

## Original Research Article

### **Study of Liver function tests in Adult patients with Dengue viral infection in Anantapuramu, Andhra Pradesh.**

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**Abstract:** Dengue is an acute, infectious, commonest arboviral disease caused by Dengue virus and is endemic in more than 100 countries in tropical and sub tropical region. Hepatic dysfunction is common in dengue infection and the degree of liver dysfunction in adults varies from mild injury with elevation of transaminases to severe injury with jaundice. This study was under taken to assess the spectrum of hepatic involvement in dengue infection. A total of 88 serologically confirmed cases of dengue infection (IgM ELISA) were enrolled. The liver function tests (serum bilirubin, AST, ALT, ALP, serum albumin) were done by using semi automated chemistry analyzer (ERBA). The Mean ( $\pm$ SD) of Total bilirubin, Alanine amino transferase (ALT), Aspartate amino transferase (AST), Alkaline phosphatase (ALP) and serum Albumin values were 1.12 $\pm$ 0.14mg/dl, 204.5 $\pm$ 11.8 U/L, 362.78 $\pm$ 37.8 U/L, 131.7 $\pm$ 3.62U/L, 3.13 $\pm$ 0.24 g/dl respectively. The mean value of AST was significantly higher than ALT. This study shown that liver injury is common in adult patients with dengue infection. We conclude that Adult dengue patients commonly showed abnormal liver function tests and accounted for at least two-thirds of them. High AST may serve as an early indicator of dengue infection. High serum bilirubin, Alanine amino transferase (ALT), Alkaline phosphatase (ALP) may act as poor prognostic markers.

**Keywords:** Dengue infection, Hepatic dysfunction, Alanine amino transferase (ALT), Aspartate amino transferase (AST), alkaline phosphatase (ALP), Adults

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#### **INTRODUCTION:**

Dengue is an acute, infectious, commonest arboviral disease caused by Dengue virus, transmitted from person to person by the infective female Aedes mosquitoes. It is endemic in more than 100 countries in tropical and sub tropical region, often giving rise to epidemic and even pandemic.

In 1998 pandemic WHO reported 1.2 million cases with about 15000 deaths. Every year it is increasing so much, it is estimated that each year 50 million infections occur with 5, 00,000 cases and 12,000 deaths [1]. In India, dengue is common in the East coast. Dengue virus has four serotypes: Dengue1 (DEN1), Dengue2 (DEN2), Dengue3 (DEN3), Dengue 4 (DEN4) and all four types of Dengue virus are present in India.

Classical dengue fever usually affects older children and adults. Dengue may also occur in more serious forms, with hemorrhagic manifestations or with shock [2]. Liver is the target organ for dengue infection and involvement of liver has been expressed in terms of

elevated aminotransferase enzyme to most severe form of fulminant hepatic failure leading to death [3].

Elevation of the liver enzymes Aspartate aminotransferase enzymes (AST) and Alanine aminotransferase (ALT) is common in acute dengue illness occurring in 65-97% of dengue patients, peaking during the convalescent period of illness [4]. Dengue fever initiates the inflammatory response leading of liver parenchymal changes and causing release of transaminases in circulation [5]. Other contributing factors include race, diabetes, hemoglobinopathies, preexisting liver damage and the use of hepatotoxic drugs [4]. Jaundice in dengue infection as been associated with fulminant liver failure [6].

Albumin is a major plasma protein involved in the maintenance of pH and plasma colloid osmotic pressure [7]. Severe dengue will be having plasma leakage which may result in low serum Albumin [8].

The aim of the present study is to assess the hepatic dysfunction in Adult patients with dengue infection by assessing liver enzymes and serum

albumin. Hepatic dysfunction changes were compared between dengue positive subjects and normal subjects.

**MATERIALS AND METHODS:**

The study was carried out by collecting blood samples from Government Medical College, Microbiology Department, Anantapuramu, and Andhra Pradesh. Informed consent has taken from all the patients. Two groups were included in this study: Control group - Normal persons without any evidence of hepatic disorders, blood and renal disorders and Study group - Dengue positive subjects.

The study group included individuals from the age group of 18 to 60 years, who were confirmed Dengue cases, tested by NIV (National Institute of Virology) Dengue IgM capture ELISA kit method (version 2.4). Out of 246 suspected samples, 88 were found to have IgM antibodies against Dengue virus and remaining 158 were IgM negative.

From all Dengue positive patients, 5 ml venous blood was collected from each subject in a plain tube and serum is separated by centrifugation. The serum is used for the estimation of the following parameters:

1. Total Bilirubin is estimated by Modified Jendrassik and Grofs method [9].
2. Albumin is estimated by Bromo cresol Green dye (BCG) end point method [10].

3. Enzyme Alkaline Phosphatase is estimated by International Federation of Clinical Chemistry (IFCC) method [11].
4. Alanine Transaminase (ALT) is estimated by International Federation of Clinical Chemistry (IFCC) method [12].
5. Aspartate Transaminase (AST) is estimated by International Federation of Clinical Chemistry (IFCC) method [13].

Subjects with history of chronic liver disease, chronic alcoholics, Nephrotic syndrome, and drug induced toxicity are excluded from this study.

All the liver enzymes levels and serum albumin levels were noted and analyzed.

The statistical analysis was done using graph pad software and students unpaired t-test for significance of difference in proportions and means between two groups respectively. A P value <0.05 was considered statistically significant

**RESULTS:**

Out of 88 patients studied, 62 were males (70.45%) and 26 were females (29.54%). The age range of patients was 18-60 years and the mean age was 37.69 years. Males were predominant among Dengue cases. Maximum number of Dengue cases was in 31-45 years age group (Table No: 1).

**Table 1: Showing Sex and Age distribution of Dengue Positive cases**

S.No.	Age group(years)	Males	Females	Total	Percentage (%)
1	18-30	18	9	27	30.6
2	31-45	35	14	49	55.6
3	46-60	9	3	12	13.6
Total		62	26	88	100

Mean (±SD) of Total Bilirubin, Aspartate Transaminase (AST), Alanine Transaminase (ALT), Alkaline phosphatase (ALP), Serum Albumin of Dengue patients and Control group were depicted in Table No:2. Total bilirubin, AST, ALT, ALP were significantly higher in Dengue patients when compared

to normal subjects and Serum albumin is decreased in Dengue patients. There is a alteration in AST seen in 80 (90.9%) and ALT seen in 77 (87.5%) of the patients. The Mean value of AST (362.78) was significantly higher than the mean ALT value (204.5) and the p value is < 0.0001.

**Table 2: Profile of Liver function tests finding in Dengue patients and Controls**

Parameters	Dengue patients	Controls	t-value	P value
Total bilirubin(mg/dl)	1.21±0.14	0.801±0.08	23.788	<0.0001 ESS
AST(U/L)	362.78±37.1	38.52±4.20	81.404	<0.0001 ESS
ALT(U/L)	204.5±11.8	35.11±4.08	127.26	<0.0001ESS
ALP(U/L)	131.7±3.62	109.44±9.9	19.704	<0.0001ESS
Serum albumin(g/dl)	3.13±0.243	4.19±0.56	16.191	<0.0001 ESS

AST: Aspartate transaminase, ALT: Alanine transaminase, ALP: Alkaline phosphatase, ESS: Extremely Statistically significant.

**DISCUSSION:**

A total of 88 serologically confirmed cases of dengue infection were studied. In the present study

males were predominant among Dengue cases and maximum number of dengue cases was in 31-45 years age group.

Dengue virus impacts on liver function and causes deterioration of patient's condition which in turn results increase in morbidity. The severity of liver dysfunction varies accordingly to the type of clinical presentation of dengue infection and is more common in patients with complicated dengue [14].

Most adults with dengue infection have some degree of hepatic involvement, an additional non-hepatic source of Aspartate amino transferase (AST) could explain the pattern observed. Alanine amino transferase (ALT) is primarily associated with hepatocytes, with minimal activity in cardiac and skeletal muscle and AST is found in erythrocytes, cardiac and skeletal muscle and kidney and brain tissue and is often elevated because of damage to those sources and response to hepatic damage [15].

In the present study the Mean value of AST (362.78) was significantly higher than the mean ALT value (204.5). In dengue infection elevation in serum AST level tends to be greater than ALT level [16, 17]. It has been suggested that it may be due to excess release of AST from damaged myocytes during infection [18].

We have found in our study that deranged liver functions are an important feature in patients with dengue infection. Total bilirubin, AST, ALT, ALP were significantly higher in Dengue patients when compared to normal subjects. Almost 87.5% of the patients in this study had elevated ALT and 90.9% of patients had elevated AST. A study carried out in Kerala [19] recorded in 83.9% of patients with elevated levels of AST. Another study carried out in Lucknow showed an elevation of ALT and AST in 96% of the study population [20].

Hower Wong *et al.*; [21] reported that AST abnormality was predominantly higher as compared to ALT about 91% and 72% respectively. A study from Asia pacific region (Taiwan) by Kuo *et al.*; reported that approximately 90% of the patients had abnormal AST level and 80% of patients had abnormal ALT [22].

A study from Om prakash *et al.*; shows that 95% of dengue patients had elevated AST levels and 86% had elevated ALT levels [23]. Furthermore a study from Kittittrakul C *et al.*; shows abnormal AST and ALT were found in 88.2% and 69.3% of dengue patients respectively [24].

The mean ALP concentration obtained in the present study was 131.7 U/L, lower than the mean values reported from Salem, Tamilnadu (147.6U/L) [25] and Ludhiana (Punjab) about 174.6U/L [26]. But higher than the values observed in this study from Lucknow (94U/L) [27] and Malaysia (93.3U/L) [28].

However, it has stated earlier that increase in ALP was unrelated to the severity of the clinical status [29].

Hypoalbuminaemia has been described with dengue infections and is an indicator of severity [30]. The mean serum Albumin concentration in the present study was 3.13g/dl. This is in line with other studies like Uday G *et al.*; [31], Rajoosingh C *et al.*; [26] who has documented Serum albumin levels as 3.5 g/dl and 3.2 g/dl respectively. A complex interaction between virus, host immune response and endothelial cells likely impacts the barrier integrity and functions of endothelial cells leading to plasma leakage causing Hypoalbuminaemia [32].

#### CONCLUSION:

Liver dysfunction seen in dengue virus infections could be a direct viral effect on hepatocytes or as a result of deregulated host immune response against the virus. Liver involvement is very common in all forms of dengue infection with AST raising significantly more than ALT. Serum ALT, Bilirubin and ALP are significantly higher in patients with dengue infection. High AST may serve as an early indicator of dengue infection. Low serum Albumin (Hypoalbuminaemia) is also an indicator of vascular permeability alteration. High ALT, Bilirubin, ALP may act as poor prognostic markers.

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