International Journal of Contemporary Pediatrics
Selvan T et al. Int J Contemp Pediatr. 2017 May;4(3):901-904
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20171695

Original Research Article

Study of hepatic dysfunction of dengue fever in children

Tamil Selvan*, Saravanan P., Nagaraj M.V., Mrigender Nath Tudu

Department of Paediatrics, Sapthagiri Institute of Medical Sciences and Research Centre,Bangalore,Karnataka,India

Received: 09 February 2017
Accepted: 03 March 2017

***Correspondence:**
Dr. Tamil Selvan,
E-mail: drselvantg@yahoo.com

ABSTRACT

Background: Dengue is a major international health concern 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 SIMS and RC over a period of 1 year from Dec 2015 to Nov 2016 both clinically and biochemically.
Results: This study reveals, the prevalence of hepatic dysfunction in 30.6% (174/568) of the cases. Among the gender and age, majority of the hepatic dysfunction were seen in males 55.7% (97/174) and in the age group of 10-18 years 44.2% (77/174). Based on the severity, majority of hepatic dysfunction was seen in severe dengue cases 59.2% (103/174). Among clinical findings, most common symptom was jaundice 27.5% (48/174) and commonest sign was hepatomegaly 39.6% (69/174). The commonest liver function test altered was AST level in 45.4% (79/174) of the cases. Commonest abdominal USG finding was gall bladder edema in 90.8% (156/174) of the cases. The mortality was nil in this study.
Conclusions: This study concludes prevalence of hepatic dysfunction was seen 30.6%, most of them seen in severe dengue 59.2% of the cases suggesting any febrile child with hepatic dysfunction, dengue infection should be suspected.

Keywords: Dengue fever, Jaundice, Hepatic dysfunction

INTRODUCTION

Dengue infection is an emerging disease and is a major health problem in our country. Globally the incidence of dengue has increased 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 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. Recovery from infection by one serotype offers lasting immunity against that particular serotype, but subsequent infections by other serotypes increase the risk of developing severe dengue.[3] Risk of mortality in treated cases of 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 threatens 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 central nervous system in dengue infection have been reported.[6,7] 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.[8-11] 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.[9,11,14,18]

The incidence of hepatic dysfunction is more in dengue shock syndrome and Dengue hemorrhagic fever.[6,8-17] Aminotransferase levels are useful in predicting the occurrence of hepatic dysfunction and spontaneous bleeding.[8] 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.[15,16]

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.[6,10,12,13] 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 the general hospital, SIMS and RC, Bangalore, Karnataka, India for a period of 1year from December 2015 to November 2016.

All the admitted patients were enrolled on a structural protocol which included symptoms, signs, diagnosis, complications, NS1 antigen, IgM, IgG dengue antibodies by ELISA technique, 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.[3]

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 ELISA technique.

Exclusion criteria

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

RESULTS

Among 568 patients studied, the prevalence of hepatic dysfunction was seen in 30.6% (174/568).

Table 1: Age and sex pattern of hepatic dysfunction.

Age in years	Male	Female	No of hepatic dysfunction
0-1	2	1	3/174(1.7%)
1-3	5	5	10/174 (5.7%)
3-6	19	17	36/174(20.6%)
6-10	27	21	48/174(27.5%)
10-18	44	33	77/174(44.2%)
Total	97	77	174

With reference to the gender and age, majority of the hepatic dysfunction were seen in males 55.7% (97/174) and in the age group of 10-18 years 44.2% (77/174). With reference to the severity, majority of them were seen in severe dengue 59.2% (103/174).

Table 2: Severity of dengue fever.

Severity of dengue fever	Hepatic dysfunction
Dengue without warning signs	0
Dengue with warning signs	71/174(49.8%)
Severe dengue	103/174(59.2%)
Total	174

Table 3: Clinical findings.

	Dengue without warning signs	Dengue with warning signs	Severe dengue
Jaundice	0	0	48/174 (27.5%)
Bleeding manifestations	0	0	43/174 (24.7%)
Hepatomegaly	0	31/174 (17.8%)	38/174 (21.8%)
Encephalopathy	0	0	8/174 (4.5%)
Ascites	0	0	62/174 (35.6%)

With reference to the clinical findings, commonest symptom was jaundice 27.5% (48/174) and commonest sign was hepatomegaly 39.6% (69/174). With reference to the liver function tests,liver enzymes was elevated in 45.4%(79/174),commonest finding was elevation of liver enzyme aspartate transaminase (AST) in 45.4% (79/174) of the cases. Commonest abdominal USG finding was gall bladder edema in 90.8% (156/174) of the cases.

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.

Table 4: Liver function tests.

Parameters	Dengue without warning signs	Dengue with warning signs	Severe dengue
Total serum bilirubin >2mg/dl	0	0	68/174(39.0%)
Mean total S. bilirubin (mg/dl)	0.6	0.9	3.8
Elevated ALT (U/l)	0	29/174(16.6%)	40/174(22.9%)
Mean ALT	29	124	313
Range	18-44	73-194	98-623
Elevated AST (U/l)	0	30/174(17.2%)	49/174(28.1%)
Mean AST	31	252	343
Range	21-47	103-479	98-723
Elevated Alk Ph (U/l)	0	30/174(17.2%)	37/174(21.2%)
Mean AP	64	393	347
Range	34-141	300-465	299-541
Abnormal serum albumin	0	0	21/174(12.0%)
Mean serum albumin (gm/dl)	3.5	3.2	2.1
Range	3.5-4.1	3-3.9	2.9-3.6
Abnormal serum giobulin	0	0	19/174(10.9%)
Mean serum globulin(gm/dl)	2.6	2.8	3.1
Range	2.4-2.8	2.5-3.6	2.2-3.6
Abnormal total protein	0	0	21/174(12%)
Mean total protein (gm/dl)	6	5.5	5
Range	5-7	4-7	3.8-7
Prolonged INR (>1.5)	0	0	26/174(14.9%)

Table 5: Clinical findings.

Common ABD USG	Dengue without warning signs	Dengue warning signs	Severe dengue
Gallbladder thickening (>5mm)	0	25/174(14.3%)	133/174(76.4%)
Ascites	0	0	62/174(35.6%)

The study shows, the prevalence of hepatic dysfunction was 30.6%, similar to other studies with 36.4%.[8-11] With reference to the age and gender majority of the cases were in the age group of 10-18 years with 44.2% followed by 6-10 years with 27.5%, and predominantly seen in male children with 55.7% of the cases.

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

With reference to the group according to WHO classification, hepatic dysfunction was observed in 59.2% of the severe dengue cases and 49.8% of the dengue with warning signs cases.

Among the hepatic dysfunction jaundice was seen in 27.5% similar pattern was seen in study by authors with 2%-25%, hepatomegaly was noticed in 39.6% of the cases similar to report by other studies[8-13] with 36.4%-96% of the cases.[8-18] The liver enzymes were elevated in 45.4% of the cases similar to other studies 36.4%-96%. Commonest abdominal USG finding was gall bladder edema in 90.8% (156/174) of the cases. With reference to the death, the mortality was nil.

CONCLUSION

This study concludes prevalence of hepatic dysfunction was seen 30.6%, most of them in severe dengue cases (59.2%), suggesting any febrile child with hepatic dysfunction, dengue infection should be suspected.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. World Health Organization; Dengue and Dengue Hemorrhagic fever. Available in www.who.int/media centre/factsheets./ fs117 /en/. Accessed on 19 April 2013.
2. Guzmán MG, Kourí G. Dengue: an update. Lancet Infect Dis. 2002;2:33-42.
3. Centers for disease control and prevention. Imported dengue - United States, 1997 and 1998. MMWR Morb. Mortal Wkly Rep. 2000:248-53.
4. World health Organization. Dengue and dengue haemorrhagic fever. Available at http// www.who.int/ mediacentre/factsheet s/fs117/en/. Accessed on 12 July 2016.
5. Kadar A, Kandasamy MS, Appavoo P, Anuradha CN. Outbreak and control of dengue in a village of Dharmapuri, Tamil Nadu. J Commun Dis. 1997;29:69.
6. Wiwanitkit V. Liver dysfunction in dengue infection, an analysis of the previously published Thai cases. J Ayub Med Coll Abbottabad. 2007;19(1):10-1.
7. Soundravally R, Narayanan P, Bhat B. Fulminant hepatic failure in an infant with severe Dengue infection. Indian J Pediatr. 2010;77(4):435-7.
8. Petdachai W. Hepatic dysfunction in children with dengue shock syndrome. Dengue Bulletin. 2005;29:112-7.
9. Mohan B, Patwari AK, Anand VK. Hepatic dysfunction in childhood dengue infections. J Trop Pediatr. 2000;46(1):40-3.
10. Wahid SF, Sanusi S, Zawawi MM, Ali RA. A comparison of the pattern of liver involvement in dengue hemorrhagic fever with classic dengue fever. Southeast Asian J Trop Med Pub Health. 2000;31(2):259-63.
11. Itha S, Kashyap R, Krishnani N. Profile of liver involvement in dengue virus infection. Natl Med J India. 2005;18(3):127-30.
12. Wong M, Shen E. The Utility of liver function tests in Dengue. Ann Acad Med. 2008;37(1):823.
13. Kamath SR, Ranjith S. Clinical features, complications and atypical manifestations of children with severe forms of dengue hemorrhagic fever in south India. Indian J Pediatr. 2006;73(10):889-95.
14. Seneviratne SL, Malavige GN, Silva HJ. Pathogenesis of liver involvement during dengue viral infections. Trans R Soc Trop Med Hyg. 2006;100(7):608-14.
15. Kumar R, Tripathi P, Tripathi S. Prevalence of dengue infection in north Indian children with acute hepatic failure. Ann Hepatol. 2008;7(1):59-62.
16. Poovorawan Y, Hutagalung Y, Chongsrisawat V. Dengue virus infection: a major cause of acute hepatic failure in Thai children. Ann Trop Paediatr. 2006;26(1):17-23.
17. World Health Organization. Dengue haemorrhagic fever: diagnosis, treatment, prevention and control. Second edition. Geneva: World Health Organization. 1997.
18. Nimmannitya S, Thisyakorn U, Hemsrichart V. Dengue hemorrhagic fever with unusual manifestations. Southeast Asian J Trop Med Public Health. 1987;18(3):398-405.
19. Wichmann O, Hongsiriwon S, Bowonwatanuwong C, et al. Risk factors and clinical features associated with severe dengue infection in adults and children the 2001 epidemic in Chonburi, Thailand. Trop Med Int Health. 2004;9(9):1022-9.
20. Faridi MMA, Aggarwal A, Kumar M, Sarafrazul A.Clinical and biochemical profile of dengue haemorrhagic fever in children in Delhi. Trop Doct. 2008;38(1):28-30.
21. Dhooria GS, Bhat D, Bains HS. Clinical profile and outcome in children of Dengue hemorrhagic fever in north India. Iran J Pediatr. 2008;18(3):222-8.
22. Chairulfatah A, Setiabudi D, Ridad A, Colebunders R. Clinical manifestations of Dengue fever in children in Bandung, Indonesia. Ann Soc Belge Med Trop. 1995;75(4):291-5.

Cite this article as: Selvan T, Saravanan P, Nagaraj MV, Tudu MN. Study of hepatic dysfunction of dengue fever in children. Int J Contemp Pediatr 2017;4:xxx-xx.