Original Research Article

Clinicolaboratory profile and outcome of dengue fever cases in peak season of an academic year among pediatric population admitted to teaching hospital, Bangalore, Karnataka, India

Deepthy Alice Varghese, Shivaprakash Sosale C.*, Keshavmurthy, Anusha P. P., Chikkanarasa Reddy

Department of Pediatrics, Banglore Medical College and Research Institute, Bangluru, Karnataka, India

*Correspondence:
Dr. Shivaprakash Sosale C.,
E-mail: shivaprakashsosale@gmail.com

ABSTRACT

Background: Dengue is a vector borne diseases with varied clinical manifestations, a major concern to public health globally. This study was done to describe the salient clinical as well as haematological profile of serologically confirmed cases of dengue fever and outcome in admitted cases.

Methods: This was a prospective study conducted at major Government teaching Hospitals in Bangalore from July 2019 to December 2019. Total 164 cases of dengue fever were enrolled and classified as per WHO guidelines. The clinical profile and demographic profile was recorded in a structured questionnaire format. Haematological parameters on admission, duration of stay and outcomes were analysed. The outcomes of the cases were mentioned as improved and death.

Results: In this study commonly affected age band was adolescents group (36.6%) without any sex predilection. Maximum number of dengue cases were presented with warning signs (87.5%), 14 (8.69%) cases without warning signs and 6 (3.72%) with severe dengue. Fever was the most common symptom (100%), followed by vomiting (58%) and abdominal pain (38.5%). NS1 antigen positive cases (61.5%). Severe Leukopenia was present in 57% of cases and Thrombocytopenia in all admitted patients (100%). Most of the cases were treated with antipyretics, oral fluids (46%) and IV fluids (53%), only single case received platelet transfusion. Duration of stay was more in severe dengue cases. Mortality of our study was 1.8%.

Conclusions: Dengue presents with varied clinical features. Community awareness, early diagnosis and management and vector control measures needs to be strengthened in order to reduce the increasing number of dengue case. Both clinical, haematological parameters should be monitored for better outcome.

Keywords: Mortality, Dengue fever, Thrombocytopenia

INTRODUCTION

Dengue fever is caused by arthropod borne virus of genus flavivirus belonging to family flaviviridae, presenting with wide clinical spectrum may range from asymptomatic fever to dreaded complications such as haemorrhagic fever and shock.[1]

It has reached alarming proportions across the globe in the past few years, due to globalization, unplanned urbanization and increased air travel.

The epidemiology of dengue is an intricate phenomenon which depends on complex relationship between epidemiologic factors viz. host, agent and environment.[2] The agent, dengue virus categorised under flavivirus.

There are four genetically related but antigenically distinct DEN serotypes (DENV-1, DENV-2, DENV-3 and DENV-4) all of which are prevalent in India. Each serotype capable of eliciting cross-reactive and disease-enhancing antibody response against the remaining three serotypes leading to a increased risk of DHF subsequently. Dengue viruses are transmitted from an infected person to others by bite of female *Aedes* mosquito. Ae aegypti breeds almost entirely in domestic man-made water receptacles found in and around households. The population of mosquito fluctuates with rainfall and water storage. Its lifespan is influenced by temperature and humidity. The dengue virus infects humans and lower primates also . The mosquito becomes infected when takes blood meal from person during febrile phase of illness. After extrinsic incubation period 8 to 10 days, mosquito become infected, then bites another person and inject saliva into through which virus enters, 4-7 days of intrinsic incubation period dengue begins abruptly. The cycle of dengue continues.

Dengue remains as puzzling disease in many aspects such as virus - host relationship and clinical expression variability.[3] Hence the present study was conducted to assess the clinical profile, laboratory variability and outcome in confirmed cases of dengue fever in children less than 18 years of age attending a tertiary care hospital.

METHODS

This was a cross-sectional observational study with clinical and laboratory parameters of serologically confirmed dengue cases admitted in the hospital during the peak period of the year as per WHO definition criteria were taken in to the study design. A total of 164 pediatric patients below 18 years admitted in pediatric teaching hospitals from July 2019 to December 2019 were included. All the cases were selected by simple random sampling method after taking well informed consent form from their parents. All children <18 years, clinically suspected and serologically confirmed were included. Patients age group >18 years, with serology negative cases and discharged against medical advice patients were excluded.

A detailed history and thorough clinical examination was performed on all the patients as per the submitted proforma and clinical diagnosis was confirmed serologically with NS1 antigen, anti-dengue IgM/IgG antibodies, which are detected by rapid immuno-chromatographic method as per WHO guidelines.

Their age and sex distribution, signs and symptoms, haematological parameters like Dengue serology (Ns1antigen, IgM and IgG antibodies), complete hemogram including Hct, PCV, TLC, platelet count, liver function tests including AST /ALT, clinical course of the illness, and outcome were analysed in detail. Patients were treated with antipyretics oral/intravenous

fluids, blood component therapy, and other supportive care as indicated.

Statistical analysis was performed using the SPSS software, Version 20. Total numbers and percentages were calculated for different categorical variables, such as clinical features, biochemical parameters, treatment and outcome.

RESULTS

Epidemiological and demographic parameters

Overall, 164 paediatric patients with clinically suspected dengue as per WHO criteria and serologically confirmed for either dengue NS1 antigen or anti-dengue IgM/IgG antibodies were taken into the study.

About 36.6% were in the age group of 11-18 years followed by 29% in 7-11 years. Minimum age at which dengue NS1 antigen detected was in a 7 months old child.

Male children accounted for 50.6% of the infections while remaining were females suggests male-to-female ratio of almost equal.

Table 1: Epidemiological and demographic parameters (n=164).

Parameter	Variables	N (%)
Age (yrs)	<3	28 (17.4)
	4-7	28 (16.8)
	7-11	49 (29.2)
	>11	59 (36.6)
Gender	Male	83 (50.6)
	Female	81 (49.3)

Table 2: Analysis of clinical manifestation on admission (n=164).

Clinical features	N (%)
Fever	164 (100)
Rash	4 (2.5)
Flushing	66 (41)
Vomiting	94 (58.4)
Loose stools	9 (5.6)
Abdominal pain	62 (38.5)
Bleeding manifestations	12 (7.5)
In shock (low pulse volume, BP<50th centile)	2 (1.24)

Analysis of clinical manifestation on admission

Analysis of clinical manifestations revealed that almost all patents 164 were presented with fever, followed by vomiting (58.4%). In our series, we had 41% of cases with flushing. About 38.5% cases presented with abdominal symptoms. 12 cases had bleeding

manifestation. Nine patients had loose stools and two patients presented with shock on admission.

Table 3: Classification.

		N (%)
Non severe dengue, (n=158)	With warning sign	144 (87.8)
	Without warning sign	14 (8.53)
Severe dengue, (n=6)		6 (3.6)

Classification

In non-severe dengue 87.8% presented with Warning sign, 8.53% without warning sign, 3.6% presented with severe dengue. Suggests importance of identifying the warning signs for better outcome.

Laboratory parameters and outcome

According to our study all of them presented with thrombocytopenia less than 1,50000 (100%) at admission. All of the Patients with platelet more than 1, 00000 were improved. 3% of patients with platelet less than 50000 were died.

Table 4: Laboratory parameters and outcome (n=164).

	Lab values	N (%)	Outcome
Total leucocyte count (cells/mm3)	<4000	57 (34.7)	3.5% death, remaining improved
	4000-11,000	96 (58.4)	100% improved
	>11,000	11 (6.7)	100% improved
Platelet at admission	>100000-149000	48 (29.8)	100% improved
	50000-100000	48 (29.8)	6% death, remaining improved
	<50000	68 (41.4)	3% death, remaining improved
Hematocrit (%)	<30	13(7.9%)	Improved
	31-40	101 (62.7)	Improved
	>41	50 (30.4%)	6.2% death, remaining improved
Liver enzymes (IU/L)	**ALT**		
	<50	126 (76.8)	Improved
	50-200	34 (21.1)	5.8% death
	200-1000	4 (2.5)	Improved
	>1000	0	
	AST		
	<50	79 (49.1)	Improved
	50-200	79 (49.1)	2.5% death
	200-1000	6 (3.6)	Improved
	>1000	0	
Serology	NS1	101(61.5)	2.9 % death
	IgM	47 (28.6)	9.4% death
	Both NS1 and IgM	26 (15.8)	100% Improved
	Ig M and IgG	11 (6.7)	Improved

Out of 164 patients 57% presented with leukopenia less than 4000, in this 3.5% died. Remaining subjects improved.

All patients presented with thrombocytopenia, 65% presented with platelet count less than 50000, out of this 3% of the people not survived.

All patients with initial hematocrit value less than 40 (70.2%) were improved, on contrary 6.2% of hematocrit value more than 41 (30.4%) expired.

In our study elevated AST was observed in 52% and ALT in 23%. 2.5% people presented with ALT more than 50,

out of this 5.8% expired, whereas only 2.5% with AST elevation died.

Elevated liver enzyme levels correlated well with the severity of dengue fever and are an indicator of organ dysfunction as all children with severe dengue had elevated liver enzymes[2]

On serology 61.5% with only NS1 positive, 96% improved. NS1 antigen positive cases (61.5%) found more than IgM positive and patient presented with isolated Positive IgM (28.6%), 9.4% died. All patients were improved with positive both IgM and IgG antibody test on admission.

Management of patients

Around 46.9% patients were treated with simple antipyretics and encouraged oral fluid along with monitoring of vital parameters, 52.4% required iv fluid, only one patient with severe bleeding manifestation was administered platelet transfusion an none of the patients were given FFP.

Table 5: Management of patients (n=164).

Treatment	N (%)
Antipyretics and oral fluids	77 (46.9)
IVF	86 (52.4)
Platelet transfusion	1 (0.6)
FFP transfusion	0

Duration of stay and outcome

Most of the patents shows clinical improvement after 3 days, 35.9% by 7th day, and 61.5% after 7th day. 8.7% patients discharged by 6th day, whereas 87.8% patients took longer time.

Table 6: Duration of stay and outcome.

	Days	N=164(%)
Duration of the stay	<3	0
	4-6	14 (8.7)
	>7	144 (87.8)
Improvement	<3	0
	4-6	59 (35.9)
	>7	101 (61.5)

DISCUSSION

A total of 164 pediatric patients presented to Department of Pediatrics, major teaching hospital in Bangalore, diagnosed with Dengue fever based on Ns1antigen, IgM from July 2019 to December 2019 has been analyzed in this study.

According to new WHO guidelines on Dengue by using a set of clinical and/or laboratory parameters, one sees a clear-cut difference between patients with severe dengue and those with non-severe dengue.[1] Those in the non-severe dengue are split into two subgroups patients with warning signs and those without them. In our study the cases were categorized into non-severe with or without warning signs and severe dengue.[2,3]

The predominant age group in our study was more than 11 yrs (36.6%) followed by 7-11 yrs (29.2%), compared to other studies showing more between 6-11 yrs.[4] In our study both male and female were almost equally affected, differing from other similar studies where Male were predominant than female.[5]

Fever was there for all the patients (100%), being the most common symptom, followed by vomiting (58%) and abdominal pain (38.5%), is the same results in almost all studies.[6,7,8]

In our study 144 (87.8%) presented with dengue fever with warning signs, 14 (8.5%) without warning signs and 6 (3.72%) with severe dengue, almost similar in other studies.[8,9,10] But not subcategorized to with or without warning signs.

The duration of stay of hospitalization was more in severe dengue cases similar to many studies. Improvement after 1week of illness in majority of cases (60%), which slightly different trend from other studies where mean duration of stay 5-6 days.[11,12]

According to our study most of them presented with thrombocytopenia (41.4%) at admission than leucopenia, similar to some studies [13] and NS1 antigen positive cases (61.5%) found more than IgM positive.[14]

Elevated liver enzyme levels correlated well with the severity of dengue fever and are an indicator of organ dysfunction as all children with severe dengue had elevated liver enzymes.[15]

Our study also showed the similar trend of elevated AST (52%) than ALT (23%) in dengue fever found in most of the studies.[16]

Most of the cases treated with antipyretics, oral fluids (46%) and IV fluids (53%), only single case received platelet transfusion.[17] Mortality in the present study was 1.8% compared to 12-13% in previous studies.[18]

Reduced mortality in the present study could have been due to the basic fact that all the children with dengue were classified according to the newer classification given by WHO.[19-21]

Of the children with warning signs needed PICU care and all were discharged well. Those who present with severe dengue should be treated with utmost care in PICU so as to reduce mortality due to this dreaded but treatable condition.

CONCLUSION

To conclude, dengue is a dreadful fever among pediatric age group with variable presentations and complications which needs to be considered with great caution in management. Understanding the warning signs supports in early and accurate diagnosis to reduce mortality. In our study, we listed all the probable clinical data and laboratory parameters that can help in establishing the severity of the fever, which helps in treatment plan. In the present study, we listed the main symptoms as fever with vomiting, abdominal pain, and laboratory parameters of high hematocrit, low leukocytes, low platelet counts

warns the severity along with rise in AST levels, which helps in distinguishing severe from non-severe cases of dengue fever. Knowledge about these factors will help in better dealing of dengue cases.

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