Section: General Medicine

Original Research Article

ANALYSIS OF LIVER DYSFUNCTION IN DENGUE AND ITS PROGNOSTIC IMPORTANCE AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Dengue is a mosquito-transmitted virus and the leading cause of arthropod-borne viral disease in the world. The liver is one of the common organs involved in dengue infection. Hence, the present study was conducted for assessing liver dysfunction in dengue patients and its prognostic importance.

Materials & Methods: A total of 200 patients with presence of dengue fever were enrolled. Complete demographic and clinical details of all the patients were obtained. A Performa was made and the detailed medical history of all the patients was recorded. Blood samples were obtained, and biochemical profile was evaluated. Categorization of patients was done on the basis of severity of dengue. The prevalence of liver dysfunction was recorded.

Results: The mean age of the patients was 49.3 years. Fever, body ache, vomiting, abdominal pain, maculopapular rashes, petechial spots, jaundice and hepatomegaly were seen in 100 percent, 65 percent, 25 percent, 20 percent, 20 percent, 10 percent, 15 percent and 10 percent of the patients respectively. Liver dysfunction was seen in 60 percent of the patients. While assessing the correlation of liver dysfunction with severity of dengue, significant results were obtained, highlighting the importance of hepatic profile as prognostic indicator.

Conclusion: One major burden on emerging nations has been dengue disease. Even though the liver is only mildly involved in many instances, acute liver dysfunction is linked to significant rates of morbidity and death because of systemic consequences.

Key words: Dengue, Liver, Dysfunction.

INTRODUCTION

Dengue is a mosquito-transmitted virus and the leading cause of arthropod-borne viral disease in the world. It is also known as breakbone fever due to the severity of muscle spasms and joint pain, dandy fever, or seven-day fever because of the usual duration of symptoms. Although most cases are asymptomatic, severe illness and death may occur. Aedes mosquitoes transmit the virus and are common in tropical and subtropical parts of the world.[1,2]

Dengue is hyperendemic in tropical and subtropical climates worldwide, mostly in urban and semi-urban areas. Global incidence of dengue has grown exponentially in recent years and nearly half of the world's population is now at risk. There are an estimated 100-400 million new infections each year, although this number may be grossly under-reported as surveillance networks are not robust in most tropical countries.[3-5] It is predicted that the transmission of dengue will be more strengthened in dengue-endemic countries, and due to climate change and increases in international traveling, the

infection may spread to countries in Europe and the US that are currently not significantly affected by DENV. Liver injury associated with DENV infection was first reported in 1967. The liver is one of the common organs involved in dengue infection. Hepatic complications were found in 60%-90% of infected patients included hepatomegaly, jaundice, elevated aspartate aminotransferase (AST), elevated alanine aminotransferase (ALT), and acute liver failure (ALF). All four serotypes have been associated with dengue-related liver injury, but DENV-1 and DENV-3 have more significant injuries.[6-8] Hence; the present study was conducted for assessing liver dysfunction in dengue patients and its prognostic importance.

MATERIAL AND METHODS

A descriptive observational study was conducted in IPD at a tertiary care center of Western Rajasthan from September 2023 to February 2024 for assessing liver dysfunction in dengue patients and its prognostic importance. A total of 200 patients with presence of dengue fever were enrolled. Complete demographic and clinical details of all the patients were obtained. A Performa was made and the detailed medical history of all the patients was recorded. Blood samples were obtained, and biochemical profile was evaluated. Categorization of patients was done on the basis of severity of dengue. The prevalence of liver dysfunction was recorded. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

The mean age of the patients was 49.3 years. Majority proportion of patients were males. Fever, Body ache, Vomiting, Abdominal pain, Maculopapular rashes, Petechial spots, Jaundice and Hepatomegaly were seen in 100 percent, 65 percent, 25 percent, 20 percent, 20 percent, 10 percent, 15 percent and 10 percent of the patients respectively. While assessing the hepatic profile, it was seen that Serum bilirubin (g/dL), SGOT (IU/L), SGPT (IU/L), Alkaline phosphate (IU/L) and Serum albumin (g/dL) levels were found to be 0.69 g/dL, 89.12 IU/L, 63.84 IU/L, 79.2 IU/L and 4.35 g/dL respectively. Liver dysfunction was seen in 60 percent of the patients. While assessing the correlation of liver dysfunction with severity of dengue, significant results were obtained, highlighting the importance of hepatic profile as prognostic indicator.

Table 1: Clinical profile

Clinical profile	Number	Percentage
Fever	200	100
Body ache	130	65
Vomiting	50	25
Abdominal pain	40	20
Maculopapular rashes	40	20
Petechial spots	20	10
Jaundice	30	15
Hepatomegaly	20	10

Table 2: Hepatic biochemical profile

Biochemical profile	Mean	SD
Serum bilirubin (g/dL)	0.69	0.38
SGOT (IU/L)	89.12	21.98
SGPT (IU/L)	63.84	18.46
Alkaline phosphate (IU/L)	79.2	33.5
Serum albumin (g/dL)	4.35	0.86

Table 3: Incidence of liver dysfunction

Liver dysfunction	Number	Percentage
Present	120	60
Absent	80	40
Total	200	100

Table 4: Correlation of liver dysfunction with severity of dengue liver

Dengue severity	Liver dysfunction present		Liver dysfunction absent	
	Number	Percentage	Number	Percentage
Dengue without warning signs	10	8.34	50	62.5
Dengue with warning signs	40	33.33	20	25
Severe dengue	70	58.33	10	12.5
Total	120	100	80	100
p-value	0.001 (Significant)			

DISCUSSION

Dengue is a vector-borne infection caused by the dengue virus, a member of the Flaviviridae family. The virus is transmitted to humans by female mosquitoes of the species Aedes aegypti, less commonly Aedes albopictus, and a few other species. The dengue virus has 4 serotypes: DENV 1, 2, 3, and 4. Infection with one serotype renders lifelong immunity against that serotype. However, reinfection with a different serotype can occur. Secondary infection by another serotype increases the risk of developing severe dengue. One modelling estimate places the global burden of dengue at 390 (95% credible interval 284–528) million infections per year, of which 96 (67–136) million manifest with varying levels of disease severity. Case fatality rates (CFR) of approximately 1% have been reported for the World Health Organization (WHO) Southeast Asia region; in India, focal outbreaks away from urban areas have reported CFR of 3%–5%.[9-11] With DENV infection, high level of viremia is associated with involvement of different organs (liver, brain) in the severe form of the disease. The liver is the commonest organ to be involved in dengue. Hepatic manifestations are either a result of direct viral toxicity or dysregulated immunologic injury in response to the virus. The spectrum of involvement includes asymptomatic elevation of hepatic transaminases to occurrence of severe manifestation in form of ALF.[12]

A total of 200 dengue patients were analyzed. The mean age of the patients was 49.3 years. Majority proportion of patients were males. Fever, Body ache, Vomiting, Abdominal pain, Maculopapular rashes, Petechial spots, Jaundice and Hepatomegaly were seen in 100 percent, 65 percent, 25 percent, 20 percent, 20 percent, 10 percent, 15 percent and 10 percent of the patients respectively. While assessing the hepatic profile, it was seen that Serum bilirubin (g/dL), SGOT (IU/L), SGPT (IU/L), Alkaline phosphate (IU/L) and Serum albumin (g/dL) levels were found to be 0.69 g/dL, 89.12 IU/L, 63.84 IU/L, 79.2 IU/L and 4.35 g/dL respectively. Roy et al estimated the range of hepatic involvement in dengue infection. They assessed the biochemical and clinical profile of hepatic involvement by dengue virus in 120 subjects. All cases were grouped into DF without warning signs (Group 1), DF with warning signs (Group 2) and severe dengue (Group 3) according to revised World Health Organization 2009 criteria. The spectrum of hepatic manifestations included hepatomegaly (80.8%), hepatic tenderness (46.3%), jaundice (60%), raised aspartate transaminase (AST), alanine transaminase (ALT) and prolonged prothrombin time (41.7%) and reduced serum albumin (56%). Hepatic dysfunction was observed more in Groups 2 and 3. There was 84.4% and 93.75% ALT and AST elevation respectively in Group 2 and 94.5% and 95.9% ALT and AST elevation respectively in Group 3 and fulminant hepatic failure was observed in Group 3.[13]

In the present study, liver dysfunction was seen in 60 percent of the patients. While assessing the correlation of liver dysfunction with severity of dengue, significant results were obtained; highlighting the importance of hepatic profile as prognostic indicator. Palmal S et al, in another previous study, authors established how different liver enzymes act in identifying markers for dengue prognosis for the early detection of severe dengue fever (DF). The diagnosis of dengue patients was confirmed by enzyme-linked immunosorbent assay, and associated clinical parameters were analyzed. The majority of these patients had elevated AST and ALT levels; ALT levels were higher than AST levels, which were partially observed in all non-structural protein 1 antigen- and dengue immunoglobulin M antibody-reactive patients. Almost 25% of patients had very low platelet count or thrombocytopenia. All these liver enzymes are significantly correlated with an increased level of T.BIL, ALT, and AST. Their study depicts that the intensity of hepatic involvement may play a critical role in the morbidity and mortality of DF patients.[14] Leowattana W et al assessed the correlation of dengue hemorrhagic fever and the liver. The hepatocellular injury was found in 60%-90% of DHF patients manifested as hepatomegaly, jaundice, elevated aminotransferase enzymes, and critical condition as an acute liver failure (ALF). Even the incidence of ALF in DHF is very low (0.31%-1.1%), but it is associated with a relatively high mortality rate (20%-68.3%). The pathophysiology of liver injury in DHF included the direct cytopathic effect of the DENV causing hepatocytes apoptosis, immune-mediated hepatocyte injury induced hepatitis, and cytokine storm. Hepatic hypoperfusion is another contributing factor in dengue shock syndrome. The reduction of morbidity and mortality in DHF with liver involvement is dependent on the early detection of warning signs before the development of ALF.[15] Juneja, D et al analyzed the demographic profile, symptomology, hospital course and outcomes of patients presenting with ALF secondary to dengue infection by reviewing the published case reports. A systematic search was performed from multiple databases including PubMed, Reference Citation Analysis, Science Direct, and Google Scholar. Data from 19 case reports fulfilling the predefined inclusion criteria were included. The median age of patients was 38 years with a female preponderance (52.6%). The median days from diagnosis of dengue to development of ALF was 4.5 d. The increase in aspartate aminotransferase was higher than that in alanine aminotransferase. All the patients had one or more organ failure, with neurological failure present in 73.7% cases. 42.1% patients required vasopressor support and hepatic encephalopathy was the most reported complication in 13 (68.4%) cases. Most of

the patients were managed conservatively and 2 patients were taken up for liver transplantation. Only 1 death was reported (5.3%). Dengue infection may rarely lead to ALF.[16]

CONCLUSION

One major burden on emerging nations has been dengue disease. Even though the liver is only mildly involved in many instances, a liver dysfunction is linked to significant rates of morbidity and death because of systemic consequences.

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