



Liver functions in children with dengue fever at a tertiary medical centre in central india.

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ABSTRACT

This study was conducted to understand the abnormalities in liver functions in children with Dengue fever and its associations with the outcome.

Method: Aim of this study was to assess liver functions SGOT (AST) & SGPT(ALT), Serum Albumin children with Dengue fever.

Objective: To study association of liver function tests with clinical stages of dengue fever and outcome with the severity of liver enzymes.

This Prospective study was conducted in Paediatric wards of NKPSIMS & LMH, Nagpur (MS), India from 1st January 2019 to 31st December 2019. During the study period 124 children in the age group upto 18 yrs presenting with fever and positive serology for dengue were included in the study.

Results: During the one year study period 124 children were admitted as serologically positive dengue patients. Maximum children were in age group of > 5yrs. Patients with dengue fever without warning signs were 73 (58.87%), 44 (35.48%) were dengue with warning signs and 7 (5.65%) were cases of severe dengue. The SGOT (AST) levels were more than 300 in 22.8% while SGPT (ALT) levels were raised in only 2.41%. Out of the 28 children with SGOT (AST) levels > 300 IU/L 28.57% of children had serum albumin levels < 2.5g/dl. Patients with SGOT (AST) & SGPT (ALT) levels of more than 300 IU/L had hospital stay of more than 7 days. The mortality rate in our study was 0.08%.

Conclusions: Liver Function Tests derangements are seen in all forms of dengue fever. Higher SGOT (AST) levels as compared to SGPT (ALT) were seen in patients with severe Dengue which was also associated with prolong hospital stay.

Keywords: Dengue fever, SGOT (AST), SGPT (ALT), Serum Albumin, Severe Dengue

INTRODUCTION

Dengue is the most rapidly spreading mosquito-borne viral disease in the world. An estimated 50-100 million dengue infections occur annually in more than 100 endemic countries.

Dengue virus (DEN) is a small single-stranded RNA virus comprising four distinct serotypes (DEN-1 to -4). These closely related serotypes of the dengue virus belong to the genus Flavivirus, family Flaviviridae. Dengue virus comprises four distinct serotypes, DEN 1-4, belonging to the Flaviviridae family. It is transmitted to humans by the bite of an infected female Aedes aegypti mosquito. Other vectors are Aedes albopictus, Aedes polynesiensis, Aedes niveus, secondary vectors in many countries.

Dengue virus infection is a significant health problem in many Southeast Asian countries India is in a high-risk zone of dengue infection transmission, given its temperature and humidity profile. According to WHO, India is amongst the top 30

countries with regards to the rate of information.

Dengue has a wide spectrum of clinical presentations, often with unpredictable clinical evolution and outcome. While most patients recover following a self-limiting non-severe clinical course, a small proportion progress to severe disease, mostly characterized by plasma leakage with or without haemorrhage.

The classical presentation is described under 3 phases- febrile, critical and recovery. Dengue is a non-hepatotropic virus, but liver dysfunction is seen in dengue. The revised 2009 WHO case definitions has classified dengue as 1) Dengue with and 2) Dengue without warning signs, and 3) Severe dengue according to levels of severity. Liver involvement varies from derangements of liver enzymes, increased bilirubin and rarely acute liver failure [1].

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 hypoxia caused by hypotension or localized vascular leakage inside the liver. [2]

As we are working in a tertiary care hospital, we see many children with dengue fever, including those with atypical manifestations. This study was conducted to understand the abnormalities in liver functions in children with dengue fever and its association with the outcome.

MATERIALS AND METHOD

This study aimed to assess liver functions SGOT (AST) & SGPT (ALT), Serum Albumin in children with Dengue fever.

Objective: To study association of liver function tests with clinical stages of dengue fever and outcome with the severity of liver enzymes and albumin abnormality.

Study design: Prospective study

Study setting: Paediatric wards of NKPSIMS & LMH, Nagpur

Study duration: From 1st January 2019 to 31st December 2019.

Inclusion criteria: During the study period, 124 children up to 18 years presenting with fever and positive serology for Dengue were included in the study.

Exclusion Criteria: Children who were diagnosed as Dengue like illness but were serologically negative and those with cirrhosis, chronic liver disease or concurrent infection with malaria, Hepatitis A, Hepatitis B, enteric fever were excluded from the study.

Data collection procedure: Investigations like CBC, LFT, USG abdomen was done in all cases. Our emphasis was on liver enzymes levels SGOT (AST), SGPT (ALT), and all the LFT components' albumin levels. The SGOT (AST), SGPT (ALT) levels were divided into three grades, i.e range of 40-149, 150-299 and >300 IU/L and the patients were categorized according to the level of rise of the enzyme levels. Similarly albumin levels were divided into 2 groups i.e < 2.5g/dl & >2.5g/dl. The study group were divided into dengue fever without warning signs, Dengue with warning signs and severe Dengue according to revised WHO 2009 criteria.

Ethics Committee: The moral review board initially approved the study of N. K. P. Salve Institute of Medical Sciences & Research Centre and Lata Mangeshkar Hospital, Nagpur.

Data collection and analysis: Descriptive data were used to classify dengue presentations, and the association of outcome with liver function tests was determined by correlation coefficient. Other statistical tests used were Chi-square & Fischer exact.

RESULTS

During the one year study period, 124 children were admitted as serologically positive dengue patients. Among them, 80 (64.51%) were male, and 44 (35.46%) were female. Maximum children were in the age group of > 5 yrs.

As per the WHO clinical classification of Dengue 73 (58.87%) of patients were dengue fever without warning signs, 44 (35.48%) were dengue with warning signs, and 7 (5.65%) were cases of severe dengue. In maximum no. of patients the liver enzymes SGOT (AST), SGPT (ALT) levels were raised in range of 55.64% & 74.19% respectively. The SGOT (AST) levels were more than 300 in 22.8% while SGPT (ALT) levels were raised in only 2.41%. (Table 1).

TEST(U/L)	40-149	150-299	≥300
SGOT/AST	69 (55.64%)	27 (21.77%)	28 (22.58%)
SGPT/ALT	92 (74.19%)	29 (23.38%)	3 (2.41%)

Table 1: SGOT (AST), SGPT (ALT) U/L levels in patients of dengue fever

Patients who had dengue without warning signs 80% had liver enzyme SGOT (AST) of <300 IU/L whereas only 20% had > 300 IU/L. In patients of dengue with warning signs 82% had raised liver enzymes in range <300 IU/L whereas 18% had levels >300. While in patients of severe dengue 75% had raised liver enzymes in range >300 while 25% had in range <300. This was statistically significant with p value of 0.04. (Figure 1)

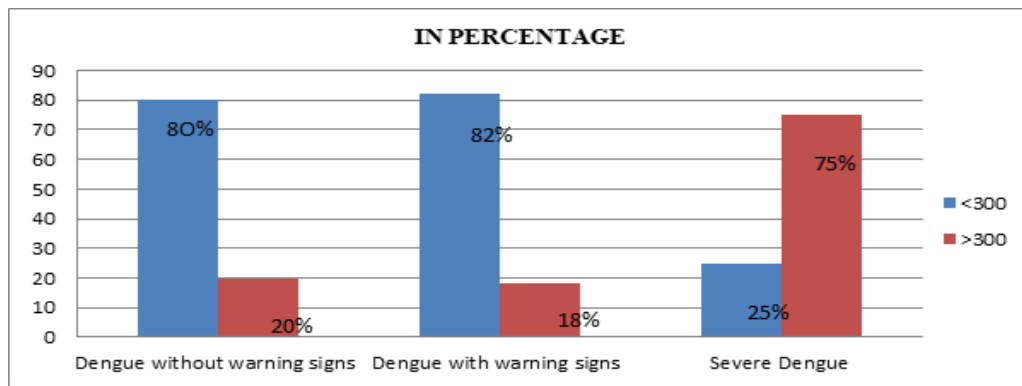


Figure 1: Association of liver enzyme SGOT (AST) & clinical severity of Dengue

SGPT (ALT) was raised but <300 IU/L in 100% of patients of dengue without warning signs, in 95% it was <300 and in 5% > 300 IU/L in patients of dengue with warning signs. In patients of severe dengue 75% had SGPT (ALT) levels <300 IU/L and in 25% it was >300 IU/L. Statistically p value was 0.16 which was not significant. (Figure 2)

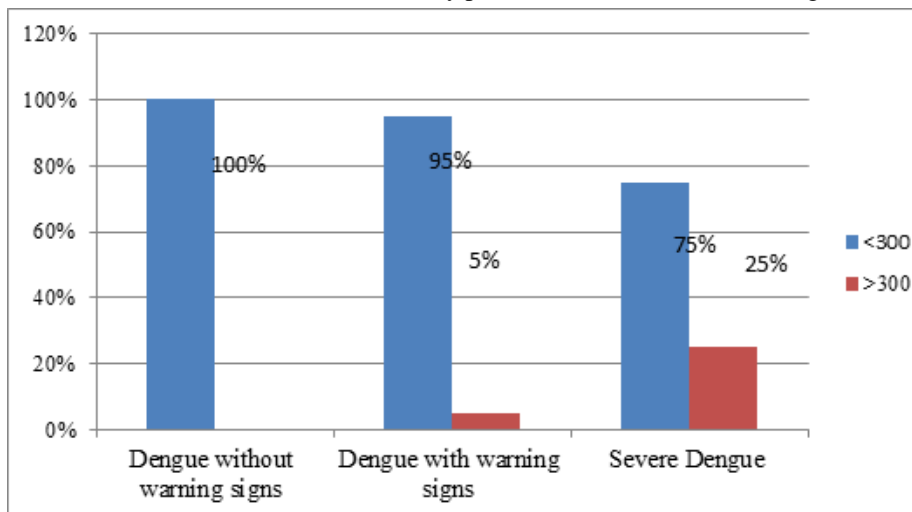


Figure 2: Association of liver enzyme SGPT (ALT) & clinical severity of Dengue (%)

These serum albumin levels were <2.5 gm/dl in only 6.45% children, whereas it was normal i.e. >3.5 gm/dl in 67.4% and between 3.5-3 gm/dl in 15.32% children.

Out of the 28 children with SGOT (AST) levels > 300 IU/L, 28.57% of children had serum albumin levels <2.5 gm/dl. Fisher's exact test was applied and p value was <0.001 which was statistically significant. (Table 2).

Serum Albumin g/dl	SGOT <300	SGOT >300	Total (n=124)
<2.5	0	8 (28.57%)	8
>2.5	96	20 (71.42%)	116

Table 2: Association Of SGOT (AST) with Serum Albumin in patients with Dengue fever

Children who had SGOT (AST) levels < 300, 88.54% had hospital stay of <7 days and 11.45% had stay of > 7 days.

While patients with SGOT (AST) levels >300, only 21.42% had a hospital stay of less than 7 days, whereas 78.57% had a stay of >7 days. A Chi-square test was applied, and it was statistically significant with a p-value of < 0.001. Similarly, for patients with SGPT (ALT) levels < 300 76.03% had hospital stay of less than 7 days and 23.96% had stay of more than 7 days. There were three patients with levels >300, and all of them had a stay of more than seven days. Fisher exact test was applied, and the p-value was 0.031, which was statistically not significant.

Of the total 28 patients who had SGOT (AST) levels more than 300 U/L, 6 (21.42%) patients had complications in the form of ascites and pleural effusion and 2 (7.14%) patients had severe bleeding.

DISCUSSION

During the one year study period, 124 children were admitted as serologically positive dengue patients. Among them, 80 (64.51%) were male, and 44 (35.48%) were female. Maximum children were in the age group of > 5 yrs. The mean age of the children was 5.5 yrs.

In the study group 73 (58.8%) of patients were dengue fever without warning signs, 44 (35.4%) were dengue with warning signs, and 7 (5.6%) were cases of severe dengue.

Of the 124 children with dengue, 101 were NS 1 positive, 18 patients were IgM positive, 5 were IgG positive, 12 were NS1 + IgM positive, and 5 were NS1 + IgM + IgG positive.

Liver involvement in children with Dengue fever varies from mild injury with an elevation of transaminases to severe damage in the form of jaundice and liver cell failure. Liver involvement may manifest as right hypochondrium pain and an increase in liver enzymes, mainly SGOT (AST) and SGPT (ALT). Hepatic dysfunction is more in patients of dengue with warning signs and severe dengue. Liver injury causes the release of the liver enzymes SGOT (AST) and SGPT (ALT) in the bloodstream. Hence they are considered sensitive indicators of liver damage. In our study, the liver enzymes SGOT (ALT) were raised >300 in 22.58% of patients, while SGPT (ALT) was raised in 2.41% of patients with severe dengue. So the rise of SGOT was > SGPT. Several authors have noted that the levels of AST were greater than ALT, similar to our study. Himabindu and colleagues reported more than tenfold increase in levels of AST and ALT in patients of severe dengue (DHF & DSS). [3] Similar findings were also seen in the study by Jagdish Kumar et al. [4] In a study conducted by B Manohar et al. in which they studied clinical profile and liver functions in Dengue, they found that AST & ALT elevation increased with the severity of the disease. The mean value of AST in severe Dengue is 471.36, and of SGPT (ALT), the mean value was 400.92. Of the total 100 patients, 25 patients had severe Dengue. Among them, nine children had AST elevation 4-10 times the average weight and 16 children had AST value above ten times the average value, and three children had ALT elevation 4-10 times the average value. [5]

Rahman et al. also reported higher levels of AST & ALT derangements in patients with severe Dengue compared to those with dengue fever. The mean value of AST was significantly higher than the mean value of ALT. This abnormality may act as an early indicator of dengue infection [6]. Similar findings were also seen in Raju YHN et al., wherein the mean SGOT values were higher than SGPT in children with severe dengue fever [7].

In our study, out of the 28 children with severe Dengue, 28.57% of children had serum albumin levels < 2.5 g/dl which was statistically significant.

In the study by Yeshwanth Raju et al., the mean serum albumin was 2.49 g/dl in children with severe Dengue. Another study by Mohan N et al. the serum albumin level was 2.47 g/dl in children with severe Dengue.

In our study, 78.57% of children who had SGOT (AST) values > 300 IU/L had a hospital stay of > 7 days, and only three children had SGPT (ALP) values of > 300 IU/L; all of them had a hospital stay of > 7 days. Similar findings were also seen in the study by Raju YHN et al., where they found that 78.6% of children who had > 6 times elevation of SGOT had a hospital stay of > 6 days. 60% of children who had > 3 times elevation of SGPT had a hospital stay of > 6 days.

Of the total 28 patients who had SGPT (AST) levels more than 300 U/L, 6 (21.42%) patients had complications in the form of ascites and pleural effusion and 2 (7.14%) patients had severe bleeding. Three patients had SGPT (ALT) values > 300 U/L, and none of them had any complications. None of our patients had Acute Liver Failure, and there was only one death. In a study by Manohar et al. edema was seen in 56% of cases. 22.2% of children with Dengue with

warning signs had bleeding manifestations, and 76% of children with severe Dengue had bleeding manifestations. In a study by Shubhankar Mishra et al., ascites and pleural effusion were common presentations, and pleural effusion was seen in 25.77%. Among patients with severe Dengue, bilateral pleural effusion was seen in 38.46% of patients. Out of the 124 patients in our study, there was only one death; the mortality rate was 0.08%. The mortality rate was comparable with a study by S.Sri Latha et al., who reported a mortality rate of 1.01, and in a study by Shubhankar Mishra et al., it was 1.03%.

CONCLUSION

Dengue is endemic in our country. This study was undertaken to study the liver functions in patients with Dengue fever. Some degree of liver injury was seen in all forms of dengue fever. Higher SGOT (AST) levels, compared to SGPT (ALT), were seen in patients with severe Dengue.

A significant rise of liver enzymes helps in recognition of severe forms of dengue infection. Higher SGOT (AST) values are associated with prolonging the hospital stay. Lower albumin levels are associated with disease severity and affect prognosis & outcome.

Limitations of study

- The sample size was small. LFT was not repeated during the course of illness.
- Follow up of the cases was not done.

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CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

- [1] Mohan B, Patwari AK, Anand VK. Hepatic dysfunction in childhood dengue infections. *J Trop Pediatr*. 2000;46(1):40–3.
- [2] Bandyopadhyay D, Chattaraj S, Hajra A, et al. A Study on Spectrum of Hepatobiliary Dysfunctions and Pattern of Liver Involvement in Dengue Infection. *J Clin Diagn Res*. 2016 May;10(5):OC21-6.
- [3] Aye KS, Charnkaew K, Win N, Wai KZ, Moe K, Punyadee N, et al. Pathologic highlights of dengue hemorrhagic fever in 13 autopsycases from Myanmar. *Hum Pathol* 2014; 45: 1221-33.
- [4] Shubhankar Mishra, Ramya Ramanathan, Sunil Kamar Agarwalla, Clinical Profile of Dengue Fever in Children: A Study from Southern Odisha, India; *Scientifica (Cairo)* 2016: 2016: 6391594, Epub April 24
- [5] Carmen SGR, Alicia C. Liver disease in pregnancy: Medical aspects and their implications for mother and child. *Ann Hepatol*. 18(4):2019, pp.553-562.
- [6] Anil A, Ashish K. Indian National Association for the Study of the Liver-Federation of Obstetric and Gynaecological Societies of India Position Statement on Management of Liver Diseases in Pregnancy. *J Clin Exp Hepatol*. 9(3):2019, pp.383-406.
- [7] Sujata EM. Clinical spectrum of Plasmodium vivax infection, from benign to severe malaria: A tertiary care prospective study in adults from Delhi, India. *Trop Parasitol*. 9(2):2019, pp.88-92.