

ASSESSMENT OF LIVER FUNCTION TEST AND ITS CORRELATION WITH SEVERITY OF DENGUE FEVER

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ABSTRACT

Background: It is reported that globally more than 2.5 billion of the population live in areas that are endemic for Dengue viral infection. Approximately about 50 million new Dengue infections are reported each year with an estimated mortality of more than 25000 globally. According to the World Health Organization, about forty percent of the world's population reported that in the current scenario are at risk for encountering Dengue viral infection. **Material & Methods:** The present cross-sectional study includes 200 Patients who had Dengue IgM antibody positive were enrolled from outdoor and from the ward by simple random sampling. Clearance from Institutional Ethics Committee was taken before the start of the study. Written informed consent was taken from each study participant. **Results:** Among the total study participants 42 (21%) had normal serum ALT levels, 52 (26%) patients had serum ALT levels raised less than Two-folds, 48 (24%) patients had serum ALT levels raised more than Two-folds, 42 (21%) patients had serum ALT levels raised more than four-folds and 16 (8%) patients had serum ALT levels raised more than ten folds. Among the total study participants 30 (15%) had normal serum AST levels, 52 (26%) patients had serum AST levels raised less than Two-folds, 56 (28%) patients had serum AST levels raised more than Two-folds, 50 (25%) patients had serum AST levels raised more than four-folds and 12 (6%) patients had serum AST levels raised more than ten folds. These differences were statistically non-significant (P-value > 0.05). **Conclusion:** We concluded from the present study that liver function deterioration in Dengue fever was varied from the normal range of biochemical markers to raised liver function markers. AST elevation was observed more statistically significant than ALT elevation. Hyperbilirubinemia and raised alkaline phosphatase levels were also observed. Low serum albumin levels were associated with the critical phase of liver disease.

Keywords: Dengue Fever, AST levels, ALT levels, Alkaline Phosphatase.

INTRODUCTION

It is reported that globally more than 2.5 billion of the population live in areas that are endemic for dengue viral infection. Approximately about 50 million new dengue infections are reported each year with an estimated mortality of more than 25000 globally (1). According to the World Health Organization, about forty percent of the world's population reported that in the current scenario are at

risk for encountering dengue viral infection (2). In India, the burden and prevalence of dengue viral infection are increasing as trends are reported globally. Along with global pandemic concerns, dengue has become a major public health concern in India. Dengue is an emerging epidemic disease and several outbreaks among every state of India are being reported from time to time (3). The prevalence

of dengue viral infection has tended to rise globally in recent decades (4).

World health organization also reported that as the high prevalence of dengue infection is seen worldwide it requires immediate action and planning to combat the situation. The estimated incidence rate of dengue infections is 1% of the global population while estimated mortality among them is approximately 20% (5). There were also reported metastasizing of dengue viral infection exponentially breaching the geographical borders(6). The exact clinical picture is varying from subject to subject which depends on the serotype of dengue virus, immunity status, and subtype of dengue fever. The classical signs and symptoms of dengue infections were fever, headache, myalgia, and arthralgia sometimes bleeding manifestations and also shock was reported. Dengue viral infections were classified among dengue fever, undifferentiated fever and dengue hemorrhagic fever, and dengue shock syndrome (7).

Due to its high incidence and prevalence rates of dengue viral infections in India, a national vector-borne diseases control program is initiated for integrated management of vectors, surveillance and monitoring, and diseases prevention along with treatment (8). The etiology behind dengue is reported as a vector-borne viral disease that is transferred to humans by the bite of the infected *Aedes* mosquito. It was also reported that the number of dengue vectors (*Aedes* mosquito) also increased which is also contributing to the high prevalence of dengue viral infections (9).

Dengue fever affects multiple organ systems namely the nervous system, heart, and liver, which results in encephalitis, myocarditis, and hepatitis. The complete clinical profile should be evaluated before the treatment protocol to save the patient's life. Hence, the present study was conducted to assess the serum aminotransferase levels and their correlation with the severity of dengue fever at tertiary care hospitals.

MATERIALS & METHODS

The present cross-sectional study was conducted at the department of general medicine of our tertiary care hospital. The study duration was of six months from June 2019 to December 2019. A sample size of 200 was calculated at a 95% confidence interval at a 5% acceptable margin of error by epi info software version 7.2. Patients who had dengue IgM antibody positive were enrolled from outdoor and from the

ward by simple random sampling. Clearance from Institutional Ethics Committee was taken before the start of the study. Written informed consent was taken from each study participant. Strict confidentiality was maintained with patient identity and data and not revealed, at any point in time.

The data were collected by detailed history, general physical and clinical examination from each patient (more than 15 years of age) after taking the written consent. Patients who had typhoid, malarial diseases, dengue, or patients with existing liver disease were excluded from the present study.

All study participants were subjected to routine blood investigation for complete blood count and liver function test and ELISA for dengue serology. All the data was recorded on a Microsoft Excel spreadsheet and data analysis was done at 5% alpha and 95% confidence interval using SPSS v22 software. Test of significance was applied on collected and organized data and a p-value less than 0.05 was considered as a statistically significant association between study variables.

RESULTS

In the present study, we enrolled 200 patients who were aged from 17 to 61 years. The mean age of the enrolled patient was 36.42 ± 5.26 years. No patient in the present study aged less than 15 years of age. Out of the total patients diagnosed Dengue IgM antibody positive 59% were male and 41% were females. All of these patients with dengue fever were subjected to routine blood investigation for complete blood count and liver function test and ELISA for dengue serology.

Among the total study participants 42 (21%) had normal serum ALT levels, 52 (26%) patients had serum ALT levels raised less than Two-folds, 48 (24%) patients had serum ALT levels raised more than Two-folds, 42 (21%) patients had serum ALT levels raised more than four-folds and 16 (8%) patients had serum ALT levels raised more than ten folds. Among the total study participants 30 (15%) had normal serum AST levels, 52 (26%) patients had serum AST levels raised less than Two-folds, 56 (28%) patients had serum AST levels raised more than Two-folds, 50 (25%) patients had serum AST levels raised more than four-folds and 12 (6%) patients had serum AST levels raised more than ten folds. These differences were statistically non-significant (P-value > 0.05). (Table 1)

Table No.-1: Distribution of study participants according to range of aminotransferase elevations

	ALT (%)	AST (%)	P value
Normal	42 (21%)	30 (15%)	-
<Two-fold rise	52 (26%)	52 (26%)	>0.05
Two-four-fold rise	48 (24%)	56 (28%)	>0.05
Four-tenfold rise	42 (21%)	50 (25%)	>0.05
>Tenfold rise	16 (8%)	12 (6%)	>0.05

In the present study, out of a total of 200 study participants, on the assessment of liver function, it was found that 28 (14%) patients had bilirubin levels raised more than two folds, 62 (31%) patients had raised alkaline phosphatase levels and 30 (15%) patients had raised serum globulins levels. out of a total of 200 study participants, 118 (59%) patients had normal serum proteins levels and 82 (41%) patients had serum proteins levels below the normal range. out of a total of 200 study participants, 116 (58%) patients had normal serum albumin levels and 84 (42%) patients had serum albumin levels below the normal range. (Table 2 & 3)

Table No.-2: Distribution of study participants according to ranges of increased bilirubin, alkaline phosphatase, and globulin levels.

Tests		Number of patients (%)
Liver function test parameters	Bilirubin > 2mg/dl	28 (14%)
	Alkaline phosphatase increased	62 (31%)
	Serum globulins increased	30 (15%)

Table No.-3: Distribution of study participants according to ranges of serum proteins and serum albumin.

Tests		Number of patients (%)
Serum proteins	Low	82 (41%)
	Normal	118 (59%)
	Increased	(0%)
Serum albumin	Low	84 (42%)
	Normal	116 (58%)
	Increased	(0%)

DISCUSSION

In previous studies, it was reported that dengue viral infection has affected the liver and liver functions. However, liver functions do not deteriorate in the early phases of dengue fever. The etiology behind this deterioration was multifactorial for example direct viral injury or hypoxic injury or immune-mediated damage (10). In the present study, we enrolled 200 patients who were aged from 17 to 61 years. The mean age of the enrolled patient was 36.42 ± 5.26 years. No patient in the present study aged less than 15 years of age. Out of total patients diagnosed dengue IgM antibody positive 59% were male and 41% were females. All of these patients with dengue fever were subjected to routine blood investigation for complete blood count and liver function test and ELISA for dengue serology. Similar results were obtained in a study conducted by Samanta J et al among patients of dengue viral fever and found that effects of dengue virus infection associated with effects on liver function test and histopathological patterns are suggestive of councilman bodies, microvascular steatosis, and liver cell necrosis (11).

Among the total study participants 42 (21%) had normal serum ALT levels, 52 (26%) patients had serum ALT levels raised less than Two-folds, 48 (24%) patients had serum ALT levels raised more than Two-folds, 42 (21%) patients had serum ALT levels raised more than four-folds and 16 (8%) patients had serum ALT levels raised more than ten

fold. Among the total study participants 30 (15%) had normal serum AST levels, 52 (26%) patients had serum AST levels raised less than Two-folds, 56 (28%) patients had serum AST levels raised more than Two-folds, 50 (25%) patients had serum AST levels raised more than four-folds and 12 (6%) patients had serum AST levels raised more than ten folds. Similar results were obtained in a study conducted by Javed S et al among 200 patients with dengue viral fever. They reported that the mean age of study participants was 36.92 years and the male to female ratio was 1.23:1. All patients who had a fever, shock, and bleeding were reported in 16 and 4 cases respectively. 130 patients had moderate dengue fever. Raised aminotransferase levels were reported among 65% of study participants, out of the approximately 40% of participants who had moderate dengue fever (12)

In the present study, out of a total of 200 study participants, on the assessment of liver function, it was found that 28 (14%) patients had bilirubin levels raised more than two folds, 62 (31%) patients had raised alkaline phosphatase levels and 30 (15%) patients had raised serum globulins levels. out of a total of 200 study participants, 118 (59%) patients had normal serum proteins levels and 82 (41%) patients had serum proteins levels below the normal range. out of a total of 200 study participants, 116 (58%) patients had normal serum albumin levels and 84 (42%) patients had serum albumin levels below the normal range. Similar results were obtained in a study conducted by Parkash et al among patients with dengue viral fever and found that 5% of patients had serum bilirubin levels raised more than two folds than normal (13). Similar results were obtained in a study conducted by Rajoo Singh Chhina et al among patients with dengue viral fever and found that 30% of patients had serum alkaline phosphatase levels raised than normal (14).

CONCLUSION

We concluded from the present study that liver function deterioration in dengue fever was varied from the normal range of biochemical markers to raised liver function markers AST elevation was observed more statistically significant than ALT elevation. Hyperbilirubinemia and raised alkaline phosphatase levels were also observed. Low serum albumin levels were associated with the critical phase of liver disease.

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