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A Clinical Study of Dengue Fever in Pediatric Age Group

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Abstract: ***Hepatomegaly, vomiting, bleeding tendencies, erythematous rash, distention of abdomen, ascites and pleural effusion, respiratory distress are suggestive of a more severe course. Laboratory investigations reveal thrombocytopenia, elevated liver enzymes, and leukopenia. Children with hepatomegaly, vomitings, bleeding manifestations, ascites, pleural effusion, respiratory distress had severe course. Rash, melena, petechae, fluid collection in abdomen is observed to be good predictive markers for DHF/DSS. Ultrasonography of chest and abdomen were more helpful than x-ray chest. Appropriate investigations, strict monitoring and prompt supportive management proved to be reducing mortality in dengue.***

Keywords: dengue, dengue hemorrhagic fever, dengue shock syndrome, haematocrit, ultrasound

1. Introduction

- Dengue is a mosquito borne viral illness caused by Flaviviridae, genus flavivirus.
- The four serotype of dengue virus designated as DEN-1, DEN-2, DEN-3, DEN-4 can be distinguished by serological methods.
- The clinical picture of Dengue varies from asymptomatic infection to a febrile illness to a more severe form like DHF (Dengue hemorrhagic fever) which can lead to Dengue Shock Syndrome (DSS).
- DHF and DSS are now leading cause of hospital admission and death among children in Asia.
- During epidemics of dengue, attack rates among susceptible are often 40 to 50% but can reach up to 80 to 90%. DHF case fatality rate can exceed 20%. With modern supportive therapy rates can be reduced to less than 1%.
- Dengue virus fever infection may be asymptomatic or may lead to undifferentiated fever. Dengue fever or dengue haemorrhagic fever with plasma leakage that may lead to hypovolemic shock, dengue shock syndrome (DSS).
- Infection with one dengue serotype provides lifelong immunity to that particular serotype but there is no overprotection to the other serotypes.
- Clinical presentation depends upon the age, immune status of the host and virus strain.

Aims and objectives:

- To study the various clinical presentations of dengue viral infection.
- To study the various pathological and radiological abnormalities in dengue
- To correlate the clinical symptoms and signs with the pathological features of the disease.
- To study the management strategies of dengue

2. Materials and Methods

- Study design: Hospital based descriptive study.
- Study settings: GSL GENERAL HOSPITAL.
- Study period: October 1st 2020-December 31st 2021
- Study population: All patients admitted in paediatric department in GSL general hospital between 1st October 2020 - 31st December 2021.
- Sample size: All study subjects who are satisfying the inclusion criteria in the study period

Inclusion Criteria

- Age group-1 month to 15 years
- The diagnosis of dengue and all variants of dengue according to definition of WHO probable cases of dengue
- Dengue IgM positive

Exclusion Criteria:

- Patients having thrombocytopenia due to any other haematological disorder will be excluded

3. Data Collection

- Clinical data was collected using a structured proforma which included case history, clinical findings, laboratory investigations and management.
- Certain criteria present in the history and clinical examination had been defined from standard references for uniformity in data collection and to decrease the fallacies in the research. Laboratory investigation obtained in these patients included hemoglobin, total and differential count, hematocrit, platelet count, SGPT, serum electrolytes, chest x-ray and ultrasonography of the chest and abdomen.
- Heart rate, blood pressure, platelet count and hematocrit were monitored daily for first five days of admission.
- Thrombocytopenia = platelet <100000.
- Raised HCT >36.3%; raised SGPT >40IU/L.
- IgG and IgM antibody test done with rapid diagnostic kit.

Statistical Analysis

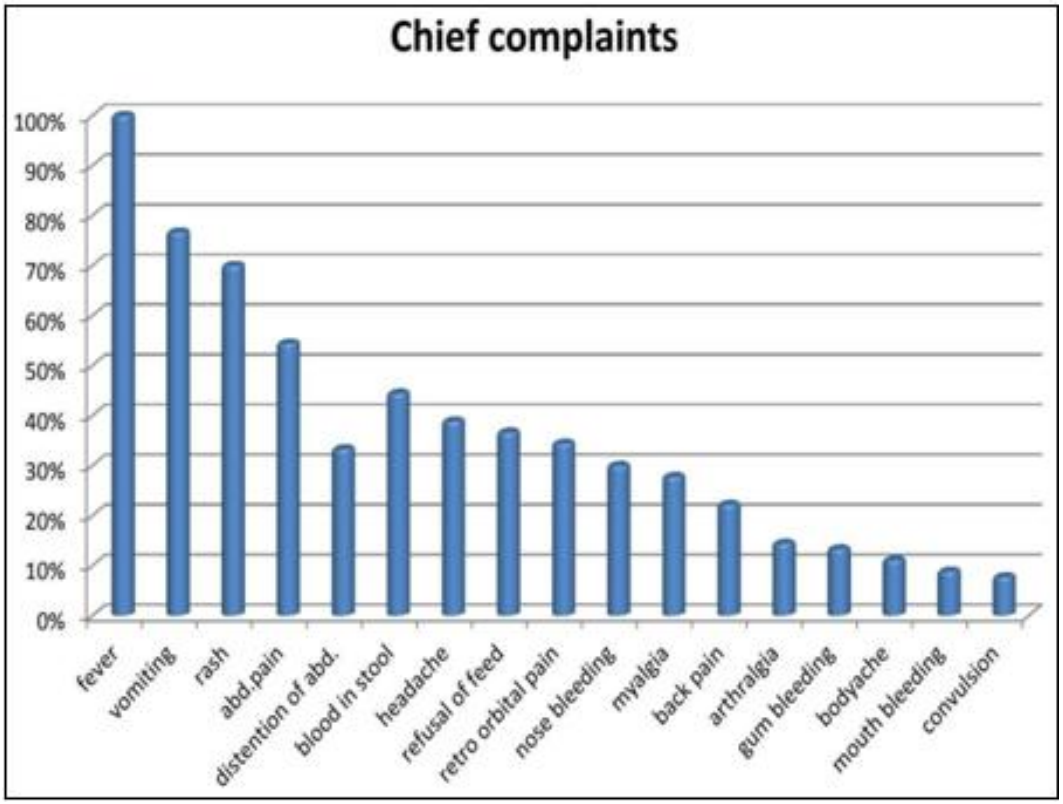
1) All statistical analysis will be performed by using SPSS (statistical package for social sciences) version 20.0 and MS-EXCEL 2013.
2) All the descriptive statistics will be presented in the form of mean+/-SD and Percentages.
3) Chi square test will be performed to assess the

association among various categorical variables.

4) For all statistical analysis, P <0.05 will be considered statistically significant.
5) Correlations will be used to assess the relativity among various continuous variables

4. Results

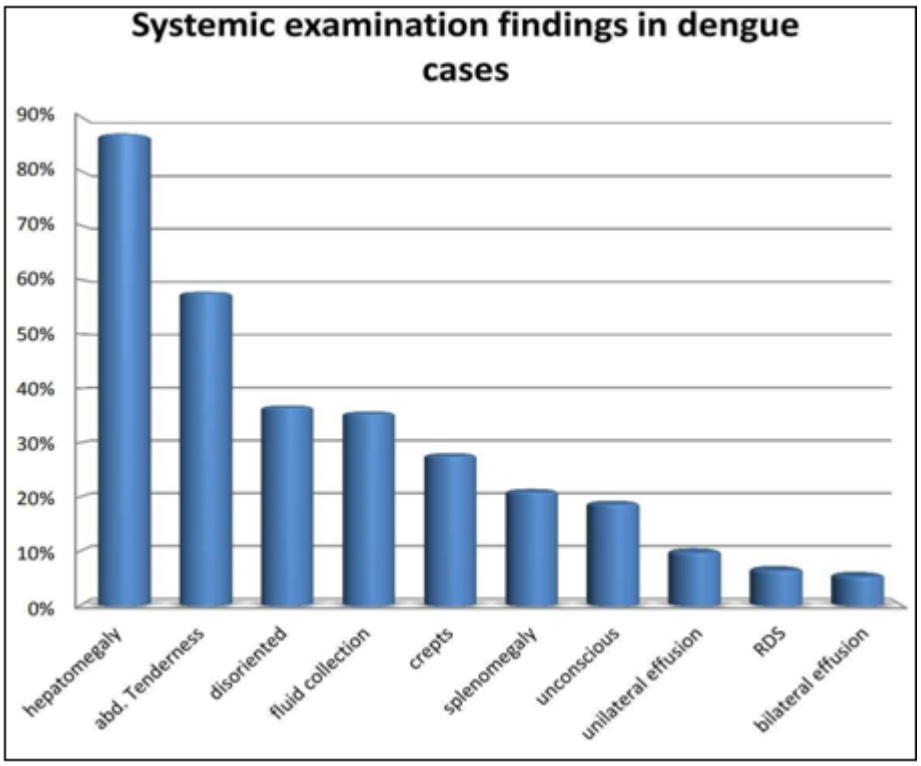
S. No	Complaints	Age group			Total
		1 month-1yr	1-<6 yrs	6-15 yrs	
1.	Fever	9	35	46	90 (100%)
2.	Biphasic	1	5	6	12 (13.33%)
3.	Vomiting	5	26	38	69 (76.67%)
4.	Back pain	0	6	14	20 (22.22%)
5.	Refusal to feed	9	11	13	33 (36.67%)
6.	Retro orbital pain	0	3	28	31 (34.44%)
7.	Headache	0	13	22	35 (38.89%)
8.	Body ache	0	6	4	10 (11.11%)
9.	Arthralgia	0	5	8	13 (14.44%)
10.	Myalgia	0	9	16	25 (27.78%)
11.	Rash	5	26	32	63 (70%)
12.	Bleeding gums	1	7	4	12 (13.33%)
13.	Bleeding nose	4	10	13	27 (30%)
14.	Bleeding mouth	0	6	2	8 (8.89%)
15.	Bleeding stool	3	16	21	40 (44.44%)
16.	Abdominal pain	1	22	26	49 (54.44%)
17.	Abdominal distention	5	12	13	30 (33.33%)
18.	Convulsion	2	5	0	7 (7.78%)



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%), myalgia (27.78%), back pain (22.22%), arthralgia (14.44%), body ache (11.11%) and convulsion (7.78%).

Clinical examination findings among 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%)	44 (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 (10%)
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%)
Ecchymoses	**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%)
Haematemesis	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%)**



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.

In our study vomiting was present in 35 (79.55%) of DHF and in 24 (70.59%) of DSS. Petechiae was present in 32 (72.73%) of DHF and 13 (38.24%) of DSS. Melena was present in 26 (59.09%) cases of DHF and 19 (55.88%) cases of DSS.

The laboratory findings in study cases:

Investigations	Type of dengue cases			Total (n=90)
	DF (n=12)	DHF (n=44)	DSS (n=34)	
Leukopenia	6 (50%)	24 (54.55%)	18 (52.94%)	48 (53.33%)
Leucocytosis	3 (25%)	7 (15.91%)	0 (0%)	10 (11.11%)
Normal leucocytes	3 (25%)	13 (29.55%)	16 (47.06%)	32 (35.56%)
Thrombocyto penia	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%)

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. .

After the clinical examination, X-ray features were confirmed with USG abdomen. On ultrasonography, hepatomegaly and free fluid in abdomen were the most common findings which were seen in 92.22% of the cases. Another finding seen was pleural effusion (74.44%). Out of those, 37 (41.11%) cases were of right sided pleural effusion and 19 (21.11%) cases of left sided pleural effusion were seen.

Bilateral pleural effusion was seen in 11 (12.22%) cases of total pleural cases. Pulmonary edema was also noticed by X-ray chest in 11 (12.22%) cases.

Various Presentations of Dengue

Presentation of dengue	No. of cases	Percentage
Dengue fever	12	13.33
Dengue hemorrhagic fever	44	48.89
Dengue shock syndrome	34	37.78
Total	90	100

5. Discussion

- The common chief complaints were fever, vomiting, refusal to feed, headache, bleeding tendency, and abdominal pain. Clinical manifestations are petechiae, purpura, severe bleeds like gastrointestinal and intracranial bleeds. The common laboratory findings were thrombocytopenia, raised SGPT, leukopenia and both IgG and IgM antibody positive.
- Hepatomegaly, fluid in abdomen, pleural effusion, and gall bladder edema, pulmonary edema were seen. . Distension of the abdomen was significantly related with abdominal fluid collection. The bleeding manifestations correlated with high levels of SGPT. But it was independent of thrombocytopenia, hepatomegaly and secondary infection.
- The risk factors of DHF/DSS were vomiting, myalgia, rash, retro-orbital pain, petechiae, melena, edema, abdominal pain, hepatomegaly, free fluid collection in abdomen, pleural effusion, thrombocytopenia, and raised SGPT. IVF and antipyretics were given to all patients. Platelets and whole blood was given in 20% and 13.3% respectively. Inotropic drugs were mainly required in DSS cases. DSS patients required more supportive therapy in the form of blood component therapy together with inotropic supports.
- In our study of 90 patients, only 1 death occurred. Patients those who died had common findings of vomiting (100%), rash (100%), hepatomegaly (100%), fluid collection (100%), altered sensorium (100%), raised SGPT (100%), both IgG and IgM positive (100%), tachypnea and edema (100%), which were statistically significant, distention of abdomen (87.5%), abdominal tenderness (87.5%), pleural effusion and gall bladder edema (87.5%), petechiae (75%), haematemesis (75%), respiratory distress and thrombocytopenia, leukopenia (75%), melena (62.5%), convulsion (62.5%), bradycardia and hypotension (62.5%).1 patient had refractory shock with ARDS

6. Conclusion

- Hepatomegaly, vomiting, bleeding tendencies, erythematous rash, distention of abdomen, ascites and pleural effusion, respiratory distress are suggestive of a more severe course. Laboratory investigations reveal thrombocytopenia, elevated liver enzymes, and leukopenia.
- Children with hepatomegaly, vomitings, bleeding manifestations, ascites, pleural effusion, respiratory distress had severe course. Rash, melena, petechae, fluid collection in abdomen is observed to be good predictive markers for DHF/DSS. Ultrasonography of chest and abdomen were more helpful than x-ray chest.

Appropriate investigations, strict monitoring and prompt supportive management proved to be reducing mortality in dengue.

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Abbreviations

DEN	DENGUE
DHF	DENGUE HEMORRHAGIC FEVER
DSS	DENGUE SHOCK SYNDROME
HCT	HEMATOCRIT
HB	HAEMOGLOBIN
USG	ULTRASONOGRAPHY