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Original Research Article

A clinical corelation study of dengue fever with hepatic dysfunction in children and their outcome

Srividya G. M.*, Poornima Lakshmi

Department of Pediatrics, Narayana Medical College and Hospital, Nellore, Andhra Pradesh, India

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***Correspondence:**
Dr. Srividya G. M.,
E-mail: Srividya.gtl@gmail.com

ABSTRACT

Background: The study was hepatic dysfunction in childhood dengue infection and to study clinical co-relation like severity, clinical features, and outcome.
Methods: Dengue sero positive patients of 100 were admitted during the study period and examined for hepatomegaly and jaundice and subjected to complete blood count, liver function tests, ultrasound abdomen, PT, APTT, HBsAg, HCV, Widal and analysed.
Results: All patients presented with fever, most commonly occurred in age group of 5 to 7 years, hepatomegaly was the commonest clinical sign seen, thrombocytopenia was seen in 88% of cases, serum total bilirubin was raised in 10% of subjects with severe dengue infection. Serum SGOT was raised in 74 % of patients with dengue. When compared between the groups, rise in SGOT occurred in 74% of patients with probable dengue, 98% with warning signs and 100% in severe dengue. SGPT was raised in 58% of patients with dengue infection. When compared between the groups, rise in SGPT occurred in 42% of patients with probable dengue, 66% with warning signs and 81% in severe dengue. SGPT was raised in 28% of patients with dengue infection. When compared between the groups, rise in SGOT occurred in 9.5% of patients with probable dengue, 32% with warning signs and 82% in severe dengue. Prothrombin time was raised in 11% of patients. When compared between the groups, rise in PT occurred in 6.4% with warning signs and 72% in severe dengue. When compared between the groups, rise in APTT occurred in 6.4% of patients with warning signs and 72% in severe dengue. When compared between the groups fall in serum protein occurred in 12.7% with warning signs and 54.5% in severe dengue. 2 cases of severe dengue expired, in which the enzyme levels were highly elevated.
Conclusions: Significant rise of liver enzymes helps in recognition of severe forms of dengue infection. As hepatic dysfunction in dengue is transient and reversible, early identification of the same should help to reduce life threatening complications. This can help to reduce the morbidity and mortality due to dengue infection.al population.

Keywords: Hepatic dysfunction, Dengue infection, Prothrombin time

INTRODUCTION

Dengue infection is a major public health problem in most of the tropical areas of the world with the greatest risk occurring in Indian sub continent and other south East Asian countries. World Health Organization (WHO), South-east Asia region and Western Pacific region, which bear nearly 75% of the current global disease burden due to dengue.[1] Dengue is the most common arbo viral disease transmitted globally. There are atleast 4 distinct antigenic types of dengue virus DEN 1, DEN 2, DEN 3, DEN 4 which is a member of family Flaviviridae.

Dengue infections are known to present with a diverse clinical spectrum, ranging from asymptomatic illness to fatal outcome. Unusual manifestations have become more

common. These include encephalitis, Guillian-Barre Syndrome, dengue hepatitis, myocarditis and acute respiratory distress syndrome. Hepatic dysfunction varies from mild injury with elevation of transaminase activity, hepatomegaly to severe damage with jaundice and fulminant hepatic failure. The cause for hepatic dysfunction may be due to inadequate perfusion, metabolic acidosis and disseminated intravascular coagulation. This in turn leads to ischaemia causing severe hepatic dysfunction. The degree of liver dysfunction in children with dengue infection varies from mild injury with elevation of transaminase activity, hepatomegaly (tender/non-tender) to severe injury with jaundice and fulminant hepatic failure.[2]

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.[3,4]

Early recognition and prompt initiation of appropriate supportive treatment can decrease the morbidity and mortality. Most data reported on abnormal liver functions in dengue are retrospective.[5-7] Therefore this cross-sectional study with new data was undertaken to assess the spectrum of hepatic involvement in children with Dengue infection at a tertiary care centre.

METHODS

Patients

A total 100 patients hospitalized with dengue infection (sero positive).

Setting

Department of paediatrics, Narayana Medical College and Hospital, Nellore.

Study duration

March 2019 to March 2020.

Inclusion criteria

All serologically proven cases.

Exclusion criteria

Associated infections known to cause Hepatic involvement like Malaria, Enteric fever, Hepatitis, Leptospirosis

Mode of evaluation

Dengue sero positive patients are selected and examined clinically for hepatomegaly and jaundice and subjected to complete blood count, liver function tests, ultrasound abdomen, PT, APTT, Widal, HBsAg, HCV and analysed. CBC was done using automated counter method. LFT was done on the day of admission. 3 ml venous blood was collected and the following were done.

Total/direct bilirubin- reference values: Total bilirubin: 0.001 to 1.00 mg/dl, direct bilirubin: 0.0 to 0.25 mg/dl, albumin: Reference values: 3.2 to 5 g/dl, SGOT/AST: Reference value: upto 46 U/l, SGPT: Reference value: upto 49 U/l, alkaline phosphatase: Reference value: 30-120 U/l, dengue IgM capture ELISA: IgM estimation can be done using commercial kits available. Sample: serum 0.5 ml is added to strip, prothrombin time: reference value: 1-1.5 INR.

RESULTS

This study was conducted on 100 serologically IgM dengue antibody positive cases between age group 2 months to 12 years of age fulfilling the WHO criteria for the diagnosis of dengue infection.

Of the 100 patients hospitalized with dengue infection, 42 were classified as having probable dengue, 47 were with warning signs and 11 were suffering from severe dengue. Dengue mainly affected children of age group 5 to 7 years i.e. in 45% among 100. Dengue affected male and female children almost equally (Table 1).

Hepatomegaly was seen in 55% of patients. When compared between the groups, 93.6% in patients with warning signs and 100% in seen severe dengue (Table 2).

Thrombocytopenia occurred in 74% of patients with probable dengue, 98% with warning signs and 100% in severe dengue (Table 3).

In this study, serum total bilirubin was raised in 10% of subjects with severe dengue infection (Table 4).

Serum SGOT was raised in 74% of patients with dengue. When compared between the groups, rise in SGOT occurred in 59.5% of patients with probable dengue, 80.9% with warning signs and 100% in severe dengue (Table 5).

SGPT was raised in 58% of patients with dengue infection. When compared between the groups, rise in SGPT occurred in 43% of patients with probable dengue, 66% with warning signs and 82% in severe dengue (Table 6).

Serum alkaline phosphatase was raised in 58% of patients with dengue infection. When compared between the groups, rise in SGPT occurred in 9.5% of patients with probable dengue, 32% with warning signs and 82% in severe dengue (Table 7).

Prothrombin time was raised in 11% of patients with dengue infection. When compared between the groups, rise in PT occurred in 6.4% with warning signs and 73% in severe dengue (Table 8).

Table 1: Comparison of changes in liver function tests and platelet count.

	Normal		Decreased		Increased		Total
	N	%	N	%	N	%	
Platelet	12	12	88	88	-	-	100
SBR-TOTAL	90	90	-	-	10	10	100
SGOT	26	26	-	-	74	74	100
SGPT	42	42	-	-	58	58	100
ALP	72	72	-	-	28	28	100
PT	89	89	-	-	11	11	100
APTT	89	89	-	-	11	11	100
Serum protein	88	88	12	12	-	-	100
albumin	97	97	3	3	-	-	100

Table 2: Comparison between groups with respect to hepatomegaly.

	Diagnosis			Chi square	P value
Liver span	**PD**	**D+WS**	**SD**		
Normal	42	3		88.65	0.001**
Increased		44	11		
Total	42	45	11		

Table 3: Comparison between groups with respect to platelet count.

Platelet	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	11	26.2	1	2.1	-	-	12	13.85	0.001**
Decreased	31	73.8	46	97.9	11	100.0	88		
Total	42	100.0	47	100.0	11	100.0	100	-	-

** Significant (highly significant).

Table 4: Comparison between groups with respect to serum bilirubin.

Variables	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	42	100.0	47	100.0	1	9.1	90	89.90	<0.001**
Increased	-	-	-	-	10	90.9	10		
Total	42	100.0	47	100.0	11	100.0	100		

** Significant at (highly significant).

Table 5: Comparison between groups with respect to serum SGOT.

SGOT	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	17	40.5	9	19.1	-	-	26	9.59	0.008**
Increased	25	59.5	38	80.9	11	100.0	74		
Total	42	100.0	47	100.0	11	100.0	100		

Table 6: Comparison between groups with respect to serum SGPT.

SGPT	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	24	57.1	16	34.0	2	18.2	42	7.74	0.021*
Increased	18	42.9	31	66.0	9	81.8	58		
Total	42	100.0	47	100.0	11	100.0	100		

Table 7: Comparison between groups with respect to serum alkaline phosphatase.

ALP	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	38	90.5	32	68.1	2	18.2	72	23.27	<0.001**
Increased	4	9.5	15	31.9	9	81.8	28		
Total	42	100.0	47	100.0	11	100.0	100		

** Significant at 1 % (highly significant).

Table 8: Comparison between groups with respect to prothrombin time.

PT	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	42	100.0	44	93.6	3	27.3	89	49.03	<0.001**
Increased	-	-	3	6.4	8	72.7	11		
Total	42	100.0	47	100.0	11	100.0	100		

** Significant at 1 % (highly significant).

Table 9: Comparison between groups with respect to APTT.

APTT	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	42	100.0	44	93.6	3	27.3	89	49.03	<0.001**
Increased	-	-	3	6.4	8	72.7	11		
Total	42	100.0	47	100.0	11	100.0	100		

** Significant at 1 % (highly significant).

Table 10: Comparison between groups with respect to serum total protein.

Serum protein	Diagnosis						Total	Chi square	P value
	PD		D+WS		SD				
	N	%	N	%	N	%			
Normal	42	100.0	41	87.2	5	45.5	88	24.61	<0.001**
Decreased	-	-	6	12.8	6	54.5	12		
Total	42	100.0	47	100.0	11	100.0	100		

** Significant at 1 % (highly significant).

Activated Partial Thromboplastin Time was raised in 11% of patients with dengue infection. When compared between the groups, rise in APTT occurred in 6.4% of patients with warning signs and 73% in severe dengue (Table 9).

Serum total protein was reduced in 12% of patients with dengue infection.

When compared between the groups fall in serum protein occurred in 12.7% with warning signs and 54.5% in severe dengue. Serum albumin was reduced in 3% of patients with dengue infection. When compared between the groups, fall in serum albumin occurred in 4.3% with warning signs and 9% with severe dengue (Table 10).

In our study 2 cases suffering from severe dengue expired. In these two cases, the enzymes level were very high.

DISCUSSION

Dengue infection is one of the most common mosquito borne disease of the world. The causative agent is dengue virus, mainly of four serotypes DEN 1, DEN 2, DEN 3, DEN 4. It has a protean of manifestations ranging from asymptomatic to life threatening complications. Hepatomegaly in dengue occurred more commonly in patients with severe dengue and those with warning signs. In present study 55% with probable dengue, % with warning signs and % with severe dengue had hepatomegaly. Thus hepatomegaly may be used as a tool to indicate the severity of the disease.

Jaundice is associated with poor prognosis. It is associated with fulminant hepatic failure. In this study, serum total bilirubin was raised in 10% of subjects with severe dengue infection.

Hypoalbuminemia may be due to liver injury and capillary leakage. In current study 12% had hypoalbuminemia. In another study by Hypoalbumenemia was observed in 66% of the cases.[8]

Serum SGOT was raised in 74 % of patients with dengue. When compared between the groups, rise in SGOT occurred in 74% of patients with probable dengue, 98% with warning signs and 100% in severe dengue. Elevation of AST was more compared to ALT in the present study and similar observations was made by others also.[9,10]

SGPT was raised in 58% of patients with dengue infection. When compared between the groups, rise in SGPT occurred in 42% of patients with probable dengue, 66% with warning signs and 81% in severe dengue. AST rise more than ALT in dengue may be due to involvement of myocyte. Wong et al reported low globulin level in 14.2% and low albumin level in 16.5%, derangements in PT and APTT in 42.5% of his adult cases.[6]

Prothrombin time was raised in 11% of patients with dengue infection. When compared between the groups, rise in PT occurred in 6.4% with warning signs and 72% in severe dengue. Reports have demonstrated a high affinity of the dengue virus for human liver cells and dengue virus has been isolated from the liver of fatal cases. Shivbalan et al found ALT, tender hepatomegaly and abdominal pain to be significant predictors for bleeding in dengue children.[11] An Indian study reported correlation between mortality and severe liver dysfunction in children with dengue infection.[12]

Thrombocytopenia occurred in 74% of patients with pbobabledengue, 98% with warning signs and 100% in severe dengue. Of 100 serologically confirmed cases hospitalized with dengue, 42 were classified as having Probable Dengue, 47 were with Warning Signs and 11 were suffering from Severe Dengue. Two cases of severe dengue expired secondary to DIC. Elevated transaminase levels have been suggested as a potential marker to help differentiate dengue from other viral infections during the early febrile phase.

Limitations

Limitations of the study is it is biochemical and other laboratory parameters were also changed in other conditions, and sample size should increase to imply the significance.

CONCLUSION

Elevation of liver enzymes can occur with or without hepatomegaly. Significant rise of liver enzymes helps in recognition of severe forms of dengue infection. Early interventions could prevent life threatening complications like massive Haemorrhage. The role of Hepato-protective drugs in dengue could be tried for early recovery and thereby decreasing morbidity and mortality in future studies.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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