Clinical spectrum of dengue in pediatric age group: A study at tertiary care hospital

Kirti Mehta[1], Avani Patel[2], Priti P Patel[3], Ankur Patel[3]

From [1]Associate Professor, [2]Senior Resident, [3]Assistant Professor, Department of Paediatrics, Government Medical College, Surat, Gujarat, India

Correspondence to: Dr. Priti P Patel, P101, Nilkanth Residency, Opposite Raj World Mall, Canal Road, Surat - 395 009, Gujarat, India.
E-mail: drpritipatel80@gmail.com

Received - 12 November 2019 Initial Review - 07 December 2019 Accepted - 15 January 2020

ABSTRACT

Background: Dengue is a mosquito-borne human viral disease, which has become a major public health problem recently. The clinical manifestation of dengue infection varies from asymptomatic to severe fatal condition in the form of dengue hemorrhagic fever/dengue shock syndrome. **Objectives:** The objectives of this study were to study the clinical profile and hematological changes in dengue fever. **Materials and Methods:** This prospective observational study was carried out at a tertiary care hospital from March 2017 to August 2018. The study population included dengue positive patients admitted to the pediatric ward. All the children age up to 12 years with positive dengue test either NS1 antigen or IgM/IgG antibodies by rapid serological test kit or ELISA were included in the study. **Results:** Of 105 cases, the most common clinical feature was fever (100%) with raised hematocrit value (45.8%), leukopenia (38.1%), and thrombocytopenia (74%). **Conclusion:** Hematological profile with thrombocytopenia, raised hematocrit, and leukopenia with raised serum glutamic-pyruvic transaminase gives enough clues to test for dengue serology to reduce the morbidity and mortality by early diagnosis and management of dengue illness.

Key words: *Clinical profile dengue, Dengue, Dengue fever*

Dengue fever (DF) is a benign syndrome caused by arthropod-borne viruses and is characterized by biphasic fever, myalgia or arthralgia, rash, leukopenia, and lymphadenopathy. Dengue shock syndrome (DSS) is a severe form and often fatal characterized by capillary permeability, abnormalities of hemostasis, and, in severe cases, a protein-losing shock syndrome which is thought to have an immunopathology basis [1].

Dengue is the most rapidly spreading mosquito-borne viral disease of humankind, with a 30-fold increase in global incidence over the past five decades. It is a major public health concern throughout the tropical and subtropical regions of the world. Almost half the world's population lives in countries where dengue is endemic. According to the World Health Organization (WHO), about 50–100 million new dengue infections are estimated to occur annually in more than 100 endemic countries, with a steady increase in the number of countries reporting the disease. Approximately 1.8 billion (>70%) of the population at risk for dengue worldwide live in member states of the WHO South-East Asia Region (SEAR) and Western Pacific region, which bear nearly 75% of the current global disease burden due to dengue. Of the 11 countries of SEAR, 10 countries including India are endemic for dengue [2].

Over the past two decades, there has been a global increase in the frequency of DF, dengue hemorrhagic fever (DHF), and its epidemics, with a concomitant increase in disease incidence. Various factors responsible for the resurgence of dengue epidemic are as follows: (i) Unprecedented human population growth; (ii) unplanned and uncontrolled urbanization; (iii) inadequate waste management; (iv) water supply mismanagement; (v) increased distribution and densities of vector mosquitoes; (vi) lack of effective mosquito control which has increased movement and spread of dengue viruses and development of hyperendemicity, and (vii) deterioration in public health infrastructure [3]. "Dengue" is a Spanish altered word evolved from the roots in the Swahili language as "Ki-dinga" [4].

In dengue, complications such as plasma leakage, hemorrhage, and organ impairment are prevented by early case detection which can be done by clinical suspicion with laboratory evidence and early treatment. With early recognition and prompt treatment, dengue-related morbidity and mortality can be reduced. A warning sign should be managed with fluid therapy according to clinical response. Several studies have previously analyzed the clinic-epidemiologic profile of dengue infection. In this study, we evaluated the laboratory-confirmed dengue cases presenting to the emergency departments of tertiary care hospital in an urban setting for their clinical and hematological profile, management, and outcome.

MATERIALS AND METHODS

A prospective observational study was carried out at a tertiary care hospital from March 2017 to August 2018. Ethical clearance was taken from the Human Research Ethical Committee to conduct this

study. The study population included serologically confirmed dengue patients admitted to the pediatric ward. Informed and written consent was obtained from the parents/guardian of all patients included in the study after explanation. All the children up to 12 years with positive dengue test were included in this study. Children who were positive for malaria, meningitis, and enteric fever and patients without parental consent were excluded from the study.

All the probable cases with high-grade fever, rash, lymphadenopathy, hepatomegaly, feature of shock, or hemorrhage were admitted with a provisional diagnosis of dengue to the pediatric ward. During the study, 160 suspected dengue cases with fever were admitted. Serological confirmation was done either with positive NS1 antigen or IgM/IgG antibodies by rapid serology test kit or ELISA. All the clinical findings and laboratory tests (complete hemogram with hematocrit and platelets, total count, and serum glutamic-pyruvic transaminase) were registered with monitoring chart of the sign of plasma leakage (pleural effusion, ascites, raised hematocrit, bleeding, hypovolemic shock, and thrombocytopenia). Blood parameters were monitored every day until a remarkable improvement was seen clinically and hematologically. All the data were entered into Microsoft Excel sheet and $p<0.05$ was considered statistically significant.

RESULTS

In the present study, there were 9990 pediatric admissions during the study, and out of them, 105 cases below 12 years of age were diagnosed as dengue cases giving a prevalence of 1.05%. Among them, 72.42% (75) were male and 28.57% (30) were female with a ratio of 2.5:1. The mean age was 7.5 years (range: 5 months–12 years). The most common age group was 7–9 years and it was lesser in infants. The patients with DF were 89 (84.7%), DHF was 14 (13.3%), and DSS was 2 (1.90%). The age group-wise distribution of dengue is shown in Table 1.

In the present study, dengue was more common in urban slums area with urban:rural ratio of 10.6:1. The majority of the cases of dengue (81%) occurred from August to January (post-monsoon). Of 105 seropositive patients, fever was present in all patients (100%), as shown in Table 2. The tourniquet test was positive in 15.24% of dengue patients. The most common laboratory finding was thrombocytopenia (74%) followed by hemoconcentration (45.8%) and leukopenia (38.1%), as shown in Table 3. Total leukocyte count (TLC) <4000/mm^3 was seen in 38.12% of cases, while 49.50% of cases had TLC of 4000–11,000/mm^3 and remaining 12.38% of cases had TLC of >11,000/mm^3.

In our study, a sign of plasma leakage like pleural effusion was present in 10.5% of cases, while ascites was present in 2.3% of patients. Majority (58%) of the patients had a positive dengue NS1 antigen test. Majority of the patients was presented in an early phase of dengue infection. The most common complication was disseminated intravascular coagulation (11.4%), while encephalopathy was mostly present in DSS, as shown in Table 4. In the present study, fluid therapy and symptomatic treatment were given in 87 (82.7%) cases and only symptomatic treatment was given in 18 (13.1%) cases. The majority of patients were discharged successfully, while 0.95% of cases expired.

Table 1: Age group-wise dengue cases

Age group (years)	Dengue fever	Dengue hemorrhagic fever	Dengue shock syndrome	Total
0–3	13 (92.8%)	0 (0%)	1 (7.2%)	14
4–6	20 (87%)	3 (13%)	0 (0%)	23
7–9	30 (79%)	7 (18.4%)	1 (2.6%)	38
10–12	26 (86.7)	4 (13.3%)	0 (0%)	30
Total	89	14	2	105

Table 2: Clinical profile of dengue

Symptoms	Number of patients (%)
Fever	105 (100)
Abdominal pain	76 (72.4)
Vomiting	71 (67.7)
Headache	75 (71.4)
Rash	30 (28.6)
Joint pain	27 (25.7)
Nausea	22 (20.9)
Difficulty in respiration	11 (10.5)
Retro-orbital pain	46 (43.8)
Abdominal distension	10 (9.6)
Petechiae/purpura/ecchymosis	13 (12.4)

Table 3: Distribution of signs and complications in DF, DHF, and DSS

Signs	DF	DHF	DSS
Impaired consciousness	0	0	2 (100%)
Pallor (%)	24 (27)	12 (85.8)	2 (100)
Lymphadenopathy	1 (1.1%)	0	0
Icterus (%)	15 (16.7)	12 (85.8)	2 (100)
Rash (%)	12 (13.5)	14 (100)	2 (100)
Petechiae (%)	1 (1.1)	13 (92.09)	2 (100)
Purpura (%)	1 (1.1)	6 (40)	2 (100)
Hepatomegaly	32	10	2
Splenomegaly	5	3	1
Platelet count			
≤20,000/mm^3	0	0	1
20,000–50,000/mm^3	4	4	1
50,000–100,000/mm^3	37	9	0
100,000–150,000/mm^3	22	1	0
Normal platelet count	26	0	0

DHF: Dengue hemorrhagic fever, DSS: Dengue shock syndrome, DF: Dengue fever

Table 4: Complications wise distribution

Complications	Number of patients (%)
Disseminated intravascular coagulation	12 (11.4)
Pleural effusion	11 (10.5)
Ascites	3 (2.3)
Encephalopathy	2 (4.8)
Raised hematocrit	48 (45.80)

DISCUSSION

In the present study, dengue accounted for 1.05% of pediatric admissions. These results were in accordance to the study conducted by Raj *et al*. [5]. The highest percentage of dengue admissions in the present study was noticed in >7 years of age group and lowest admissions in <3 years of age group, which is comparable with the study by Banerjee *et al*. [6]. In the present study, the male-to-female ratio was 2.5:1. Male predominance was also reported by Pai *et al*. and was explained by the traditional full covering of the skin surface in females as compared to males and more exposure of the male children to mosquitoes while playing outside in open fields [7].

In the present study, majority of the cases were classified into DF, and similar findings were also reported by Rathod *et al*. [10]. In the present study, majority of the patients was from urban area and less number of patients was from rural area, while in a study by Kulkarni *et al*. [8] and Shewale [9], patients from rural area were also in good number. This could be due to majority of the nearby area being urban slums; lesser number of patients was coming from the remote area.

Males and females were equally distributed in DHF which was comparable with the results obtained by Rathod *et al*. [10]. Majority of patients belong to DF (84.7%) and similar pattern was also present in the study by Raj *et al*. [5]. In the study done by Ratageri *et al*. [11] and Prathyusha *et al*. [12], maximum number of patients were from DHF, while it was less in the present study as majority of patients were admitted at the stage of DF and so progression of disease was prevented by early initiation of treatment.

The common clinical manifestations were fever, vomiting, abdominal pain, headache, and rash, where fever was most common, headache was present in 71.4% of patients, and rash was reported in 28.6% of patients. Fever was a common feature in all patients with dengue infections in all studies. In the study by Raj *et al*., the second most common feature was headache followed by an equal number of patients with abdominal pain and vomiting. In the study by Vazhayil *et al*., themajority of patients had vomiting which was the third most common complaint in the present study. Mogra *et al*. reported 50% of the cases with rash. Retro-orbital pain reported here was also observed by Banerjee *et al*. and Vazhayil *et al*. [6,13,14].

In the present study, majority of the patients had a positive dengue NS1 antigen test. These results were in accordance to the observations made by Vazhayil *et al*. [13], while Mishra *et al*. reported a positive rapid diagnostic test in majority of the patients [15]. This was mainly as the majority of patients presented in the early phase of dengue infections. Thrombocytopenia was the most common laboratory finding in dengue patients noted here, which was comparable with the observations made by other authors [10-12]. A total of 82.9% of patients were administered fluid therapy and 13.1% with symptomatic treatment in the present study, and these results were comparable to the study by Sharma *et al*. [16]. Newer findings were that patients in the study presented with retro-orbital pain along with fever.

This study had few limitations. The dengue cases that left without informing or took discharge against medical advice were excluded from the study as their investigations and outcome determination were not possible.

CONCLUSION

With an early diagnosis in initial stage and proper management, complications, morbidity, and mortality can be reduced. Moreover, community awareness and vector control measures need to be strengthened, especially during the peri-monsoon period to reduce dengue cases.

REFERENCES

1. Robert MK. Nelson Textbook of Paediatrics. Part. 17. 20th ed., Vol. 2. Ch. 269. U.S: Elsevier; 2016. p. 1629-32.
2. World Health Organization. National Guidelines for Clinical Management of Dengue Fever. Geneva: World Health Organization; 2015. p. 1-29.
3. National Vector Borne Disease Control Programme. Guidelines for Clinical Management of Dengue Fever, Dengue Haemorrhagic Fever and Dengue Shock Syndrome. New Delhi: National Vector Borne Disease Control Programme; 2008. p. 1-17.
4. Kapse A. Textbook of Paediatrics Infectious Disease-IAP. 1st ed. Ch. 5.13. Gwalior: Jaypee Brothers Medical; 2013. p. 313-21.
5. Raj AS, Munshi S, Shah BH. A study on clinical presentation of dengue fever in children. Int J Sci Res 2016;5:2272-5.
6. Banerjee A, Barik KL, Bandyopadhyay A, Paul UK. A study on the clinical features of dengue virus infected pediatric patients. Int J Contemp Pediatr 2018;5:368-71.
7. Pai Jakribettu R, Boloor R, Thaliath A, Yesudasan George S, George T, Ponadka Rai M, *et al*. Correlation of clinicohaematological parameters in paediatric dengue: A retrospective study. J Trop Med 2015;2015:647162.
8. Kulkarni MJ, Sarathi V, Bhalla V, Shivpuri D, Acharya U. Clinico-epidemiological profile of children hospitalized with dengue. Indian J Pediatr 2010;77:1103-7.
9. Shewale NS. Clinical profile and outcome of children admitted for dengue with warning signs and severe dengue. MedPulse Int J Pediatr 2017;3:23-7.
10. Rathod NP, Nusrat JR, Singh DK. A study of hematological and radiological profile of patients of dengue fever in paediatrics age group. Glob J Res Anal 2017;6:440-4.
11. Ratageri VH, Shepur TA, Wari PK, Chavan SC, Mujahid IB, Yergolkar PN. Clinical profile and outcome of dengue fever cases. Indian J Pediatr 2005;72:705-6.
12. Prathyusha CV, Rao MS, Sudarsini P, Uma K. Clinico-haematological profile and outcome of dengue fever in children. Int J Curr Microbiol Appl Sci 2013;2:338-46.
13. Vazhayil PP, Sindhu TS, Vinoth K. A retrospective observational study of dengue fever in a tertiary care center in Kerala. Int J Sci Study 2017;5:30-4.
14. Mogra G, Ghildiyal RG, Mohanlal S. Classification and study of the clinico-hematological profile of patients with dengue fever in the pediatric age group. Int J Contemp Pediatr 2016;3:1405-10.
15. Mishra S, Ramanathan R, Agarwalla SK. Clinical profile of dengue fever in children: A study from Southern Odisha, India. Scientifica (Cairo) 2016;2016:6391594.
16. Sharma N, Balasubramanyam V, Kandati J, Ponugoti M. Clinical and laboratory profile of dengue fever in children during an outbreak-one year study at tertiary care hospital, Chennai, Tamil Nadu, India. Int J Contemp Pediatr 2017;4:110-5.

Funding: None; Conflicts of Interest: None Stated.

How to cite this article: Mehta K, Patel A, Patel PP, Patel A. Clinical spectrum of dengue in pediatric age group: A study at tertiary care hospital. Indian J Child Health. 2020; 7(1):19-21.

Doi: 10.32677/IJCH.2020.v07.i01.005