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Clinical study of dengue fever in children of 1-12 years age group at a tertiary hospital

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Abstract

Background: Dengue infections vary in severity, ranging from influenza like self-limiting illness to life threatening dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). Present study was aimed to study dengue fever in 1-12 years age group at a tertiary hospital.
Material and Methods: Present study was single-center, observational, cross-sectional study, conducted in children (1-12 years age) with serologically confirmed (either with positive NS1 antigen or IgM/IgG antibodies by rapid serology test kit or ELISA) dengue admitted to the paediatric ward.
Results: During study period 135 children with dengue were studied. Majority were of 11-12 years age (40.74%), male (65.93%) & were hospitalized for 4-6 days (57.04%). Mean age of participants was 9.2 ± 1.9 years & mean duration of hospitalization was 3.8 ± 1.8 days. In present study, majority cases were of non-severe dengue fever (60.74%). Among 53 patients of severe dengue, 42 had dengue hemorrhagic fever (DHF) and 11 had dengue shock syndrome (DSS). Common symptoms in present study were fever (100.00%), headache (75.56%), vomiting (70.37%), abdominal pain (67.41%), retro-orbital pain (50.37%) & signs observed were pallor (39.26%), rash (28.89%), hepatomegaly (25.93%), icterus (15.56%). Majority of cases were managed with antipyretics (100.00%), IV fluids (77.78%) while few required platelet transfusion (5.93%), Whole blood transfusion (3.70%) & Dopamine (3.70%). In present study, 7 children required who Mechanical ventilation, 13 children who needed blood products, 3 children Developed AKI. Case Fatality was noted in 2 cases (1.48%).
Conclusion: Dengue in children was common among 11-12 years age, male & were hospitalized for 4-6 days. Majority children had NS 1 Ag +ve, platelet count was 100,000–150,000/mm^3 & managed with antipyretics, IV fluids only.

Keywords: Dengue, children, NS 1 Antigen, platelet count, had dengue hemorrhagic fever, dengue shock syndrome

Introduction

Dengue viruses (DV) occur as four antigenically related but distinct serotypes transmitted to humans by Aedes aegypti mosquitoes. These viruses generally cause either a benign

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syndrome, dengue fever (DF), or a severe capillary leakage syndrome, dengue haemorrhagic fever/dengue shock syndrome (DHF/DSS) [1]. Dengue infections vary in severity, ranging from influenza like self-limiting illness to life threatening dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) which, if left untreated, are associated with mortality as high as 20% [2].

Ranging from mild undifferentiated fever to severe shock, dengue illnesses have wide spectrum of clinical presentations. Clinical manifestations are variable in adults and children. Children in addition to normal signs and symptoms (High grade fever, myalgia, headache, and vomiting, retro bulbar pain) present with epistaxis, melena and Hepatomegaly. More cases of DHF are reported from children than adults. Dengue remains as puzzling disease in many aspects such as virus-host relationship and clinical expression variability [3].

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 [4]. Present study was aimed to study dengue fever in 1-12 years age group at a tertiary hospital.

Material and Methods

Present study was single-center, observational, cross sectional study, conducted in Department of Pediatrics, Vilasrao Deshmukh Government Medical College, Latur, India. Study duration was of 2 years (July 2019 to June 2021). Ethical clearance was taken from the institutional ethical committee to conduct this study.

Inclusion criteria

- Children (1-12 years age) with serologically confirmed (either with positive NS1 antigen or IgM/IgG antibodies by rapid serology test kit or ELISA) dengue admitted to the paediatric ward.

Exclusion criteria

- Cases confirmed as malaria, typhoid, chikungunya and other causes.
- Patients without parental consent.
- Informed and written consent was obtained from the parents/guardian of all patients included in the study after explanation.

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 paediatric ward. The demographic, clinical profile, clinical findings, sign of plasma leakage (pleural effusion, ascites, raised haematocrit, bleeding, hypovolemic shock and thrombocytopenia) and laboratory tests (complete hemogram with haematocrit and platelets, total count and serum glutamic-pyruvic transaminase) were noted.

Blood parameters Hb%, total platelet count (TPC), haematocrit, hemogram, Prothrombin time (PT), activated partial thrombin time (aPTT), Total lymphocyte count (TLC), liver function test were monitored every day until a remarkable improvement was seen clinically and hematologically. Ultrasonography of abdomen, chest X-ray were done in cases where required.

The enrolled cases were classified based on the WHO guidelines as severe dengue fever which included dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS), non-severe dengue (with or without warning signs) and undifferentiated fever. The patients were

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treated as per WHO guidelines by paracetamol, inotropes, I.V. fluids and whole blood, platelet transfusions where required. Outcomes of patients were recorded.
Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version statistical analysis was done using descriptive statistics.

Results

During study period 135 children with dengue were studied. Majority were of 11-12 years age (40.74%), male (65.93%) & were hospitalized for 4-6 days (57.04%). Mean age of participants was 9.2 ± 1.9 years & mean duration of hospitalization was 3.8 ± 1.8 days.

Table 1: General parameters

Parameter	Number of cases (N=135)	Percentage
Age (years)		
1-3	21	15.56%
4–7	28	20.74%
8–11	31	22.96%
11-12	55	40.74%
Mean age (years)	8.7	
Gender		
Male	89	65.93%
Female	46	34.07%
Duration of hospitalization (days)		0.00%
0–3	45	33.33%
4–6	77	57.04%
>6	13	9.63%
Mean duration of hospitalization (days)	3.8	

In present study, majority cases were of non-severe dengue fever (60.74%). Among 53 patients of severe dengue, 42 had dengue hemorrhagic fever (DHF) and 11 had dengue shock syndrome (DSS).

Table 2: Dengue according to severity

Dengue according to severity	Number of cases (N=135)	Percentage
Dengue Fever	82	60.74%
Severe dengue (DHF +DSS)	53	39.26%
DHF	42	31.11%
DSS	11	8.15%

Common symptoms in present study were fever (100.00%), headache (75.56%), vomiting (70.37%), abdominal pain (67.41%), retro-orbital pain (50.37%), nausea (43.70%), Joint pain (18.52%) & difficulty in respiration (9.63%). While common signs observed were pallor (39.26%), rash (28.89%), hepatomegaly (25.93%), icterus (15.56%), petechiae/purpura/ecchymosis (15.56%), abdominal distension (12.59%), splenomegaly (4.44%), lymphadenopathy (1.48%) & impaired consciousness (1.48%).

Table 3: Clinical profile of dengue

Symptoms	Number of cases (N=135)	Percentage
Fever	135	100.00%
Headache	102	75.56%
Vomiting	95	70.37%

Abdominal pain	91	67.41%
Retro-orbital pain	68	50.37%
Nausea	59	43.70%
Joint pain	25	18.52%
Difficulty in respiration	13	9.63%
Signs		
Pallor (%)	53	39.26%
Rash	39	28.89%
Hepatomegaly	35	25.93%
Icterus (%)	21	15.56%
Petechiae/purpura/ecchymosis	21	15.56%
Abdominal distension	17	12.59%
Splenomegaly	6	4.44%
Lymphadenopathy	2	1.48%
Impaired consciousness	2	1.48%

In present study majority children had NS 1 Ag +ve (48.15%), followed by both IGG & IGM +ve (31.85%), IGM +ve (16.30%) & IGG +ve (8.15%). Platelet count of majority cases was 100,000-150,000/mm^3 (33.33%), >150,000/mm^3 (31.85%), 50,000–100,000/mm^3 (27.41%), 20,000-50,000/mm^3 (6.67%) & ≤20,000/mm^3 (0.74%). Other findings we noted were deranged LFT's (15.56%), Deranged RFT's (9.63%) & Deranged Coagulation profile (3.70%).

Table 4: Serological profile of children with dengue.

Parameter	Percentage
Dengue Serology	
IGM +ve	16.30%
NS 1 Ag +ve	48.15%
Both IGG & IGM +ve	31.85%
IGG +ve	8.15%
Platelet count	
≤20,000/mm3	0.74%
20,000–50,000/mm3	6.67%
50,000–100,000/mm3	27.41%
100,000–150,000/mm3	33.33%
>150,000/mm3	31.85%
Other	
Deranged LFT's	15.56%
Deranged RFT's	9.63%
Deranged Coagulation profile	3.70%

Majority of cases were managed with antipyretics (100.00%), IV fluids (77.78%) while few required platelet transfusion (5.93%), Whole blood transfusion (3.70%) & Dopamine (3.70%). In present study, 7 children required who Mechanical ventilation, 13 children who needed blood products, 3 children Developed AKI. Case Fatality was noted in 2 cases (1.48%).

Table 4: Management of patients.

Management	Number of cases (N=135)	Percentage
Antipyretics	135	100.00%
I. V. fluids	105	77.78%
Platelet transfusion	8	5.93%

Whole blood transfusion	5	3.70%
Dopamine	5	3.70%
Other		
Children required who Mechanical ventilation	7	5.19%
Children who needed blood products	13	9.63%
Developed AKI	3	2.22%
Case Fatality	2	1.48%

Discussion

Several factors may influence disease severity, including host factors, virus serotype or genotype, sequence of virus infection, differences in dengue cross-reactive antibody, and T-cell responses [5]. DF is usually self-limiting, and death is uncommon. However, age-related differences in dengue severity are poorly understood and data on clinical features in adult patients are limited [6].

Although shock and plasma leakage seem to be more prevalent in younger patients, the frequency of internal haemorrhage augments as age increases [7]. Furthermore, complications of dengue infection observed in adults, including DF with unusual bleeding and DHF, have been increasing [8]. DHF can be distinguished from DF by the presence of increased vascular permeability (plasma leakage syndrome) and marked thrombocytopenia (100,000/ml) associated with bleeding, hepatomegaly and/or abnormal liver function [2]. Although children are more likely to develop hypovolaemic shock characterized by increased microvascular permeability in DHF, a high mortality rate has been observed in adult patients [9].

Sunetra Roy *et al*., [10] studied 107 cases, majority of patients were of the age group of 1-5 years (47%) & gender distribution was equal. Duration of fever was mostly for 6-10 days (69%) & only 40% of cases had the dengue rash. Bleeding manifestation were noted in 18%, mostly petechiae (10%). GI symptoms were the commonest manifestation (90%) followed by neurological symptoms (18%). Shock in the form of hypotension (14%) and oliguria was (5.6%) were taken as criteria of severe dengue. Platelet count < 50,000 was noted in 10.2% cases. Management of Dengue was mainly done with IV Fluids (83%). 97% cases were treated in pediatric wards. The duration of hospital stay was mainly for 5-7 days (57%). Mortality was 4%.

In study by Mehta K *et al*., [11] out of 105 cases, the most common clinical feature was fever (100%) with raised hematocrit value (45.8%), leukopenia (38.1%) and thrombocytopenia (74%). 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.

In study by Khandelwal R, [12] 26% of the patients had leucopenia (<4000), 66% had leucocyte count in normal range (4,000-11,000) and only 8% had leukocytosis (>11,000). About 34 (68%) patients had neutrophil count of less than 40% and 16 (32%) patients had neutrophils between 40 to 80%. In early febrile period of dengue fever, majority have normal white blood cell count. Any change in the values of total leucocyte count points towards the progression of the disease towards severity.

Premkumar B *et al*., [13] studied 360 children with dengue fever, there were 198 boys (55%). The most common affected age group was less than 3 years with 179 (49%). Among the cases, 297 (82%) were of severe dengue which constitute dengue haemorrhagic fever (38%) and Dengue shock syndrome (62%). Serological analysis showed NS1 Ag was positive in 144 children (40%), Dengue IgM was positive in 54 children (15%), both IgM and IgG positive in 126 children (35%) and IgG was positive in 36 children (10%). Out of the total children admitted with dengue fever, the case fatality was 0.5% (2 children).

In the study done by Sharma G *et al*., [14] in Rajasthan also the case fatality was 0.5%. In WHO manual, it was highlighted that, if untreated the fatality was 30 to 40% in patients with

DSS [15]. It is worthwhile to note that the survival of dengue infected children is directly related to early and intensive management.

Kumar SK *et al*., [16] studied 77 cases, classified into 67 (87%) non-severe and 10 (13%) severe dengue cases. The most common age of presentation was above 10 yrs. The mean age of admission was 8.9 yrs. The most common presenting symptom was fever seen in 93% followed by vomiting in 68%. Elevation in Aspartate transaminase (SGOT) and thrombocytopenia were found in 32.4%.

Patients suffering from dengue fever with warning signs and severe dengue need hospitalization [17]. Patients with unstable hemodynamics, major bleeding, respiratory distress and organ failure are often admitted to critical care unit [18]. Organ dysfunction is a frequent complication in patients of severe dengue infection. There may be a single or in combination of 2 or more organ dysfunction [19]. Severe organ impairment including hepatic failure, encephalitis or encephalopathy, acute renal failure and myocardial dysfunction is associated with high mortality even in the absence of plasma leakage and shock [15]. Disease severity, hyperlactatemia at admission, need for multiple vasoactive drugs and positive fluid balance are predictors of mortality in severe dengue infection in children admitted [20].

Conclusion

As the early presentations of DF and DHF/DSS are similar and the course of infection is short, timely identification of persons that will develop severe manifestations can be challenging. Dengue in children was common among 11-12 years age, male & were hospitalized for 4-6 days. Majority children had NS 1 Ag +ve, platelet count was 100,000–150,000/mm^3 & managed with antipyretics, IV fluids only.

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