ORIGINAL ARTICLE

AN EPIDEMIOLOGICAL STUDY, CLINICOPATHOLOGICAL CORRELATION AND MANAGEMENT OF DENGUE FEVER

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ABSTRACT: BACKGROUND: Dengue fever is an arthropod borne viral syndrome. **OBJECTIVE:** This study evaluated the newer signs and symptoms, to come to a bedside diagnosis of dengue fever and to predict the prognosis on the basis of clinical features and investigations. **METHODS:** This was a prospective study and included children aged upto 15 years, admitted in the pediatric ward over 2 year period. Dengue like fever was defined according to WHO guidelines and then newer signs and symptoms and lab investigations were looked for,and treated symptomatically according to WHO guidelines.**RESULTS:** Most of the children included were in the age group of 6-12 years with mean age being 5.3 years. Male to female ratio was 1.3:1 . Maximum patients were seen in winter with peak in October. Out of 90 children 13.3 % of DF , 48.89 % DHF, 37.78% DSS. The newer clinical features were found to were Pruritus (80%)on recovery ,retro orbital pain(35%),Anorexia 68% ,Sore throat 30% , Fever(100%), Scrotal oedema (10%), Loose stools(20%), Cardiomyopathy (10%), Encephalopathy (1%), Menorrhagia(20%). One child had presented with Autism /ADHD on followup. Mortality rate 8.8% and all belonged to DSS group. Poor prognostic factors for death were vomiting, tachypnea ,convulsions, fluid collection in lungs, abdomen ,altered sensorium, convulsions , raised SGPT and secondary infections.Fluid therapy (Oral / IV) was used in all Platelets and blood transfusion was given in 20% and 13.3 % respectively. Ionotropes were used for DSS cases. **CONCLUSIONS:** The timely appropriate identification and timely management of Dengue fever go a long way in reducing mortality in dengue.

KEY WORDS : Dengue fever,Dengue hemorrhagic fever,shock

INTRODUCTION: Dengue is mosquito borne viral illness caused by Flaviviridae, genus flaviviridae, genus flavivirus. Epidemics of an illness compatible with dengue fever were first reported in the medical literature in 1779 and 1780 and until the 1935 – 45 war pandemics of Dengue Fever occurred every 10-30 years. Nevertheless, recurrence of epidemic of DF at any one location was infrequent. During the Second World War south East Asia experienced the co-circulation of multiple dengue virus serotypes and epidemic activity increased. [(1)]

With subsequent uncontrolled growth of cities, epidemics of Dengue Fever associated with Dengue Hemorrhagic Fever emerged as a major public health problem. Dengue virus infection is increasingly being recognized as one of the world's major emerging infectious diseases.

The clinical picture of Dengue virus infection varies from asymptomatic infection to a febrile flu like illness to a more severe form like DHF which can lead to Dengue Shock Syndrome.

During epidemics of dengue, attack rates among susceptible are often 40 to 50% but can reach up to 80 to 90%. Without proper treatment, DHF case fatality rate can exceed 20%. With modern supportive therapy rates can be reduced to less than 1% [(1)].

Dengue virus is now the most common cause of arboviral disease in the world.

AIMS & OBJECTIVES: To study the epidemiological factors and various clinical presentation of Dengue viral infection and also various pathological and radiological abnormalities in Dengue viral disease.

To correlate the clinical symptoms and signs with the pathological features of the disease and study the management strategies of dengue viral infection.

To suggest measure to reduce the morbidity and mortality associated with Dengue.

MATERIAL AND METHODS: This was a hospital based observational clinical study conducted in department of Pediatrics in Pediatric intensive care unit and in ward of a major tertiary care hospital in Dhule for the period of two years.

INCLUSION CRITERIA: The diagnosis of Dengue fever, dengue hemorrhagic fever and dengue shock syndrome according the definition of WHO probable cases of dengue.
Dengue IgM positive

EXCLUSION CRITERIA: Patient who does not full fill the criteria for probable case of dengue
Patients having thrombocytopenia due to any other haematological disorder will be excluded.
Patient those who are not willing to give consent.

METHOD

Clinical data was collected using a structured Proforma which was including the case history, clinical findings, laboratory investigations and management.
Monitoring and treatment was given as per WHO guidelines of Dengue.

RESULTS:

Presentation of Dengue	No. of cases	Percentages (%)
Dengue Fever (DF)	12	13.33
Dengue Hemorrhagic Fever (DHF)	44	48.89
Dengue Shock syndrome (DSS)	34	37.78
Total	90	100

Table 1 – Various presentations of Dengue

In this study, the total numbers of cases were 90. Out of which 44 (48.89%) were cases of Dengue Hemorrhagic fever, 34 (37.78%) were cases of Dengue Shock syndrome and 12 (13.33%) were case of Dengue fever. Dengue Hemorrhagic Fever was most commonly seen in the study.

In the two years of study, total numbers of cases were maximum in month of October that is 29 cases.

Sr.	Complaints	Age Group			
		0 - <1 yr	1 - <6 yr	6 – 12 yrs	Total
	Fever	9	35	46	90 (100%)
	Biphasic	1	5	6	12(13.33%)
	Vomiting	5	26	38	69(76.67%)
	Back pain	0	6	14	20(22.22%)
	Refusal to Feed	9	11	13	33(36.76%)
	Retro Orbital Pain	0	3	28	31(34.44%)
	Headache	0	13	22	35(38.89%)
	Body ache	0	6	4	10(11.11%)
	Arthralgia	0	5	8	13(14.44)
	Myalgia	0	9	16	25(27.78%)
	Rash	5	26	32	63(70%)
	Bleeding Gums	1	7	4	12(13.33%)
	Bleeding Nose	4	10	13	27(30%)%
	Bleeding Mouth	0	6	2	8(8.89%)
	Bleeding Stool	3	16	21	40(44.44%)
	Abdominal Pain	1	22	26	49(54.44%)
	Abdominal Distension	5	12	13	30(33.33%)
	Convulsion	2	5	0	7(7.78%)

Table 2 – Frequency distribution of common complaints among different age groups in study subjects :

The above table represents the various clinical symptoms seen commonly in dengue cases.

Clinical Findings Presence of	Diagnosis			Total (n=90)
	DF = (n=12)	DHF (n = 44)	DSS (n = 34)	
Tachypnea	2 (16.67%)	14(31.82%)	28 (82.35%)	4(48.89%)
Pallor	6 (50%)	22 (50%)	19(55.88%)	47(52.22%)
Icterus	0 (0%)	2 (4.55%)	2(5.88%)	4 (4.44%)
Lymphadenopathy	4 (33.33%)	4 (9.09%)	1(2.94%)	9 (101%)
Pedal Edema	5 (41.67%)	19 (43.18%)	12(35.29%)	36 (40%)
Periorbital Edema	1 (8.33%)	4 (9.09%)	3(8.82%)	8 (8.89%)
Limb edema	4 (33.33%)	15(34.09)	7(20.59%)	26 (28.89%)
Anasarca	0(0%)	0 (0%)	9(26.47%)	9 (10%)
Petechiae	0(0%)	32 (72.73%)	13(38.24%)	45 (50%)
Purpura	0(0%)	5 (11.36%)	2(5.88%)	7 (7.78%)
Ecchymosis	0(0%)	0 (0%)	1(2.94%)	1 (1.11%)
Gum Bleeding	0(0%)	7 (15.91%)	4(11.76%)	11 (12.22%)
Epistaxis	0(0%)	17 (38.64%)	10(29.41%)	27 (30%)
Melena	0(0%)	26 (59.09%)	19(55.88%)	45 (50%)
Hematemesis	0(0%)	7 (15.91%)	10(29.41%)	17 (18.89%)
Rash (total cases)	9 (75%)	35 (79.55%)	22(64.71%)	66 (73.33%)
Rash 1	0(0%)	4 (9.09%)	3(8.82%)	7 (10.61%)
2	3 (25%%)	3 (6.82%)	3(8.82%)	9 (10%)
3	2(16.67%)	9(20.45%)	5(14.71%)	16 (17.78%)
4	2 (16.67%)	8(18.18%)	4(11.76%)	14 (21.21%)
3 + 4	2 (16.67)	11(25%)	7(20.59%)	20(33.33%)
Erythema	4 (33.33%)	10(22.73%)	13(38.24%)	27(30%)
Tourniquet Test	1 (8.33%)	10(22.73%)	3(8.82%)	14(15.56%)
Signs of Shock	0 (0%)	0 (0%)	34(100%)	34(37.78%)

TABLE : 3 Showing various signs in dengue

As shown in the above table, these were the general examination finding in the study. Rash was found to be the most common examination finding which was present in 73.33% of the patients followed by pallor (52.22%). In the study 50% of cases had Petechiae and melena and closely followed by tachypnea (48.89%) which was statistically significant.

Examination Findings	Diagnosis			Total (n=90)
	DF = (n=12)	DHF (n = 44)	DSS (n = 34)	
Abdominal tenderness	7(58.33%)	28(63.64%)	17(50%)	52 (57.78%)
Hepatomegaly	12(100%)	36(81.82%)	30(88.24%)	78 (86.67%)
Splenomegaly	3(25%)	9(20.45%)	7(20.59%)	19 (21.11%)
Fluid Collection	1(8.33%)	9(20.45%)	22(64.71%)	32 (35.56%)
CNS Conscious	12(100%)	27(61.36%)	1(2.94%)	40 (44.44%)
Disoriented	0(0%)	14(31.82%)	19(55.58%)	33 (36.67%)
Unconscious	0(0%)	3(6.82%)	14(41.18%)	17 (18.89%)
Respiratory System crepts (1)	0(0%)	1(2.27%)	24(70.59%)	25 (27.78%)
Unilateral effusion (2a)	0(0%)	0(0%)	7(26.47%)	9 (10%)
Bilateral effusion (2b)	0(0%)	0(0%)	5(14.71%)	5 (5.56%)
Respiratory distress	0(0%)	0(0%)	6(17.65%)	6 (6.67)

Table 4 – Systemic examination findings

The table shows the findings on systemic examination in the study. Among the various findings hepatomegaly was most common finding found (86.67%) followed by abdominal tenderness in 57.78%) cases.

Investigations	Type of Dengue Case			Total (n=90)
	DF = (n=12)	DHF (n = 44)	DSS (n = 34)	
Leukopenia	6 (50%)	24 (54.55%)	18 (52.94%)	48 (53.33%)
Leukocytosis	3 (25%)	7 (15.91%)	0 (0%)	10 (11.11%)
Normal Leucocytes	3 (25%)	13 (29.55%)	16 (47.06%)	32 (35.56%)
Thrombocytopenia	10 (83.33%)	33 (75%)	28 (82.35%)	71 (78.89%)
Hematocrit (>36.3%)	6 (50%)	18 (40.91)%	13 (38.24%)	37 (41.11%)
SGPT Increase	5 (41.67%)	30 (68.18%)	32 (94.12%)	67 (74.44%)
Na (Hyponatremia)	1 (8.33%)	20 (45.45%)	9 (26.47%)	30 (33.33%)
IgG + IgM present	0 (0%)	16 (36.36%)	22 (64.71%)	38 (42.22%)
IgM Present	12 (100%)	28 (63.64%)	12 (35.29%)	52 (57.78%)

Table 5 – The laboratory findings in study cases

In the study the laboratory investigations show thrombocytopenia in 71(78.89%) cases, which was the most common finding. The second most commonly seen was raised SGPT in 67 (74.44%) cases followed by leukopenia in 48 (53.33%) cases.

Hepatomegaly	Raised SGPT		Total
	Present	Absent	
Present	60 (89.55%)	23 (100%)	83 (92.22%)
Absent	7 (10.45%)	0 (0%)	7 (7.78%)
Total	67 (74.44%)	23 (25.56%)	90 (100%)

TABLE : 6 The correlation between raised SGPT and hepatomegaly.

The above table shows relation between raised SGPT and hepatomegaly.

	Bleeding Manifestation		
Thrombocytopenia	Present	Absent	Total
Present	59	12	71
Absent	16	3	19
Total	75	15	90
Raised SGPT			
Present	62	5	67
Absent	16	7	23
Total	78	12	90
Hepatomegaly			
Present	69	14	83
Absent	16	2	7
Total	74	16	90
IgG + IgM positive			
Present	31	7	38
Absent	45	7	52
Total	76	14	90

Table : 7 shows the correlation between bleeding manifestation with following factors.

The above table represent the correlation between bleeding manifestation with thrombocytopenia, raised SGPT, hepatomegaly and secondary infection. In study found that bleeding manifestation was related with raised enzyme SGPT .

Management Details	Dengue Cases			Total
	DF = (n=12)	DHF (n = 44)	DSS (n = 34)	
Intravenous Fluids	12	44	34	90 (100%)
Antipyretics	12	44	34	90 (100%)
Platelet Transfusion	1(8.33%)	11 (25%)	6 (17.65%)	18 (20%)
WB	1(8.33%)	2 (4.55%)	9 (26.47%)	12 (13.33%)
Dopamine	0 (0%)	1 (2.27%)	29 (85.29%)	30 (33.33%)
Dobutamine	0 (0%)	0 (0%)	23 (67.65%)	23(25.56%)
Noradrenaline	0 (0%)	0 (0%)	8 (23.53%)	8(8.89%)
Adrenaline	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 8– Management of dengue cases

The above table shows the management given in the study. IV fluids and antipyretics were given to 100% of patients. Inotropic and drugs were mainly required DSS.

Outcome	Dengue Cases			Total
	DF	DHF	DSS	
Cured / Recovered	12	44	26	82 (91.11%)
(Death)	0	0	8	8 (8.89%)
Total	12	44	34	90

TABLE :9 showing mortality of cases.

In the two year of study, out of 90 cases there were total 8 (8.89%) deaths and 82 (91.11%) cases recovered completely. All 8 (23.53%) deaths were cases of Dengue Shock Syndrome which was statistically significant.

DISCUSSION: Dengue fever is usually a benign syndrome caused by an arthoropod borne virus. This study reviewed the epidemiological factors, common clinical features, various laboratory investigations, radiological factors and management in cases of Dengue.

The study was conducted over a period of two years. In this study, a total of 90 dengue positive cases were taken, out of which 12 (13.3%) patients had DF, 44 (48.89%) patients had DHF and 34 (37.78%) patients had DSS. In the study by Ira Shah et al [2] DF (2.5%), DHF (51.3%) and DSS (46.2%) was observed where as Kabra SK et al [3] reported DF (10%), DHF (42%) and DSS (47%). Thus DHF and DSS are more common in the subgroups of dengue due to secondary infection and the wide spread of the dengue virus.

The study showed that the common age group was 6 – 12 years and mean age was 5.3 years. In the study by Ira Shah et al [2], the mean age was 4.9 years, where as in the study by Kabra et al [3], the peak age was 8 years and Gomber et al [4] showed a similar finding, with common age group of 6 – 12 years (78.9%). C. H. rasul et al [5] study shows the common age group being 5 – 9 years (57.1).

In sex distribution, a male preponderance was seen. Male to female ratio was 1.3:1, which was similar to Agrawal et al [10] 1.4:1. Whereas in studies of C. H Rasul et al [5].

A peak was seen in the month of October with 29 cases, which was similar to C. H. Rasul et al [5] .

In the study , patients had complaints of fever (100%) with mean duration of 5,4 days, vomiting (76.67%), rash (70%) abdominal pain (54.44%), headache (38.89%), retro orbital pain (34.44%), my Algia (27.78%), back pain (22.22%), arthralgia (14.44%) body ache (11.11%), and convulsion (7.78%). Whereas in the study by Ira Shah et al [2], the chief presentation was with fever (100%) with mean duration being 7.7 days, vomiting (86.6%), rash (41%), altered sensorium (48.7%). .

In this study various types of bleeding presentations were seen. Bleeding is one of the dreaded complications. Clinical manifestations of bleed are highly variable from simple skin bleeds like gastrointestinal bleeds and fatal intracranial bleeds. In our study tourniquet test was positive in 15.56% of cases. Melena (50%) and petechiae (50%) were significant bleeding manifestations in patients of dengue. Other manifestations were epistaxis (30%) and hematemesis (18.89%). Ira Shah et al [2] presented with melena (85.7%), hematemesis (9.5%), petechiae (2.6%), where as Agrawal et al [10] presented with hematemesis (39%), epistaxis (36%), skin bleeds (33%) and tourniquet test positive (32%) cases. In another study of predictors of spontaneous bleeding by Shivbalan et al [6] petechiae was the most frequent (46.6%) followed by hematemesis (26%), melena (21.6%), subconjunctival hemorrhage (6.6%). In a study by Richard et al [7], tourniquet test was positive in (100%) cases, petechiae (43.5%) and epistaxis (39.1%). There is poor sensitivity of tourniquet test in the diagnosis of DHF [4].

On systemic examination , abdominal tenderness (57.78%), hepatomegaly (86.67%), ascites (35.56%), pleural effusion (16.67%), splenomegaly (21.11%) and altered sensorium was present in (18.89%). Pleural effusion on the right side (41.11%) was more common than in the left side (21.11%) and bilateral effusion (12.22%) was seen in cases of DSS. Whereas in the study of Ira shah et al[2] ascites (35.8%), splenomegaly (30.8%) and Agrawal et al [10] showed hepatomegaly in 72% and splenomegaly in 19% of cases.

On laboratory examination, in our study leukopenia was present in 53.33%, thrombocytopenia in 78.89%, hemoconcentration (>36.3%) in 41.11%, raised SGPT in 74.44%, primary infection present in 57.78% and secondary infection was present in 42.22%. hyponatremia was also present in 33.33% cases. Ira Shah et al [2] study showed thrombocytopenia (92.3%), raised liver enzyme (74.3%), leukopenia (23%), and hemoconcentration (>40%) in 7.7%. hunter et al [8] study showed thrombocytopenia and leukopenia in >70% of cases and elevated liver enzyme in 47% cases. In our study thrombocytopenia and leukopenia was more or less similar in the subgroups of dengue whereas raised serum level of enzyme SGPT was more in DHF (68.18%) and DSS (94.14%).

In a study during the 2001 dengue epidemic in Chennai by Manjith narayan, M. A. Arvind et al secondary infection was detected in 71% of 174 ELISA Positive cases more commonly in patients with DHF than DF [9]

In our study all 90 patients were given intravenous fluid and antipyretics. Platelet transfusion was given in DF (8.33%), in DHF (25%) and in DSS (17.65%). Whole blood was also given in 8.33% in DF, in DHF (4.55%) and in DSS (26.47%). Along with blood therapy in intravenous fluid, inotropic drugs were also required in DSS, like Dopamine (85.29%), Dobutamine (67.65%),

and Noradrenaline (23.53%) (Statistically significant). In our study, it was found that the outcome of patients do not correlate with platelet transfusion and it was statistically significant. The number of days of hemorrhage was not affected by Platelet transfusion and the outcome.

In our study of 90 patients, a total of 8 deaths occurred. All deaths which occurred were cases of DSS. Case fatality rate was 8.89%. Mortality in the Ira Shah et al [2] study was 7.6% and in Rasul et al [5] death rate was 7%.

CONCLUSION : Endemicity of dengue fever is on the rise with increased incidence among children. Fever, hepatomegaly, vomiting, bleeding tendencies, erythematous rash, distension of abdomen, ascitis and pleural effusion, respiratory distress are suggestive of a more sever course. Laboratory investigations reveal thrombocytopenia, elevated liver enzymes, leukopenia.

Predictive markers for DHF / DSS are younger age, rash, melena, petechiae, tender abdomen, fluid collection in abdomen, hepatomegaly, pleural effusion, thrombocytopenia and secondary infections, the most common complications were refractory shock, severe / massive bleeding and ARDS.

Platelet transfusion should be given in those patients who have severe bleeding (DIC). Ultrasonography of chest and abdomen consider better investigation over x – ray chest.

Appropriate investigations, strict monitoring and prompt supportive management can reduce mortality in dengue. However, for effective management, recognition of the epidemic and taking steps for prevention of transmission by eliminating the mosquito vector is essential.

REFERENCES :

1. World health Organization. Dengue Hemorrhagic Fever : diagnosis, Treatment and Control, Geneva, 2nd edition. World health organization, 1998.
2. Ira Shah, G. C. Deshpande and P. N. Tardeja : outbreak of Dengue in Mumbai and predictive markars for DSS. J. of Tropical paediatrics 2004, 50(5) : 301 – 305.
3. Kabra Sk, Jain Y, Madhulika, Tripathi P, Singhal T, Broor S et al. Role of platelet transfusion in Dengue hemorrhagic fever. Indian Pediatric 1998; 35 : 452 : 455
4. Gomber S, Ramachandran VG, Kumar S, Agrwal Kn,N, Gupta P, Dewan DK et al. Hemorrhagic observations as a diagnostic marker in dengue hemorrhagic fever – A reappraisal. Indian Pediatrics 2001; 38 : 477 – 481.
5. C. H. Rasul, H. A. M. N. Ahasan, A. K. M. M. Rasid, M. R. H. Khan, Epidemiological Factors of Dengue Hemorrhagic Fever in Bangladesh. Indian Pediatrics April 2002 (39) : 369 – 371.
6. Shivabalan S, Anandanathan K, Balasubramanin S, Datta N. Predictors of spontaneous bleeding in dangue. India J. Pediatrics, 2004 Jan; 71(1) : 33 – 36.
7. Richard et al, Bagus R, Baso SM, Tan R, Graham RR, Sandjaja B, Corwin Al, Pinjali N. the first reported outbreak of DHF in Irian Jaya; 57 (1) : 49 – 55.
8. Hunter RF, morales R, Garcia S, Dengue fever with thrombocytopenia. Studies towards defining vulnerability of bleeding. Bol Asoc Med PR. 1995 Jan – Feb; 87 (1 – 2) : 2 – 7.
9. Kabilan L, Balasubramanian, Keshav SM, Satyanarayan K. The 2001 dengue epidemics in Chennai. IJP; 2005 (72) : 919 – 923.

10. Agrawal A, Chandra J, Aneja S, Parwari AK, Dutta AK. An epidemic of Dengue Hemorrhagic Fever and Dengue Shock Syndrome in children in Delhi. Indian Pediatrics 1998; 35: 727-732.

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