

Study of Hepatic Dysfunction of Dengue Fever in Children

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Abstract

Background: Dengue is a major international problem that is prevalent in tropical and sub-tropical countries. It is estimated that worldwide nearly 2.5 billion people continue to live at risk of contracting the infection while 50 million cases and 24,000 deaths tend to occur in 100 endemic countries. Hepatic dysfunction is common in dengue fever and the degree of liver dysfunction in children varies from mild injury with to severe injury.

Methods: Prospective and descriptive study was conducted on all the laboratory confirmed cases of dengue fever in children admitted at our institute in Department of Paediatrics over a period of 1 year clinically and biochemically.

Results: This study reveals, the prevalence of hepatic dysfunction in 30.7% (160/500) of the cases. Among the gender and age, majority of the hepatic dysfunction were seen in males 53.7% (86/160) and in the age group of 10-18 years 45% (72/160). Based on the severity, majority of hepatic dysfunction with severe dengue cases were 60% (96/160). Among clinical findings, most common symptom was jaundice 23.7% (38/160) and commonest sign was hepatomegaly 39.3% (63/160). The commonest liver function test altered was AST level in 46.2% (74/160) of the cases. Commonest abdominal USG finding was gall bladder edema in 90.6% (145/160) of the cases. The mortality was nil in this study.

Conclusions: This study concludes prevalence of hepatic dysfunction was seen 30.7%, most of them seen in severe dengue 60% of the cases suggesting any febrile child with hepatic dysfunction, dengue infection should be suspected.

Keywords: Dengue Fever; Jaundice; Hepatic Dysfunction.

Introduction

Dengue is an emerging disease and is a major health problem in our country. Globally the incidence of dengue has enlarged in the recent years. The WHO estimates that presently about two fifths of the world population is at risk for this viral infection [1]. Dengue fever was first reported by Benjamin Rush in 1780 as "break bone fever." It is a mosquito borne viral infection with four serotypes causing severe dengue fever, dengue with warning signs, and dengue without warning signs [2]. It is expected that worldwide nearly 2.5 billion people continue to live at risk of getting the infection while 50 million cases and 24,000 deaths tend to occur in 100 endemic countries. Recovery from

infection by one serotype offers immunity against that specific serotype, but subsequent infections by other serotypes increase the risk of developing severe dengue [3]. Risk of mortality in treated cases is less than 1% while mortality rate among untreated cases escalates to 20% [4]. India is one of the seven countries in the South-East Asia region regularly reporting incidence of dengue outbreaks due to its high incidence which constantly threaten the health care system. The first confirmed case of dengue infection in India dates back to 1940s, and since then more and more new states have been reporting the disease which mostly strikes in epidemic proportions often inflicting heavy morbidity and mortality [5].

Unusual manifestations involving liver and

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central nervous system in dengue infection have been reported [6]. The degree of liver dysfunction in children with dengue infection varies from mild injury with elevation of transaminases to severe injury with jaundice and liver cell failure [7]. Mechanisms of liver injury in dengue may be due to direct effects of the virus or host immune response on liver cells, circulatory compromise, metabolic acidosis and/or hypoxia caused by hypotension or localized vascular leakage inside the liver [8]. The incidence of hepatic dysfunction is more in dengue shock syndrome and Dengue hemorrhagic fever [9]. Aminotransferase levels are useful in predicting the occurrence of hepatic dysfunction and spontaneous bleeding [10]. In recent studies from India and Thailand, dengue infection was the most important cause of acute hepatic failure in children contributing to 18.5% and 34.3% of the cases respectively [11]. Hence early recognition and prompt initiation of appropriate supportive treatment can decrease the morbidity and mortality. Most of the data reported on abnormal liver functions in dengue are retrospective [12]. The aim of this study was to assess the prevalence, hepatic dysfunction of dengue fever both clinically and biochemically in children.

Methods

This hospital-based descriptive study with prospective data collection were carried out at our institute in Department of Paediatrics. All the admitted patients were enrolled on a structural protocol which included symptoms, signs, diagnosis, complications, NS1 antigen, IgM, IgG dengue antibodies by card test, platelet count, LFT and other relevant investigations, treatment, duration of stay and outcome. Relevant data was entered in a proforma and analyzed. The diagnosis of dengue fever was based on the WHO criteria [13].

Table 3: Clinical findings

	Dengue without warning signs	Dengue with warning signs	Severe dengue	Total
Jaundice	0	0	38/160 (23.7%)	
Bleeding manifestations	0	0	31/160 (19.3%)	
Hepatomegaly	0	12/160 (7.5%)	51/160 (31.8%)	63/160 (39.3%)
Encephalopathy	0	0	7/160 (4.1%)	
Ascites	0	0	21/160 (13.6%)	

Inclusion criteria

- Admitted with symptoms of dengue fever based on WHO criteria.
- Children with age group of 0-18 years.
- NS1 antigen and IgM dengue antibody-positive cases by Card test.

Exclusion criteria

- Children with IgG dengue antibody positive.
- Children with malaria and enteric fever.

Results

Among 500 patients studied, the prevalence of hepatic dysfunction was seen in 30.7% (160/500).

Table 1: Age and sex pattern of hepatic dysfunction.

Age in years	Male	Female	No of hepatic dysfunction
0-1	2	1	3/160(1.7%)
1-3	5	4	9/160 (5.7%)
3-6	19	14	33/160(20.6%)
6-10	18	25	43/160(27.5%)
10-18	42	30	72/160(45%)
Total	86	74	160

With reference to gender and age, majority of hepatic dysfunctions were seen in males 53.7% (86/160) and in the age group of 10-18 years 45% (72/160). With reference to the severity, majority of them were seen in severe dengue 60% (96/160) [14].

Table 2: Severity of dengue fever.

Severity of dengue fever	Hepatic dysfunction
Dengue without warning signs	0
Dengue with warning signs	64(40%)
Severe dengue	96(60%)
Total	160

Table 4: Liver function tests

Parameters	Dengue without warning signs	Dengue with warning signs	Severe dengue
Total serum bilirubin >2mg/dl	0	0	62/160(39.0%)
Elevated ALT (U/l)	0	29/160(18.1%)	34/160(21.2%)
Elevated AST (U/l)	0	24/160(15%)	50/160(31.2%)
Elevated Alk Ph (U/l)	0	30/160(18.7%)	37/160(23.2%)
Abnormal serum albumin	0	0	21/160(13.1%)
Abnormal serum globulin	0	0	19/160(11.8%)
Abnormal total protein	0	0	21/160(13.1%)
Prolonged INR (>1.5)	0	0	24/160(15%)

Table 5: Findings

Common USG	Dengue without warning signs	Dengue warning signs	Severe dengue
Gallbladder thickening (>5mm)	0	23/160(14.3%)	122/160(76.2%)
Ascites	0	0	21/160(13.6%)

With reference to the clinical findings, commonest symptom was jaundice 23.7% (38/160) and commonest sign was hepatomegaly 39.3% (63/160). With reference to the liver function tests, liver enzymes were elevated in 46.2% (74/160), commonest being elevation of liver enzyme aspartate transaminase (AST) in 46.2% (74/160) of the cases. Commonest abdominal USG finding was gall bladder edema in 90.6% (145/160) of the cases [15].

The mortality was nil in this study.

Discussion

Dengue is a major international health concern that is prevalent in tropical and sub-tropical countries. The objective of the study was to study the prevalence and hepatic dysfunction of dengue fever both clinically and biochemically in children [16].

The study shows, the prevalence of hepatic dysfunction was 30.7%, similar to other studies with 36.4% [17]. With reference to the age and gender majority of the cases were in the age group of 10-18 years with 45% followed by 6-10 years with 27.5%, and predominantly seen in male children with 53.7% of the cases [18].

This may be due to outdoor activities of these children, where chances of getting bitten with mosquitoes are more [19].

With reference to the group according to WHO classification, hepatic dysfunction was observed in 60% of the severe dengue cases and 40% of the dengue with warning signs cases [20].

Among the hepatic dysfunction jaundice was seen in 23.7% similar pattern was seen in study by authors with 2%-25%, hepatomegaly was noticed in 39.3% of the cases similar to report by other studies 8-13 with 36.4%-96% of the cases [21]. The liver enzymes were elevated in 46.2% of the cases similar to other studies 36.4%-96%. Commonest abdominal USG finding was gall bladder edema in 90.6% (145/160) of the cases [22]. With reference to the death, the mortality was nil.

Conclusion

This study shows prevalence of hepatic dysfunction and was 30.7%, most of them in severe dengue cases (60%), suggesting any febrile child with hepatic dysfunction, dengue infection should be suspected and the patient investigated and treated accordingly [23]. The early diagnosis of dengue fever gives a better outcome and reduced morbidity and mortality [24].

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