

Original Research

Assessment of hepatic dysfunction in Dengue fever

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ABSTRACT:

Background: Dengue virus infection has varied clinical implications, ranging from patients presenting with no symptoms to landing up in critical conditions like Dengue hemorrhagic fever and Dengue shock syndrome. The present study was conducted to assess hepatic dysfunction in Dengue fever. **Materials & Methods:** 100 symptomatic Dengue serology positive patients of both sexes were investigated for complete blood counts, serum dengue IgM or IgG antibodies. Liver function tests, Ultrasound abdomen and chest X-Ray were done. **Results:** 97% of patients had fever, myalgia was present in 85%, headache in 80%, retro orbital pain in 77%, pain in abdomen in 32%, bleeding tendencies were present in 14%, altered sensorium in 7% and arthralgia in 2% of the patients overall. 36 cases had hepatomegaly present, 6 cases had epigastric tenderness and 2 cases had tenderness in right hypochondrium present. Hepatomegaly was the most common per abdomen finding. **Conclusion:** Serum AST and ALT levels are significantly elevated in all forms of dengue virus infection- DF, DHF, DSS and also it correlates with severity of dengue virus infection. We also found that serum AST were significantly raised in comparison to serum ALT levels in all the 3 forms of dengue virus infection

Key words: Chest X-Ray, Dengue, Ultrasound abdomen.

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INTRODUCTION

A number of outbreaks of dengue virus infection are frequently reported from India, every year. Dengue virus infection has varied clinical implications, ranging from patients presenting with no symptoms to landing up in critical conditions like Dengue hemorrhagic fever and Dengue shock syndrome. Dengue virus can also have systemic effects affecting the hepatic, cardiovascular, nervous and renal systems.¹

Despite of Dengue virus being a non- hepato trophic virus, it is not very uncommon, to come across hepatic function disturbances in dengue virus infection.² The patients who have hepatic involvement usually present with pain in the right hypochondrium. Hepatic involvement in dengue virus infection can be characterized by manifestations such as hepatomegaly, jaundice, and increased serum aminotransferase levels.³ These levels usually show an increase, and reach the peak of the curve at around ninth day from the first day of onset of symptoms, and

in and about 3 weeks, they return back to normal levels.

In most of the patients, due to the hepatic involvement, the clinical course is prolonged. The cause behind the hepatic involvement in dengue virus infection is unclear but could be due to direct effect of the viral load in the body or due to impaired host immune response against the virus.⁴ The present study was conducted to assess hepatic dysfunction in Dengue fever.

MATERIALS & METHODS

The present study was conducted among 100 symptomatic Dengue serology positive patients of both sexes, aged > 14 years in DR. D.Y. Patil Medical College, Pune. All patients will be interviewed and clinically examined.

All patients included in the study were investigated for complete blood counts, serum dengue IgM or IgG antibodies. Liver function tests namely serum total bilirubin, direct and indirect bilirubin, serum proteins,

AST, ALT, alkaline phosphatase, Prothrombin time, activated partial thromboplastin time, CK-MB, Ultrasound abdomen, chest X-Ray. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Age group (In years)	No. of Patients	Percentage
Below 21	18	18.00%
21 to 30	30	30.00%
31 to 40	31	31.00%
41 to 50	16	16.00%
51 and above	5	5.00%

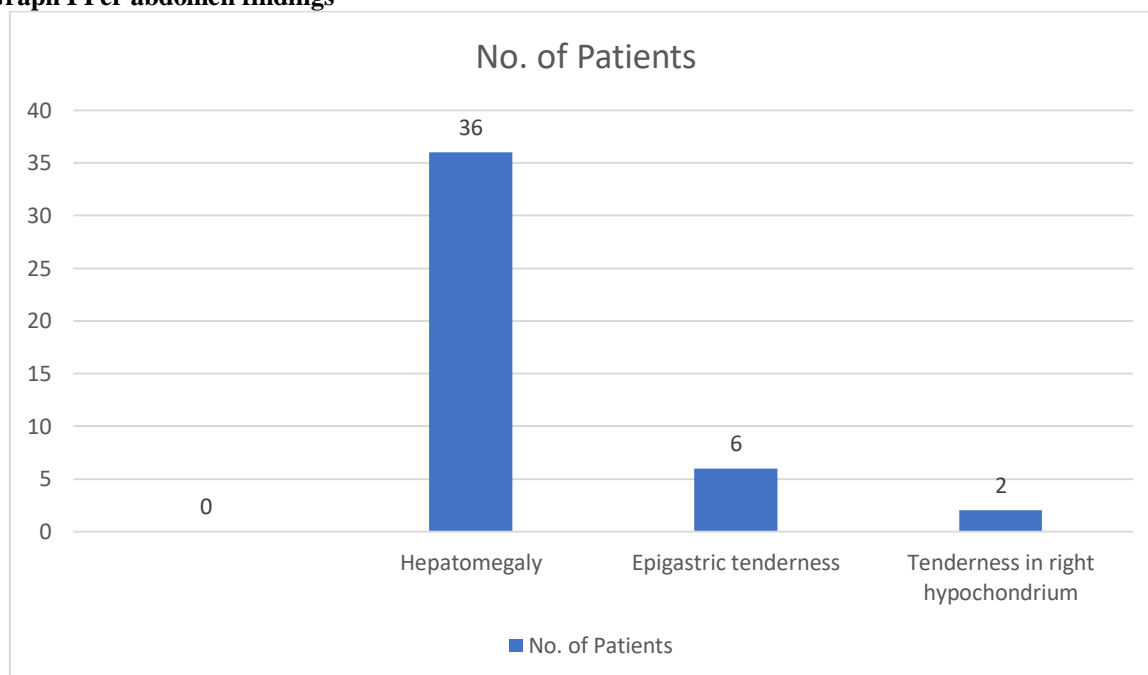
Table I shows that below 21 years had 18, 21-30 years had 30, 31-40 years had 31 and 41-50 years had 16 patients.

Table II Symptoms observed

Presenting Symptoms	No. of Patients	Percentage
Fever	97	97%
Myalgia	85	85%
Headache	80	80%
Retro orbital pain	77	77%
Pain in abdomen	32	32%
Bleeding tendencies	14	14%
Altered sensorium	7	7%
Arthralgia	2	2%

Table II shows that 97% of patients had fever, myalgia was present in 85%, headache in 80%, retro orbital pain in 77%, pain in abdomen in 32%, bleeding tendencies were present in 14%, altered sensorium in 7% and arthralgia in 2% of the patients overall.

Graph I Per abdomen findings



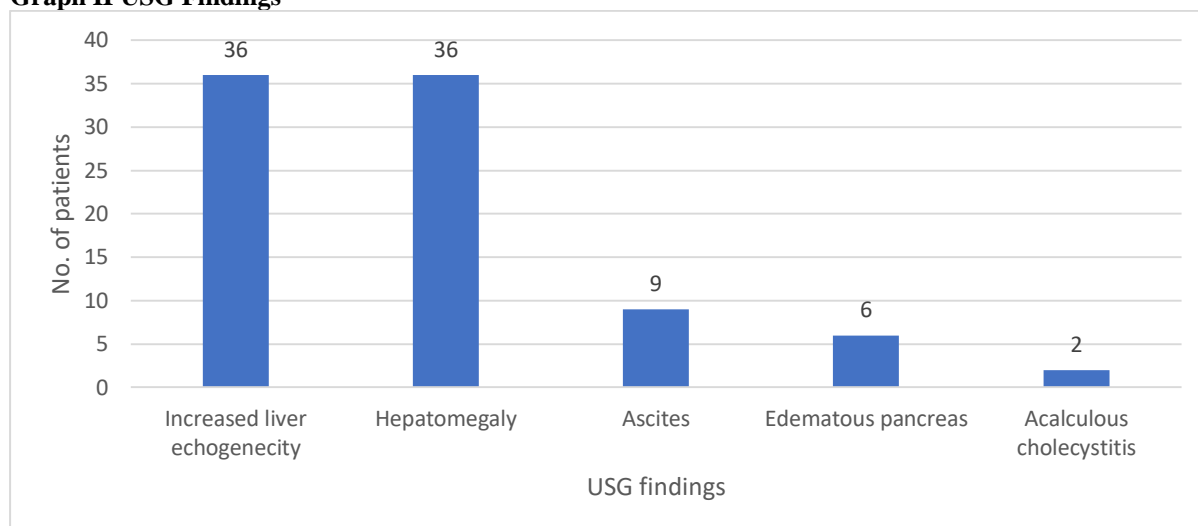
Graph I shows that 36 cases had hepatomegaly present, 6 cases had epigastric tenderness and 2 cases had tenderness in right hypochondrium present. Hepatomegaly was the most common per abdomen finding.

Table III Liver enzymes

Liver enzymes	No. of patients	Percentage
ALT	45	45%
AST	45	45%
ALP	28	28%

Table III shows that AST and ALT levels were elevated in 45 cases each whereas ALP levels were elevated in 28 cases.

Graph II USG Findings



Graph II shows that hepatomegaly along with raised liver echogenicity were the most common findings on ultrasound accounting in 36% of our cases followed by ascites accounting in 9% of our cases followed by edematous pancreas accounting for about 6% of the cases followed by acalculous cholecystitis accounting in for about 2% of cases.

Table IV Comparison between DF, DHF AND DSS

Lab Findings	DF		DHF		DSS		P value
	Mean DF	Std Dev DF	Mean DHF	Std Dev DHF	Mean DSS	Std Dev DSS	
Platelet count	60011.62	29231.93	21111.11	7557.18	17400.00	4878.52	0.00001
HCT	41.47	4.08	46.66	2.50	46.40	4.56	0.000135
Total Bilirubin	0.66	0.22	1.36	0.99	1.38	0.99	P<0.001
Direct Bilirubin	0.223	0.07	0.67	0.78	0.68	0.79	P<0.001
Indirect Bilirubin	0.44	0.19	0.69	0.31	0.7	0.28	0.000316
ALT	119.69	134.73	610.56	750.44	425.80	163.88	0.00001
AST	189.06	217.38	1788.33	3336.34	579.60	171.65	0.00005
ALP	105.56	43.33	150.44	83.95	120.60	28.10	0.026857
Sr. Total Proteins	6.72	0.19	5.55	0.33	5.62	0.16	P<0.001
Albumin	3.89	0.34	2.5	0.4	2.58	0.21	P<0.001
PTINR	1.08	0.039	1.477	0.19	1.44	0.20	P<0.001
aPTT	22.84	2.81	30.11	6.09	29	4.95	P<0.001
CKMB	24.35	12.51	42.89	22.72	22.00	10.51	0.000715
Amylase	77.75	38.08	298.33	271.23	420.8	312.04	P<0.001
Lipase	283.29	111.32	873.33	863.87	1198.6	844.85	P<0.001

Table IV shows that all above parameters found to be significant (P< 0.05).

DISCUSSION

Dengue viruses infect humans and several species of lower primates. Humans are the main urban reservoir of the viruses. Studies in Malaysia and Africa have shown that monkeys are infected and are the likely reservoir hosts, although the epidemiological significance of this observation remains to be established.⁵ Dengue virus strains grow well in insect tissue cultures and on mammalian cell cultures after adaptation. It is caused by the dengue virus, a flavivirus transmitted by *Aedes aegypti*. There are four distinct antigenic types of dengue viruses. Each virus elicits specific lifetime immunity against the same serotype, as well as short term cross immunity against the other three serotypes which may last for several months. All four serotypes can cause severe and fatal disease.⁶

In our study, dengue virus infection and its impact on liver function was studied in 100 serologically confirmed cases of dengue virus infection. Out of which 86% cases were of DF, 9% cases were of DHF and 5% cases of DSS. In our study, the mean age of the patients was 32 ± 6 , with the sex ratio of male: female being almost equal. Females accounted for about 46% and males accounted for 54% whereas in a recent study which was done by Rajoo et al.⁷

We found that 97% of patients had fever, myalgia was present in 85%, headache in 80%, retro orbital pain in 77%, pain in abdomen in 32%, bleeding tendencies were present in 14%, altered sensorium in 7% and arthralgia in 2% of the patients overall. Nimmannitya et al⁸ investigating 145 dengue patients, found ALT levels to be normal, slightly elevated or significantly elevated in 74, 18 and 8% of patients, respectively. No mention of AST levels was found in this report. Wahid et al⁹ studied 50 serologically confirmed cases of dengue (25 cases each of DF and DHF), and found serum AST and ALT levels to be significantly higher in patients with DHF.

We observed that 36 cases had hepatomegaly present, 6 cases had epigastric tenderness and 2 cases had tenderness in right hypochondrium present. Hepatomegaly was the most common per abdomen finding. People infected with one serotype maintain a lifelong protective immunity to infection by the homologous virus. However protective immunity to infection with heterologous serotypes is transitory.¹⁰ It has been proposed that neutralizing antibodies down regulate the severity of the disease, during a secondary infection with a different serotype, the presence of low amount of heterotypic neutralizing antibodies could prevent severe disease; on the other hand, when no neutralizing antibodies are present, heterotypic antibodies form complexes with dengue viruses, which infect mononuclear phagocytes with enhanced efficiency and as a consequence a higher number of cells are infected.¹¹

AST and ALT levels were elevated in 45 cases each whereas ALP levels were elevated in 28 cases. In dengue infections, elevations in serum AST appear to

be greater than ALT levels. This differs from the pattern in viral hepatitis, in which ALT levels are usually higher than or equal to AST levels but it is similar to that seen with alcoholic hepatitis.¹²

We observed that Hepatomegaly along with raised liver echogenicity were the most common findings on ultrasound accounting in 36% of our cases followed by ascites accounting in 9% of our cases followed by edematous pancreas accounting for about 6% of the cases followed by acalculous cholecystitis accounting in for about 2% of cases.

CONCLUSION

Serum AST and ALT levels are significantly elevated in all forms of dengue virus infection- DF, DHF, DSS and also it correlates with severity of dengue virus infection. We also found that serum AST were significantly raised in comparison to serum ALT levels in all the 3 forms of dengue virus infection (viz. DF, DHF, DSS). We would also conclude that prothrombin time and serum albumin, which are considered as indicators of liver cell function, they correlated with severity of dengue virus infection.

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