International Journal of Contemporary Pediatrics
Tripathy A et al. Int J Contemp Pediatr. 2024 Aug;11(8):1066-1071
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20242016

Original Research Article

The study of clinical profile and management of dengue fever in children

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Received: 16 June 2024
Revised: 15 July 2024
Accepted: 18 July 2024

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ABSTRACT

Background: Dengue fever is characterized by biphasic fever, myalgia or arthralgia and rash. WHO has estimated that there are 100 million cases and 30,000 deaths worldwide. It is caused by serotypes of dengue virus and transmitted by mosquitoes of Aedes Aegypti. The aim was to study the clinical-epidemiological profile of children with dengue fever.
Methods: From January 2020 to December 2020, the baseline survey was conducted in pediatrics department, Civil Hospital, Asarwa, Ahmedabad, India in which the data was confirmed dengue fever with laboratory diagnosis of serology (NS1/IgM) positive in the age group of >6 months and <12 years.
Results: In a total of 127 cases of dengue, majority (52%) were in age group of 6-12 years and presented with warning signs (72%). The most common complication and hemorrhagic manifestation were dengue hepatitis (10.5%) and petechiae/purpura (29.1%). Bleeding was common when platelet count was <20000 lakh/mm^3. Diagnosis was confirmed with dengue NS1 Ag (71.7%) and serum IgM (100%). Most of the patients recovered with IV fluid therapy (81.9%).
Conclusions: Major admissions were in the febrile phase of the disease. NS1Ag, liver function test and ultrasonography play an important role in early diagnosis, early detection of complication and as a prognostic marker for outcome in dengue fever. The mainstay of management is adequate hydration (IV fluids). It was concluded that, prevention is better than cure of the disease in the form of integrated vector management control.

Keywords: Dengue, Mosquito, Warning signs, Serology, Hepatitis, Prevention

INTRODUCTION

Dengue fever, an infection caused by several arthropod-borne viruses, is characterized by biphasic fever, myalgia or arthralgia, rash, leucopenia, and lymphadenopathy. myalgia and arthralgia-severe pain give it the name break bone fever or bone crusher disease.[1] It is distributed in most of the tropical areas of the world with greatest risk occurring in India and subcontinent and other south east Asian countries. Dengue is caused by infection with 1 of the 4 serotypes of dengue virus den-1, den-2, den-3, den-4, family *Flaviviridae*, genus flavivirus. Dengue is transmitted by mosquitoes of genus *Aedes*, *Aedes aegypti* being the most important vector.[2] Over the past two decades, there has been a global increase in the frequency of dengue fever and its epidemics with a concomitant increase in disease incidence. WHO currently estimates around 390 million cases of dengue infection worldwide every year with around 24000 deaths and approximately 2.5 billion people live in dengue endemic countries. In India, currently, 50 million dengue infection cases occur annually with the outcome of 500000 hospitalizations and deaths over 20000.[3] Factors for dengue's spread include uncontrolled population growth, urbanization,

overcrowding, inadequate health facilities, increased travel to epidemic areas, poor vector control, climate change and lack of awareness among people.

Objective

General

It was to study the clinicoepidemiological profile of dengue children presenting to the hospital.

Specific

It was to know the major presentation, complications, and treatment required. Also, to analyze the root cause to reduce the incidences of the disease severity.

METHODS

This was a prospective, observational study done in the pediatric department of Civil Hospital, Asarwa, Ahmedabad, India from January 1st 2020 to December 31st 2020. The study protocol was approved by Ethical Committee of B. J. Medical College, Ahmedabad, Gujarat, India. All the patients were admitted based on clinical suspicion of dengue fever according to the inclusion criteria mentioned the history was taken in detail and clinical examination was done. As per the new guidelines the disease is classified as: dengue without a warning sign; dengue with a warning sign; and severe dengue.

Inclusion criteria

All the children with confirmed dengue fever with laboratory diagnosis of either dengue NS1 and/or dengue IgM positive in the age group of >6 months and <12 years, were admitted in the pediatric department.

Exclusion criteria

Children of <6 months and >12 years of age; any children with dengue-like illness treated on OPD basis; and all the children with suspected dengue fever with negative laboratory reports (dengue NS1/ Dengue IgM) were excluded.

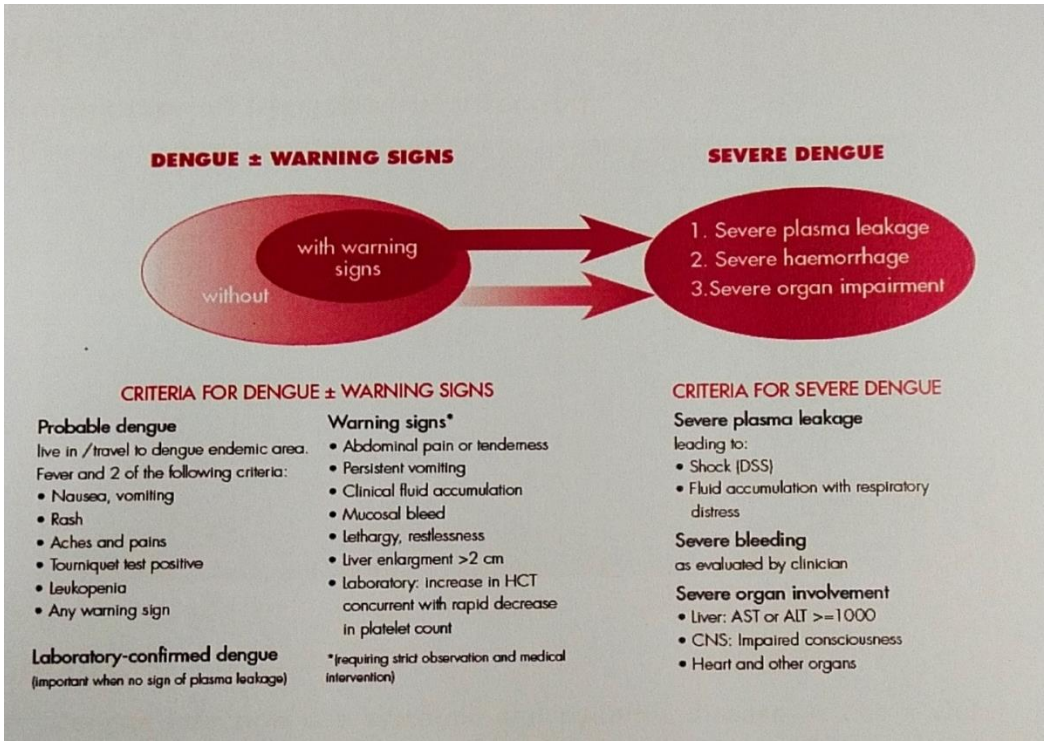

Figure 1: Dengue classification and severity.[4]

Procedure

All the patients were admitted based on clinical suspicion of dengue fever according to inclusion criteria mentioned and the history was taken in detail and clinical examination was done and patients were classified according to newer WHO classification into Dengue without warning signs, Dengue with warning signs, and severe dengue. Basic investigations like CBC (hemoglobin, total count, differential count, hematocrit, platelet count), renal function test, liver function test were done. For confirmation of diagnosis, Dengue NS1 antigen

or Dengue IgM antibody assay was done according to the days of onset of fever. In all positive cases, vital monitoring like blood pressure, heart rate, temperature recording, input/output monitoring and monitoring for any complication and hemorrhagic manifestations were done. Hematocrit and platelet counts were monitored and repeated accordingly. Patients were treated with IV fluids according to severity grading according to WHO/NVBCDP guidelines. Antibiotics and blood products were given accordingly

Data of this study was recorded and analyzed in Microsoft Excel.

RESULTS

Out of 7965 patients were admitted over period of 1 year from January 1, 2020 to December 31, 2020; the total number of confirmed dengue cases was 127. The incidence of dengue fever in this study among the hospitalized patients in the pediatric ward was 1.59%.

In the present study, majority of the patients (52%) were in age group of 6-12 years followed by age group of 1-5 years (38.6%) and only 9.4% were in <1 year age group. Mean age of presentation (mean±SD) is 5.88±3.57.

Table 1: Age wise distribution.

Age (years)	No. of dengue cases
<1	12
1-5	49
6-12	66

Table 2: Symptoms of dengue fever on admission.

S. no.	Symptoms	Present study (n=127)	
		N	**Percentage (%)**
1.	Fever	127	100
2.	Vomiting	91	71.1
3.	Rash	70	55.1
4.	Abdominal pain	60	47.2
5.	Bodyache	58	45.7
6.	Cough\rhinitis	57	44.9
7.	Headache	52	40.9
8.	Swelling	38	29.9
9.	Joint pain	35	27.6
10.	Bleeding manifestations	33	26
	Petechiae	15	45.5
	Mucosal bleed	6	18.2
	Melena	5	15.3
	Hematemesis	3	9
	Ecchymosis	3	9
	Epistaxis	1	3
11.	Retro orbital pain	30	23.6
12.	Difficulty in breathing	20	15.7
13.	Convulsion	16	12.6
14.	Altered sensorium	12	9.4
15.	Decreased urine output	12	9.4
16.	Yellowish discoloration of skin and eyes	8	6.3

A higher incidence of dengue fever was seen in higher age group because these groups have more outdoor activities and more environmental exposure. The most common presentation was fever (100%) followed by vomiting (71.1%) followed by rash (55.1%), abdominal pain (47.2%), body ache (45.7%) and headache (40.9%).

Nonspecific symptoms like cough/rhinitis (44.9%), myalgia was also found in significant number of patients. Bleeding (26%) includes petechiae, mucosal bleed, melena, hematemesis, ecchymosis, and epistaxis. Difficulty in breathing (15.7%), yellowish discoloration of skin and eyes (6.3%), body swelling (29.9%), decreased urine output (9.4%), convulsion (12.6%) and

altered sensorium (9.4%) are the symptoms of severe dengue and its complications.

Table 3: Distribution of dengue fever in terms of severity.

Dengue fever	Present study (n=127)	
	N	Percentage (%)
Dengue fever with warning signs	72	56.7
Dengue fever without warning signs	34	26.8
Severe dengue fever	21	16.5

Table 4: Complications in dengue fever.

Complications	Present study (n=127)	
	N	Percentage (%)
Hepatitis	13	10.5
Dengue shock syndrome	10	7.9
Hyponatremia	10	7.9
Myocarditis	9	7
DIC	9	7
Encephalopathy	5	3.9
ARDS	2	1.6
Metabolic acidosis	2	1.6
Acute renal failure	1	0.8

In present study, most of the patients were presented with warning signs (72%) followed by dengue without warning signs (26.8%) and least were presented with severe dengue fever (16.5%).

Similar findings were seen in Yagnik et al study and Hemant et al.[5,6] Out of the warning signs, the most common was vomiting followed by abdominal pain. The higher incidence of patients of dengue fever with warning signs could be because these patients required hospital admissions and therefore became the part of the study. Similar findings were seen in previous studies Yagnik et al and Hemant et al.[5,6] More patients of dengue fever with warning signs were observed, 74% in Yagnik et al and 64.6% in Hemant et al.[5,6] Most common sign of dengue fever was tachycardia (67.7%) probably associated with fever followed by maculopapular rash (55.1%) and edema (29.9%). Other common signs were hypotension, petechiae/purpura (22%), positive tourniquet test. Signs of fluid accumulation like ascites (15.7%) and pleural effusion (18.1%) were also common in the study.

Hepatitis was seen as the most common complication in dengue fever (10.5%). Because the liver is most commonly and early involved organ in dengue fever. 5 patients developed encephalopathy and 10 patients developed dengue shock syndrome and 9 patients developed disseminated intravascular coagulation. 9 patients developed myocarditis and 1 patient had acute renal failure. 2 patients developed acute respiratory distress syndrome. These complications were more commonly seen in severe dengue patients and increase the risk of mortality. Thus, early liver function tests and ultrasonography helps in early diagnosis of the complications like dengue hepatitis contributing to improved prognosis.

Most of the patients had platelet count between 50000 – 1 lakh/mm^3 from them 29.7% patients developed petechiae and 26.9% patients had positive tourniquet test. Among 17 patients having platelet count 20000-50000 /mm^3 petechiae were developed in 37.8% of patients and 34.6% of patients had positive tourniquet test. Among 10 patients having platelet count <20000 /mm^3 out of all developed petechiae and positive tourniquet test. So, it can be said that the lesser the platelet counts more the Percentage of patients developing petechiae and positive tourniquet test and more commonly associated with platelet count <50000 /mm^3.

Table 5: Correlation of platelet counts, petechiae and positive tourniquet test.

Platelet count	No. of patients (n=127)	No of patients having petechiae (n=37)	No of patients with positive tourniquet test (n=26)
	N (%)	N (%)	N (%)
Normal (>1.5 lakh/mm^3)	12 (9.5)	0	0
Mild (1-1.5 lakh/mm^3)	30 (23.6)	2 (5.4)	0
Moderate (50000-1 lakh/mm^3)	58 (45.7)	11 (29.7)	7 (26.9)
Severe (<50000 /mm^3)	27 (21.2)	24 (64.8)	19 (73.1)

Table 6: Correlation between duration of fever and serological diagnostic.

Days of fever on day of illness	No. of patients (n=127)	Positive NS1 antigen report	Positive s. IgM report
		N (%)	N (%)
1-3	54	51 (94.4)	3 (5.6)
4-6	55	37 (67.7)	15 (32.3)
>6	18	0	18 (100)

Continued.

Days of fever on day of illness	No. of patients	Positive NS1 antigen report	Positive s. IgM report
Total	127	91 (86)	36 (14)

For diagnosis, S. IgM was positive in 36 patients. NS1 antigen test was positive in 91 patients. In present study, NS-1 antigen assay and serum IgM assay, both has been done in all suspected patients to compare sensitivity of the test with the duration of illness. Out of 54 patients admitted on the 1-3 days of fever, most of the patients had positive NS1 antigen test (94.4%) and only 3 patients had IgM positive report. In patients admitted after 6 days of fever, all the patients had positive serum IgM report. In patients admitted on 4-6 days of fever, approximately 67.7% patients had NS1 positive report and 32.3% had positive serum IgM report. So, it can be concluded that the sensitivity of NS1 antigen is higher in the initial 4-5 days of fever. 17 patients required oxygen support that includes critically ill patients with severe dengue fever.

IV fluids were given to 104 patients (81.9%). Most of the patients were improved with IV fluids. Inotropes were given to 15 patients who were in profound shock and not improved with IV fluids and it also included patients who were critically ill and required inotropes in patients with severe dengue. FFP was given to 9 patients who have prolonged PT time and in patients with DIC. Platelet concentrate was given in 18 patients who had severe thrombocytopenia with or without bleeding.

Packed red cell volume was transfused to 6 patients and whole blood was transfused to 5 patients who presented with severe anemia or in impending CCF and had severe bleeding. Antibiotics were given in 57 patients even though there is no proven role in dengue. Most of the times antibiotics were started empirically to prevent secondary infection. IV fluids and proper monitoring of vitals and fluid balance remains the main stay of treatment in dengue fever.

In this study, survival rate was 92.1% of the patients. Total 7 patients expired and all of them had multisystem involvement and all the patients had developed shock as an ultimate event.

Among the 7 patients expired, 4 patients had dengue shock syndrome with DIC with encephalopathy, 2 patients had hepatitis with myocarditis with encephalopathy, and 1 patient had ARDS as the cause of death. Leading cause of death in this study is dengue shock syndrome and dengue hepatitis.

DISCUSSION

This was a prospective observational study was conducted with the aim of studying clinic-epidemiological profile of dengue in children. Out of 7965 patients who were admitted over a period of 1 year from January 1, 2020 to December 31, 2020, the total number of confirmed dengue cases was 127. The incidence of dengue fever in this study among the hospitalized patients in the pediatric ward was 1.59%. Majority of the patients (52%) were in the age group of 6-12 years followed by age group of 1-5 years (38.6%) and only 9.4% were in <1 year age group which was similar to previous studies; Senthil et al, Yagnik et al and Jagdish et al.[5,7,8] In the present study, most common presentation was fever (100%) followed by vomiting (71.1%) followed by rash (55.1%), abdominal pain (47.2%), body ache (45.7%) and headache (40.9%). In previous studies also, most common presentation was fever, Yagnik et al (100%), Senthil et al (98%) and Kamlesh et al (100%).[5,7,8] Most of the patients were presented with warning signs (72%) followed by dengue without warning signs (26.8%) and least were presented with severe dengue fever (16.5%) which was similar to previous studies, that is, more patients of dengue fever with warning signs were observed, 74% in Yagnik et al and 64.6% in Hemant et al.[5,6]

Hepatitis was seen as the most common complication in dengue fever (10.5%) followed by dengue shock syndrome (7.9%). The most common complication in previous studies was hepatitis in Jagdish et al (18%) and Yagnik et al (16%).[5,8] Subsequently, more cases of dengue shock syndrome were seen in Jagdish et al (10%) and encephalopathy in Yagnik et al (8%).[5,8] Most of the patients had platelet count between 50000-1 lakh/mm^3 (45.7%) which was similar as found in the previous study, Jagdish et al and severe thrombocytopenia was seen in 21.2% of patients, mostly in severe dengue patients.[5] Findings were different compared to Senthil et al study in which most patients had platelet count between 1-1.5 lakh/mm^3.[7] Out of 54 patients admitted on the 1-3 days of fever, most of the patients had positive NS1 antigen test (94.4%) and only 3 patients had IgM positive report. In patients admitted after 6 days of fever, all the patients had positive serum IgM report. In Yagnik et al 86% of patients were NS1 positive and in Senthil et al 79.1% of patients were NS1 positive and in Jagdish et al, 64% were NS1 positive.[5,7,8] Hence we found in our study that that sensitivity of NS1 antigen is more in initial 4-5 days of fever.

Most of the patients were improved with IV fluids, 104 (81.9%) which was similar in previous studies. IV fluid was given in 93.8% of patients in Senthil et al and 89% of patients in Jagdish et al.[7,8] In the present study, survival rate was 92.1% of the patients which was similar to Yagnik et al (96%).[5]

Limitations

This was prospective observational study, so the follow up of the patients who had severe variety and had

complications was not possible. So, it may differ the outcome. As the study was conducted in a tertiary care hospital, the data was comprising more of patients with warning signs and less without warning signs. Thus, complicated cases outnumbered the normal cases. Also, the outpatient cases were less included in this study

CONCLUSION

Dengue fever is a common preventable vector borne disease with incidence around 1.59% and almost equally distributed in both sexes. Highest incidence of dengue fever was found in 6-12 years of age (52%). Most of the patients were presented with dengue fever with warning signs. Only 16.5% of patients had severe dengue and the most common presentation was dengue hepatitis followed by dengue shock syndrome and least occurring presentation was acute renal failure. Majority of patients were diagnosed with dengue NS1Antigen (71.7%). NS1 antigen was positive in 90% of patients presented in 1st to 5th day of illness while serum IgM was positive in all of the patients presented after 6th day of illness. This suggests higher sensitivity of NS1Antigen test in first 5 days and serum IgM after 5 days of illness. Most of the patients recovered with IV fluid therapy (81.9%) and only 15 patients (11.8%) required inotropic support. Platelet transfusion was required in 18 patients (14.2%) and was given in case of platelet count <20000/mm3 and/or having severe bleeding. Mortality occurs only when complications arise otherwise mostly cured with proper hydration. Hence, we concluded from this study that, prevention is the best cure for this disease.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. WHO. Dengue: guidelines for diagnosis, treatment, prevention and control. A joint publication of world health organization (WHO) and the special programme for research and training in tropical disease (TDR). New edition. 2014. Available at: https://www.who.int/publications/i/item/9789241547871. Accessed on 20 January 2024.
2. Kapse AS. Dengue illnesses. In: Parthasarathy A, Menon PSN, Agarwal RK, eds. IAP textbook of pediatrics. 7th ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.; 2019:397-8.
3. Kabra SK, Menon P. Dengue fever, dengue hemorrhagic fever, dengue shock syndrome. In: Ghai OP, eds. GHAI essential pediatrics. 9th ed. New Delhi: CBS publishers and distributors; 2019:219-24.
4. WHO. Special Programme for Research, Training in Tropical Diseases, World Health Organization. Department of Control of Neglected Tropical Diseases, World Health Organization. Epidemic, Pandemic Alert. Dengue: guidelines for diagnosis, treatment, prevention and control. World Health Organization; 2009. Available at: https://www.grepmed.com/images/2260. Accessed on 17th January 2024.
5. Yagnik C, Suva CM. A study of clinical profile of dengue fever in a tertiary care hospital of Jamnagar, Gujarat, India. Int J Res Med Sci. 2016;4(10):4500.
6. Jain H. Clinical profile and outcome of dengue fever in hospitalized children of South Rajasthan, India. Int J Contemp Pediatr. 2016;3(2):546-9.
7. Kumar SK, Rajendran NK, Brabhukumar C. Clinical profile of dengue fever in children: analysis of 2017 outbreak from Central Kerala, India. Int J Contemp Pediatr. 2018;5(6):2265.
8. Kumar J, Nagaveni P, Subbarao KV. Clinical and laboratory profile of dengue fever in children in tertiaty care centre in Telangana. J Evid Based Med Healthcare. 2020;7(5):758.

Cite this article as: Tripathy A, Gosai D, Pathak GH, Jadav MM. The study of clinical profile and management of dengue fever in children. Int J Contemp Pediatr 2024;11:1066-71.