Original Article

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Clinico: Epidemiological Study of Dengue Fever

Patil Basavaraj M., MD(PED)*; Harshangi Sandeep V., Waddankeri Srikanth***, Dharmanand Reddy******

*Associate professor, Dept of Pediatrics, **Assistant professor, Dept of Pediatrics, ***Prof and Head of Department, Dept of Pediatrics, *****Sr Resident, Dept of Pediatrics, M.R. Medical College, Gulbarga, Karnataka 585105.

Abstract

Children with dengue fever presenting to the Basaveshwar Teaching And General Hospital and Sangmeshwar Teaching and General Hospital Attached to M.R. Medical College, Gulbarga, during the months of January 2011 to December 2012, were prospectively followed up for clinical profile and outcome.

Commonest clinical features were fever, vomiting, bleeding, body pain and Hepatomegaly. Elevated liver enzymes and low platelet counts were common laboratory findings in dengue. Hepatomegaly and thrombocytopenia were more common in DHF and DSS group. Retro-orbital pain was slightly more in DHF and DSS groups and there was a tendency for DSS to present at an earlier age.

Keywords: Dengue,Hepatomegaly,Thrombocytopenia.

Introduction

Dengue is the most important of the arboviral infections of humans.[1] Global incidence of Dengue fever (DF) and Dengue hemorrhagic fever (DHF) has increased dramatically in the recent decades.[1,2] In India, epidemics are becoming more frequent.[1,2] Involvement of younger age group and increase in the frequency of epidemics are indicators of higher incidence of infection.[1] If untreated, mortality from complications of DF is as high as 20%, whereas if recognized early and managed properly, mortality is less than 1%.[2] Early diagnosis is essential and clinical suspicion is based on the frequency of symptoms in the population. Additional data about the disease lead to implementation or alteration of public health programs. Thus there is a need to keep track of various manifestations and gather descriptive data of the disease in each epidemic.

Subjects and Methods

This prospective study was done on cases of DF/DHF reporting at Department of pediatrics, M.R. Medical College, Gulbarga between January 2011 and 31st December 2012 when dengue occurred in Gulbarga. A total of 146 children identified as probable cases by clinical suspicion (any acute febrile illness with one of the following: myalgia, headache, retro-orbital pain, bleeding, altered sensorium, shock or low platelet count) were registered in the study, informed consent was obtained and detailed clinical history was taken. For all cases, the rapid IgM-IgG capture ELISA test, which has become the standard for serological diagnosis of dengue fever[3], was done at our laboratory, Gulbarga. Children positive for NS1, IgM alone or both IgM and IgG were followed up for clinical profile. Cases of typhoid and leptospirosis were

Corresponding Author: Dr Basavaraj Patil, Associate Professor, Dept of Pediatrics, M.R. Medical College, Gulbarga – 585105, Karnataka. Email: dr.basavarajpatil@gmail.com

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excluded by serological tests done at the appropriate time interval after the onset of fever. Cases where malarial parasite was seen in peripheral smear were also excluded. The number of cases included based on the above criteria was 146. Children who were dengue seropositive were classified on basis of WHO criteria[1] as follows: (*i*) dengue fever (DF): dengue seropositive satisfying WHO; (*ii*) dengue hemorrhagic fever (DHF); and (*iii*) dengue shock syndrome (DSS): evidence of peripheral circulatory failure.

Laboratory investigations carried out in these patients included hemoglobin, total and differential leukocyte count, hematocrit, platelet count and Complete blood counts including hematocrit were repeated daily during the acute phase of the illness. Chest x-ray was taken to demonstrate pleural effusion in all cases. CSF analysis was done in patients with convulsions or meningeal signs.

The clinical manifestations and laboratory findings of each group of illness were taken for study. Cases were managed according to the WHO protocol[1] and outcome was analyzed.

Results

Hundred and forty six seropositive cases were reported in our hospital during the study period of which 12 were DSS, 10 were DHF, and 124 were DF. The age group of the affected children less then 1year was 29 cases, 1year to 5year was 45 cases and with a modal age group of 6years to 12 years was 42 cases and 13 years to 18 years were 16 cases. DSS occurred at a lower age group than other complications of dengue fever, but the difference was not statistically significant.

Most common presentations were fever (100%), vomiting, headache, pain abdomen and myalgia (*Table I).* Fever, vomiting and body pain. The mean duration of fever at the time

Table I: Symptoms and Signs of Dengue Cases

S.No.	*Feature*	*Dengue infection*	*DF*	*DHF*	*DSS*
1	*Number of cases*	*146*	*124 [84.9]*	*10 [6.8]*	*12 [8.2]*
2	*Male sex,no.(%)*	*80 [54.7]*	*69 [55.6]*	*6 [7.5]*	*5 [6.2]*
3	Fever, no. (%)	146[100]	126 [86.3]	8 [5.4]	12[8.2]
4	Mean duration of fever days: (s.d.)	5.3	6	4	6
5	Vomiting, no. (%)	56(38.3)	44 [78.5]	5 [8.9]	7 [12.5]
6	Bleeding, no. (%)	2 [1.3]	0	2 [100]	0
7	Body pain, no. (%)	24 [16.4]	12 [50]	0	12 [50]
8	Headache, no. (%)	22 [15.0]	21 [95.4]	0	1 [4.5]
9	Drowsiness, no. (%)	19 [13.0]	10 [52.6]	4 [21.0]	5 [26.3]
10	Abdominal pain, no. (%)	22 [15.0]	16 [72.7]	2 [9.09]	4 [18.1]
11	Bleeding from >1 site,no (%)	2 [1.3]	0	0	2 [100]
12	Retro-orbital pain, no. (%)	16 [10.9]	15 [93.7]	0	1 [6.3]
13	Cough	17 [11.6]	15 [88.2]	1 [5.8]	1 [5.8]
14	Convulsions	14 [9.58]	10 [71.4]	0	4 [28.5]
Signs					
15	Hepatomegaly, no. (%)	85 [58.2]	67 [78.8]	8 [9.4]	10 [11.7]
16	Tourniquet+ve, no. (%)	19 [13.01]	8 [42.1]	8 [42.1]	3 [15.7]
17	Shock, no. (%)	15 [10.27]	2 [13.3]	1 [6.6]	12 [80]
18	Conj. suffusion, no.(%)	38 [26.02]	26 [68.4]	6 [15.7]	6 [15.7]
19	3rd space fluid, no (%)	41 [28.08]	25 [60.9]	6 [14.6]	10 [24.3]
20	Lymphadenopathy, no. (%)	2 [1.36]	2 [100]	0	0
21	Pallor	67 [45.8]	55 [82.08]	6 [8.9]	6 [8.9]
22	Rashes, no. (%)	32 [21.9]	20 [62.5]	8 [25]	4 [12.5]

Table II: Investigations and Management of Dengue Seropositive Cases

S. No.	Investigation	Dengue Infection	DF	DHF	DSS
1	Mean Hemoglobin, g/dL	9.9	10.1	9.3	10.3
2.	Hematocrit, mean	30.4	32.3	27.7	31.3
3.	Platelet count cells/ cumm, mean	1,16,513	126 [1,10,540]	10 [1,37,000]	12 [1,01,999]
4	Platelet count >2, 00,000 cumm, no (%)	27 [4,31,500]	26 [2,83,000]	1 [5,80,00]	0
5.	Platelet count >1,00,000 to 2,00,000 cumm, no (%)	40 [1,44,000]	38 [1,48,000]	O	2 [1,40,000]
6.	Platelet count 50,001-100000/cumm, no (%)	38 [64,106]	31 [69,903]	4 [60,750]	3 [61,666]
7.	Platelet count <50,000 Cumm, no (%)	43 [23,855]	31 [25,900]	5 [23,500]	7 [22,166]
8.	Differential lymphocyte count no (%)	46.5	44.9	50.1	44.7
9.	AST > 50 IU/L, no (%)	23 (54.7)	14 (45.1)	5 (71.4)	2 (50)
10.	ALT > 50 IU/L, no. (%)	21 (50)	15 (48.3)	4 (57.1)	2 (50)
11.	S. Alkaline Phosphatase >200 IU/L, no (%)	18 (42.8)	14 (45.1)	2 (28.5)	2 (50)
12.	Urine albumin present	17 (40.4)	13 (41.9)	2 (28.5)	2 (50)
13	NS1 Ag positive	46	40	2	4
14	IgM positive	100	84	6	10

Table III:Out come of dengue infection

Outcome of dengue infection	Dengue fever	DHF	DSS
Improved discharged	124	10	10
Death	0	0	2

of admission to the hospital was 5.33 days. Common signs were, conjunctiva suffusion, pallor, third space fluid, and Hepatomegaly (58.2%) (Table I).

Tourniquet test was positive in 19 and bleeding tendency noted in 2 cases. Patients with DHF and DSS had a higher proportion of tourniquet test positivity. Frank bleeding was noted in 2 cases and hematemesis was the commonest bleeding tendency.

On clinical examination the most consistent finding was Hepatomegaly. DF cases had significantly Hepatomegaly. Other findings included epigastric tenderness in 13 and splenomegaly in 17 cases respectively, besides those shown in *Table I*. Meningeal signs were noted in 7 cases. Only 12 were classified as DSS because these cases showed evidence of plasma leakage.

Laboratory investigations (*Table II*) revealed a large proportion of mildly anemic patients among our cases. A hematocrit more than 40 was noted in only 16 children. A fall of hematocrit by more than 20% on treatment was noted in 14 cases. Platelet counts were also significantly lower in the DHF and DSS groups. There was no correlation between the platelet counts and bleeding in classical dengue fever.

Liver enzymes were markedly elevated in more than 60% of the children who were dengue seropositive. Aspartate aminotransferase (AST) was elevated in a larger proportion of the patients. There was no significant difference between the subgroups of dengue with respect to liver function tests. Albuminuria was seen in a one third of the patients.

Outcome of dengue infection, dengue fever 124 cases, dengue hemorrhagic fever 10 cases and dengue shock syndrome 10 cases were improved and discharged and 2 cases of

dengue shock syndrome were death. (Table III)

Discussion

The age group affected by dengue fever and its complications is lower in this study compared to previous Indian studies. This supports the view that endemicity of dengue fever is increasing in India. Among the subgroups of dengue there is a distinct tendency for DSS to occur at lower age, though the difference is not statistically significant. However, previous studies have not noted any difference in age between dengue with and without shock.[3-6]

Fever and vomiting were the most frequent symptoms and Hepatomegaly was the most frequent sign in these children, as observed in earlier studies.[4,6,7] Vomiting, body pain, drowsiness and bleeding are slightly more common in DSS and DHF group than the others, though the difference is not statistically significant. Hepatomegaly is a less frequent finding among adults as reported in Philippines and Delhi.[8,9] We found Hepatomegaly to be more in DHF and DSS groups than others, in contrast to previous studies.[6,10]

Hematemesis is the most common bleeding manifestation in our cases as reported in other studies on Indian children.[4,7,10] Studies in other countries especially South-East Asian countries, report tourniquet test positivity as the commonest bleeding manifestation.[3,8] Low proportion of positive tourniquet test in Indian studies [4,5,7,9, 10] may be due to the darker skin color or may be the result of different strain of the dengue virus affecting the Indian subcontinent. The proportion of patients having positive tourniquet test among those with frank bleeding is 42.8% which is not very different from the proportion among those without frank bleeding 20%. Thus tourniquest test does not correlate well with other bleeding manifestations in dengue fever, similar to the finding reported by Wali *et al.* [11] This may be because tourniquet test positivity and other bleeding manifestations have different pathogenesis. This has resulted in the modified 1997 WHO criteria for DHF[1], where tourniquet test is no longer essential for the diagnosis of DHF.

There are a low proportion of children with evidence for hemoconcentration in our study group. If this was not taken as an essential criteria for DHF as in Aggarwal *et al*[7], nine more cases could have been included in DHF group and three more in DSS group. The overall mean hematocrit value in the non DHF/DSS group was only 32.2%. Thus it is necessary to conduct studies towards defining the cutoff points for raised hematocrit to diagnose DHF in Gulbarga population as conducted by Gomber *et al*[5] in Delhi, which identified the cutoff value as 36.3%. In cases without evidence for hemoconcentration (DF or DFB), there was no correlation between platelet count and bleeding manifestation. This supports the finding by other studies of the important contribution of factors other than thrombocytopenia in bleeding in dengue fever cases[6,9] However studies which include only DHF cases show correlation between platelet count and bleeding manifestations.[11] This gives further evidence that bleeding manifestations due to classical dengue fever (DFB) are multifactorial.

The other important laboratory finding is the rise in serum levels of liver enzymes (LFTs) as reported in various studies.[3,10,12] However, our study failed to demonstrate a significant difference in the LFTs between the subgroups of Dengue, unlike other studies.[4,12] The high incidence of vomiting, Hepatomegaly and elevated liver enzymes can serve as markers for suspicion of dengue during an epidemic. Subclinical hepatitis may contribute to the abdominal pain and vomiting in these children.

The mortality in our series was comparable with other Indian studies.[4,7,9] Both the children who died had DSS and expired within 24 hrs of hospitalization. In these cases, the period of defervescence preceding shock was found to produce a sense of complacency in parents and contributed to the late

presentation at the hospital. Hence health education regarding manifestations of DSS is important during an epidemic. It needs to be emphasized that a child between 3 months -6 years becoming drowsy or cold after a period of fever lasting 3-4 days has to be immediately brought to the hospital.

Conclusion

To conclude, this study shows that DF is becoming more prevalent in India. In children, importance should be given to symptoms like fever, vomiting, bleeding and musculoskeletal pain. If these are associated with Hepatomegaly and elevated liver enzymes in context of a low platelet count, a strong possibility of DF or DHF is present, especially in an epidemic setting. There are few symptoms or signs which can reliably differentiate between DF, DHF and DSS. Retro-orbital pain, Hepatomegaly and positive tourniquet test are certain markers that predict DHF.

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