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Original Research Article

Clinicohaematological profile of dengue in children: a hospital based study

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ABSTRACT

Background: Dengue fever is one of the most common arbo virus mediated outbreaks, being reported from different parts of the world. Now as the outbreaks are hitting different geographic locations, different clinical manifestations are being reported recently. The aim of this study is to document varied clinical manifestations and haematological parameters of dengue patients in a tertiary care centre.
Methods: A total 130 cases of any of NS1 antigen, IgM card test positive or IgM ELISA positive dengue patients were included in this observational study. Clinical and haematological parameters were noted and analysed statistically.
Results: Most common clinical feature was fever (100%) followed by headache (51.5%). Atypical features like seizures due to encephalitis was seen in a child with dengue. Seizure were present in 1.5% of cases, two children died due to severe dengue with shock and multi organ failure. In our study 26.92% of patients had thrombocytopenia. The mean Hb was 12.86 g/dl and platelet count was 104202/mm^3.
Conclusions: Fever and headache are the main features of dengue. However, one should be aware of different atypical presentations of dengue fever to diagnose and intervene timely. Early recognition of complication and timely intervention are required in the management of dengue cases.

Keywords: Children, Dengue, Dengue shock, Encephalitis

INTRODUCTION

Dengue is a fast-emerging pandemic-prone viral disease in many parts of the world. Dengue is a mosquito-borne viral infection causing a severe flu-like illness and sometimes causing a potentially lethal complication called severe dengue. Severe dengue was earlier known as dengue hemorrhagic fever.[1]

The incidence of dengue has grown dramatically around the world in recent decades. Over 2.5 billion people-over 40% of the world's population-are now at risk from dengue.[2] WHO currently estimates there may be 50-100 million dengue infections worldwide every year.[3]

The Aedes aegypti mosquito is the primary vector of dengue. The virus is transmitted to humans through the bites of infected female mosquitoes. After virus incubation of 4-10 days, an infected mosquito is capable of transmitting the virus for the rest of its life. Infected humans are the main carriers and multipliers of the virus, serving as a source of the virus for uninfected mosquitoes. Patients who are already infected with the dengue virus can transmit the infection (for 4-5 days; maximum 12days).[4]

Dengue fever (DF) is a severe, flu-like illness that affects infants, young children and adults, but seldom causes death. Dengue should be suspected when a high fever

(40°C/104°F) is accompanied by two of the following symptoms: severe headache, pain behind the eyes, muscle and joint pains, nausea, vomiting, swollen glands or rash. Symptoms usually last for 2-7 days, after an incubation period of 4-10 days after the bite from an infected mosquito. Severe dengue is a potentially deadly complication due to plasma leakage causing fluid accumulation, respiratory distress, severe bleeding, or organ impairment. Warning signs occur 3-7 days after the first symptoms in conjunction with a decrease in temperature (below 38°C/100°F) and include: severe abdominal pain, persistent vomiting, rapid breathing, bleeding gums, fatigue, restlessness, and blood in vomitus. The next 24-48 hours of the critical stage can be lethal; proper medical attention is warranted to avoid complications and risk of death.

New WHO classification- Dengue without warning signs (Group A), Dengue with warning signs (Group B) and Severe dengue (Group C-dengue hemorrhagic fever. dengue shock syndrome).[4]

There is no specific treatment for dengue fever.

For severe dengue, medical care by physicians and nurses experienced with the effects and progression of the disease can save lives-decreasing mortality rates from more than 20% to less than 1%. Maintenance of the patient's intravascular fluid volume is critical for severe dengue care.

Prevention-At present, no vaccine is available, the only method to control or prevent the transmission of dengue virus is to combat vector mosquitoes.

In the recent times, it has been observed that most patients admitted to our hospital with dengue fever were from Manglore (south karnataka) and from the northern kerala districts. Hence the objective of this study was to enumerate the varied clinical characteristics and hematological parameters of children affected with dengue fever from this region.

METHODS

This was an observational prospective study. The patients were selected from Father Muller Medical College hospital, Mangalore, Karnataka. The study was approved by the ethics committee of the hospital and informed consent was obtained from all the subjects. We included 130 patients diagnosed of dengue fever from June 2014 to May 2016 in the study. All the patients, who presented with fever and found positive to any one of Dengue NS I antigen and anti-dengue IgM antibodies (card test) or IgM enzyme-linked immunosorbent assay (ELISA) admitted in the hospital were included in the study. A detailed history was taken and a careful clinical examination was performed. The laboratory investigations like hemoglobin (Hb), the total and the differential leukocyte counts (TLC and DLC), platelet count, hematocrit (Hct), done in all patients and tests like liver function tests (LFT). Urea, Creatinine, Chest X-Ray and Ultrasonography of abdomen were done in relevant patients. Haemoglobin and haematocrit on admission and the lowest recorded platelet count during the hospital course was considered for this study. Patients were managed as per standard guidelines. Results were analysed statistically with chi square test using SPSS software version 21.0.

RESULTS

In this study, total of 130 dengue patients who met the inclusion criteria; who was diagnosed by any one of Dengue NS I antigen, anti-dengue IgM antibodies (card test) or IgM enzyme-linked immunosorbent assay (ELISA), were included and analyzed.

The demographic details are depicted in Table 1, different clinical features of these patients are shown in Table 2 and Table 3 shows various clinical signs of children admitted with DF.

Most patients were from rural area (57%) when compared to urban area (43%). Most common age group affected was adolescents (10.1-15 years), youngest affected was 1 year of age.

Table 1: Demographic characteristics.

Characters	No. of patients	%
Age in years		
0-5 years	23	18
5.1-10 years	49	38
10.1-15 years	58	44
Sex		
Male	74	57
Female	56	43
Epidemiological features		
Urban	55	43
Rural	75	5
History of DF in family	32	25
History of DF in neighbourhood	2	1.5

Table 2: Symptoms of dengue fever.

Symptoms	No of patients (n=130)	%
Fever	130	100
Headache	67	51.5
Arthralgia/ myalgia	35	26.92
Vomiting	51	39.23
Abdominal pain	32	24.61
Bleeding	4	3.0
Altered sensorium	3	2.30
Seizure	2	1.53
Rash	13	10

Fever was present in all 130 patients (100%), next common symptom was headache 67 (51.5%) followed by vomiting 51 (39.23%) and myalgia (26.92%). Bleeding from different sites of the body was evident in 4 patients (3%). Among these 2 patients had gum bleeding and other 2 patients had gastrointestinal bleeding in the form of hematemesis. 13 patients (10%) had rash, which was erythematous maculopapular type and 15 patients (11.53%) had petechiae.

60 children (46.15%) had hepatomegaly and abdominal tenderness was seen in 32 patients (24.69%). 32 children had hypotension (24.61%). One child had dengue encephalitis which recovered without any neurological deficits, and 1 had malaria (vivax) and dengue together. 2 children had generalized seizure of which 1 was diagnosed to have encephalitis and other had febrile seizure. Two children died due to severe dengue (shock with multi organ dysfunction).

Table 3: Signs of dengue fever.

Signs	No of patients (n=130)	%
Tachypnoea	2	1.53
Tachycardia	6	4.61
Hypotension	32	24.61
Hess test positive	9	6.92
Petechiae	15	11.53
Hepatomegaly	60	46.15
Oedema	5	3.84
Plasma leak	3	2.30
Encephalopathy	1	0.76
Splenomegaly	15	11.53
Abdominal tenderness	32	24.69
Flushing	58	44

Most of the patients admitted were in group A (68.46%) followed by group B (28.46%) and only 4 patients (3.07%) had characteristics of group C (Table 4). Various clinical parameters like headache, hemorrhagic manifestations, rash and hepatomegaly were compared in all three groups and a significant p value (<0.0001) was observed.

Table 4: Type of dengue and number of patients.

Type of dengue	No of patients (n)	%
Group A	89	68.46
Group B	37	28.46
Group C	4	3.07

Haematologic parameters like haemoglobin and haematocrit on admission and the lowest recorded platelet count during the hospital course was considered for this study. The mean and standard deviation of hemoglobin, hematocrit and platelet count were calculated. The mean Hb was 12.86 g/dl with standard deviation of 1.73 and the mean haematocrit was 39.12% with standard deviation of 3.28. The mean platelet count was 104202/mm^3 with a standard deviation of 47879. 35 patients had platelet count of <100000 cumm (26.92%). The lowest platelet count noted in this study was 8200 mm^3.

Table 5: Comparison of clinical parameters in types of dengue.

	Group A	Group B	Group C
Headache	50	15	2
Hemorrhagic manifestation	0	0	4
Rash	10	2	1
Hepatomegaly	41	16	3

chi square - 104.37 p value - <0.0001

DISCUSSION

We have found that the varied spectrum of dengue fever (DF) has ranged from some known clinical presentations of fever, rash, headache to some atypical presentations like encephalitis. Some features are increasing in the recent outbreaks like neurological manifestations (encephalitis), as evidenced by recent studies.[7]

In DF, cutaneous manifestations can vary from maculopapular rash, petechiae and flushing. In our study, we found maculopapular rash in 10% and flushing in 44% cases. In a study of 300 patients by Nadia A et al, flushing was present in 28.7% and 44.9% had maculopapular rash.[5] In a study of 62 patients in Japan, by Itoda et al, rash was more frequent in 82% cases.[6] In a north Indian study by Karoli R et al, rash was present in 26% cases while 16% had cutaneous hypersensitivity.[7] Rahim MA et al, also found rash in high frequency of 78.5% in a Bangladesh based study.[8]

Thrombocytopenia is one of the important causes of devoloping petechial rash and other mechanism like immunologic cause may be an explanation for developing these rashes. Dengue virus when interacts with host cells, there occurs release of cytokines and stimulation of immunologic mechanism by which vascular endothelial changes, infiltration of mono-nuclear cells and perivascular edema occurs.[5] In our study the mean platelet count was 104202/mm^3. Bleeding diathesis is a known feature of DF because of low platelet count and leakage of plasma from blood vessels. Bone marrow suppression, immune mediated clearance and spontaneous aggregation of platelets to virus infected endothelium may be responsible for such thrombocytopenia.

In our study, we found only 4 patients (3%) had bleeding episodes in the form of gum bleeding and hematemesis, in a north Indian study by Seema A et al, 8% patients had bleeding episodes while 26% patients had platelet count below 20,000/cmm and 84% had <1 lakh/cmm.[9] On the other hand, in a Delhi based study by Tripathy BK et al, hematemesis, melena and epistaxis were found in 28.28%,

26.78% and 14.28% respectively but only 12.85% cases had platelet count <70,000/cmm.[10] But in a Hyderabad based study by Khan AH et al, only 5% patients had bleeding while 40% had thrombocytopenia.[11] A Study conducted on 84 cases in Sudan by Ageep AK et al bleeding was present in 93% of cases and thrombocytopenia in 88% cases.[12]

In north Indian children, a study was done by Mittal H et al, which revealed thrombocytopenia in 92.6% while bleeding was present in 48.8% cases.[13]

Headache due to systemic inflammatory mediators, is a well-known feature in dengue fever. In our study, we found 51.5 % patients presented with headache. In a study done by Singh NP et al it was 61.6%.[14]

But in some studies, like by Itoda I et a1 done in Japan, headache was present in 90% cases.[6] On the other hand the north Indian study by Seema A et a1, reported headache in only 9% of cases.[9] We have noted some neurological manifestations which were not very common in previous outbreaks.

One child had dengue encephalitis. MRI showed brainstem hyper intense lesion. He recovered without neurological deficits with disappearance of intensities on follow up scans.

Neurological involvement in dengue may occur because of neurotropism of the virus, immunologic mechanism, cerebral anoxia, intracranial haemorrhage, hyponatremia, cerebral oedema, fulminant hepatic failure with portosystemic encephalopathy, renal failure or release of toxic products. In a study by Kamath SR et al, neurological manifestations were noticed in 20% of the patients. In our study, it was only 0.76 %.[2]

In our study, 26.92% of patients had thrombocytopenia which was much lesser when compared to a study done by Ritu karoli et al (86%).[7] Mortality was less (1.53%) in our study when compared to same study done by Ritu karoli et al (6%).[7]

Early interventions and awareness of the disease among our study population are probably the reasons for favourable outcome in our study.

CONCLUSION

In the recent few years, the world has seen varied clinical presentation of the Dengue fever in different epidemics, even in the same regions and with same period of time. Even though some known features are still manifesting, few atypical features are noted from several parts of the world as evidenced with the current study.

With timely diagnosis and prompt management, mortality can be minimized.

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