 was considered significant. Written consent was taken from the parents before enrolling in the study.

III. Observations and Results

Out of 118 patients studied 72 were males and 46 females with male to female ratio 1.5:1. Sixty-five patients had dengue without warning signs, 45 had dengue with warning signs and 8 had severe dengue. Eighty patients were in the age group of 6-14 years, 20 in 2-5 years and 18 were below 2 years. Total WBC count was within normal limits (4000-11000/cumm) in 92 (78%) cases and there was leucopenia in 26 (22%). Moderate thrombocytopenia (50000-1.5 lakh/cumm), was seen in 54.2% (64/118) and severe thrombocytopenia was seen in 13.6% (16/118) cases while platelet count was in normal range in 32.2% (38/118) cases.

Sixty three percent of children complained of fever > 7 days with continued type of fever being predominant (75%). About 37.3% of patients had abdominal pain, 48.3% vomiting, 46.3% myalgia, 38.1% headache, 18.6% arthralgia, 14.8% retro-orbital pain, 9.3% loose stool and 3.7% runny nose/cough. Tourniquet test was positive in almost one third cases (29%). NS1 antigen was positive in 90% of cases. IgM and IgG antibodies for dengue virus were positive in 62.5% and 45% of patients respectively, both IgG and IgM were positive 35.5% cases and serological tests were negative in 3.5% cases. Bleeding manifestations were seen in 25.4% (30/118) and hypotension in 32.2% (38/118) cases.

Table 1: Clinical Features of patients with dengue

Clinical Features	No. of patients (n=118)
Fever	116 (98.3%)
Vomiting	57 (48.3%)
Rash	75 (63.5%)
Malaise	49 (41.5%)

Hepatomegaly	46 (38.9%)
Abdominal pain	44 (37.3%)
TourniquettestPositive	34 (28.8%)
Headache	45 (38.1%)
Petechiae	37 (31.3%)
Bleeding manifestation	30 (25.4%)
Leucopenia	26 (22%)
Thrombocytopenia	80 (67.8%)
Deranged LFT	53 (44.9%)
Hypotension	38 (32.2%)
Altered sensorium	5 (4.2%)
Convulsion	3 (2.5%)
Arthralgia	22 (18.6%)

Table 2: Factors associated with severe dengue and dengue with warning signs.

Factors	SevereDengue	Dengue withwarning signs	Denguewithoutwarning signs	Total	p-value
Age(years)					
<2years	0	7(38.9%)	11(61.1%)	18(100%)	0.45
>2to 5years	3(15%)	9(45%)	8(40%)	20(100%)	
6to14years	5(6.2%)	29(36.3%)	46(57.5%)	80(100%)	
Gender					
Female	3(6.5%)	19(41.3%)	24(52.2%)	46(100%)	0.487
Male	5(6.9%)	26(36.1%)	41(57%)	72(100%)	
Malaise	7(14.3%)	20(40.8%)	22(44.9%)	49(100%)	0.565
Vomiting	8(14.0%)	28(49.1%)	21(36.8%)	57(100%)	0.147
Rash	10(13.3%)	31(41.4%)	34(45.3%)	75(100%)	0.903
Petechiae	10(27.0%)	23(62.2%)	4(10.8%)	37(100%)	0.0459
Bleeding Manifestation	13(43.4%)	17(56.6%)	0	30(100%)	0.0308
Headache	6(13.3%)	18(40.0%)	21(46.7%)	45(100%)	0.696
Tachycardia	6(35.3%)	10(58.8%)	1(5.9%)	17(100%)	0.0027
Hepatomegaly	11(23.9%)	35(76.1%)	0	46(100%)	0.034
Splenomegaly	3(30%)	6(60%)	1(10.0%)	10(100%)	0.028
PositiveTourniquettest	8(23.5%)	15(44.1%)	11(32.4%)	34(100%)	0.0065
Ascites	8 (36.4%)	9 (40.9%)	5 (22.7%)	22(100%)	0.0834
Pleural effusion	9 (39.1)	8 (34.8)	6 (26.1)	23(100%)	0.1023

Bleeding tendency, tachycardia, hepatomegaly, splenomegaly and positive tourniquet test were significantly associated with dengue with warning signs and severe dengue (p value <0.05). Liver enzymes were elevated in 53 (45%) cases and were normal in 65 (55%) cases. Ultrasound of the abdomen showed hepatomegaly in 46 (39%) of the cases, ascites in 18.6% (22/118) and pleural effusion in 19.5% (23/118) cases. Most of the cases 70 (59.3%) were noted in August and September months and 48 (40.7%) cases were recorded in rest of the months. Three patients died during treatment who were diagnosed as severe dengue with shock accompanied by DIC (case fatality 2.5%). All the 3 cases were referred cases and came to our hospital after taking few days of treatment outside. Out of 118 cases 98 cases were primarily treated at our center from the beginning while 20 patients were referred to our hospital after taking treatment at some other hospitals.

Table 3: Hemoglobin range.

Hb	No. of cases	Percent (%)
<5gm%	04	3.3%
5-10gm%	48	40.7%
10-15gm%	56	47.5%
>15gm%	10	8.5%
Total	118	100%

Present study showed hemoglobin range from less than 5gm% to more than 15gm%. Almost half (47.5%) cases showed hemoglobin values between 10-15 gm%.

Table 4: Hematocrit value.

Hematocrit	No. of cases	Percent (%)
26-36%	13	11%
37-47%	80	67.8%
>47%	25	21.2%
Total	118	100%

Raised hematocrit (>47%) was observed in 21.2% cases (25/118).

Table 5: Total leukocyte count and platelet count.

TLC/cumm	No.of cases	Percent (%)	Platelet count/cumm	No.of cases	Percent (%)
< 4000	26	22.1%	<20000	10	8.5%
			20000-50000	6	5.1%
4000-11000	87	73.7%	50000-1.5laks	64	54.2%
>11000	05	4.2%	>1.5laks	38	32.2%
Total	118	100%	Total	118	100%

IV. Discussion

Dengue is an important arboviral infection in the tropical region with increasing global incidence in the recent decades [2]. This observational study was done to document the clinical findings in dengue infection in children of Bihar, India. The mean age of the patients was 9.5 ± 1.5 years with age range of 6 months to 14 years. Male female ratio was 1.5:1. Similar results were reported by Malavige et al and Ahmed et al. Malavige GN et al found mean age of the patients 7.9 ± 2.9 years and their age range was from 1 month to 12 years while Ahmed et al. found mean age 9.0 ± 2.8 years with a age range of 2.5-12 years [8,9]. A male preponderance with a male female ratio of 3:2 was observed by Ahmed et al. In our study, 38% of children had dengue with warning signs and 7% had severe dengue. Most of the patients in our study were in age group 6 to 14 years. Similarly most studies have reported the common age group of presentation to be between 4.9 -12 years. Increased number of cases of dengue in this age group is probably due to more involvement in outdoor activities during the day time when there is high risk of mosquito bites. Though we found a male preponderance in our study as seen in other studies, there was no association between gender and severity of dengue as seen in other studies. Based on the WHO 2009 dengue guidelines, in our study, the total number of cases analysed was 118, out of which 110 (93.2%) were categorised as cases of non severe dengue which included dengue fever (DF) both with and without warning signs and 8 (6.8%) were cases of severe dengue (DHF grades 1-4). The maximum numbers of cases were seen in the group >6 years of age (68%) and the least affected age group was infants. More involvement in older children can be explained by diurnal adaptation of *Aedes* mosquito in stored water and outdoor activity of older children. Increased admissions in the rainy and winter seasons can be explained by breeding season of mosquitoes which is similar to previous studies [10]. Duration of hospitalisation was more in case of severe dengue patients. But delay in hospitalisation did not predict the severity in our study.

In our study fever was present in all cases. Abdominal pain, vomiting, retro-orbital pain, and abdominal distension were seen commonly. This goes in accordance with the previous studies [10]. Bleeding in dengue is caused due to multiple reasons. The most common bleeding manifestations were petechiae, purpura, and ecchymosis. Bleeding from gastrointestinal tract was significant in severe dengue cases. Haematemesis was the most common bleeding manifestation reported in other studies from India. Convulsions in dengue infection is very rare. Three patients in the severe dengue group had convulsion after having DSS. There was not any correlation found between platelet count and bleeding manifestations in the study. A similar finding had also been noted in other studies [11]. Various factors apart from thrombocytopenia lead to bleeding in dengue fever, viz. deranged platelet function, abnormal PT/APTT, fibrinogen consumption, and vascular damage [13]. In our study, in the majority of the patients tourniquet test was found to be negative, whereas studies in other countries, especially Southeast Asian countries, report tourniquet test positivity as the commonest bleeding manifestation [14]. Low proportion of positive tourniquet test in Indian studies may be due to the darker skin colour in Indian children [15]. The most consistent finding was hepatomegaly, which was similar to many other studies [10, 11]. Among the various clinical findings hypotension, pleural effusion, and respiratory distress were notable and were analogous to other studies. Leukopenia was seen, which was similar to two other studies [10, 15]. Early haematologic abnormality was progressive decline in total WBC count. Leukopenia was not significantly related with severe dengue cases which were against some results [15]. Increasing haematocrit is a reliable indicator of deranged vascular permeability and plasma leakage. It was also seen in previous studies that in some cases the fluid leakage did not achieve a high levels of hematocrit even if the patient is in shock; this explains our findings. In some DF patients raised hematocrit could have been due to dehydration as a result of poor fluid intake and vomiting [16]. There are no clear-cut guidelines for haemoconcentration in Indian population. Elevation of SGOT was significantly more compared to SGPT in the present study and is more associated with severity of infection which coincides with others also [15]. SGOT raise more than SGPT in dengue may be due to involvement of myocytes. Value more than 1000 IU/L is seen in severe dengue. Very high levels of SGOT and SGPT indicate severity of the disease along with morbidity and mortality. This differs from the pattern seen in viral hepatitis [16]. Rise in PT/aPTT also depicts severity of disease. Ascites and pleural effusion were common presentations, whereas chest X-ray revealed pleural effusion in 19.5%. In USG of the chest right sided effusion (13.46%) was most commonly seen which was similar to the previous study [11]. Pleural effusion is more significant in severe dengue. Among types of effusions bilateral pleural effusion is more indicative of

severity of the disease. In our study all non-severe dengue cases recovered. Among the severe dengue cases 5 cases recovered and 3 patients expired due to intractable shock.

There was less mortality in the present study as compared to earlier studies. The reason may be delay in recognition of epidemic in previous years or delay in seeking medical attention. Case fatality rate (CFR) of the SEAR countries in 2006 was less than 1%. India, Indonesia, Bhutan, and Nepal still have case fatality rates above 1% [16]. Early diagnosis and improved case management of dengue fever are required to bring down CFR to below 1%.

V. Conclusion

Dengue is a common disease in this part of the world. It is one of the dreaded fevers for the paediatric age group. The disease has various presentations and features, but early diagnosis and management can decrease case fatality rate significantly. In our study we have enlisted all the typical and atypical presentations, epidemiological data, investigations, and management according to recent WHO guidelines.

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