



A STUDY OF HEPATIC ENZYMES STATUS IN PATIENTS WITH DENGUE INFECTION:

Pediatrics

Dr Preetham R. M Assistant Professor, Department of Pediatrics, Kanachur Institute of Medical Sciences, Mangalore

Dr Narayanappa D* Professor, Department of Pediatrics, JSS Hospital, Mysore *Corresponding Author

ABSTRACT

Dengue viral infections are known to present a diverse clinical spectrum, ranging from asymptomatic illness to severe dengue.⁴ The degree of liver dysfunction in children with dengue infections varies from mild injury with elevation of transaminase activity, hepatomegaly (tender/non tender) to severe injury with jaundice and fulminant hepatic failure.⁶ The elevation of liver enzymes varies according to the type of clinical presentation of dengue infection, and is more common in patients with severe dengue. Awareness of these manifestations of hepatic involvement in dengue may be helpful in arriving at early diagnosis and avoiding morbidity and mortality.

Since our hospital (Kanachur Institute of Medical Sciences) is tertiary care hospital, we do see a lot of children with dengue infections including those with atypical manifestations. So, an attempt has been made to study hepatic enzymes status and its prognostic significance in children with dengue virus infection.

KEYWORDS

Heptic Enzymes, Dengue, Status, SGOT, SGPT.

Introduction:

Dengue epidemics are known to have occurred over the last three centuries in tropical, subtropical and temperate areas of the world. In spite of multiple dengue strain endemicity and countrywide invasion of *Aedes aegypti*, till very late India remained a silent zone, however by late eighties this scenario started changing beginning from Surat in 1988, sharp outbreaks of dengue have occurred all over the country, in last decades many cities: Delhi, Kolkata, Bangalore, Chennai, Jaipur, Gwalior have suffered of dengue epidemic.¹ Dengue fever has been reported from India over a long time, but dengue hemorrhagic fever (DHF) was first reported in 1963 from Calcutta city.² Since then several outbreaks of dengue fever have been reported from India with a major epidemic of dengue hemorrhagic fever that occurred in Delhi in 1996 when 10252 cases and 423 deaths were reported.² The number of DF/DHF cases and deaths reported since the epidemic has been low till 2002 but again has risen from 2003.³ The case fatality has been above 1% for the last 10 years.²

The global prevalence of dengue has grown dramatically in recent decades. The disease is now endemic in more than 100 countries in Africa, Americas, the eastern Mediterranean, South East Asia and western pacific. South east Asia and western pacific are most seriously affected.² Nearly 2.5 billion people are at risk of dengue. WHO currently estimates there may be 50 million cases of dengue infection worldwide every year. During epidemics of dengue, attack rates among susceptible are often 40-50%, but may reach 80-90%. An estimated 500,000 cases of dengue infection require hospitalization each year, of which very large populations are children. At least 2.5% cases die, although case fatality could be twice as high. Without proper treatment DHF case fatality can exceed 20%.²

Dengue viral infections are known to present a diverse clinical spectrum, ranging from asymptomatic illness to severe dengue.⁴ Unusual manifestations of dengue infections such as encephalitis, Guillain Barre syndrome, hemolytic uremic syndrome, dengue hepatitis, myocarditis, acute respiratory distress syndrome are recognized and they have become more common in recent years.⁵ Hepatic injury with dengue infection has been described since 1967.⁷ The degree of liver dysfunction in children with dengue infections varies from mild injury with elevation of transaminase activity, hepatomegaly (tender/non tender) to severe injury with jaundice and fulminant hepatic failure.⁶ The elevation of liver enzymes varies according to the type of clinical presentation of dengue infection, and is more common in patients with severe dengue. Awareness of these manifestations of hepatic involvement in dengue may be helpful in arriving at early diagnosis and avoiding morbidity and mortality.

Since our hospital (Kanachur Institute of Medical Sciences) is tertiary care hospital, we do see a lot of children with dengue infections including those with atypical manifestations. So, an attempt has been made to study hepatic enzymes status and its prognostic significance in

children with dengue virus infection.

Aims and Objectives:

To study hepatic enzymes status in patients with dengue infection.

Materials and Methods:

METHODOLOGY

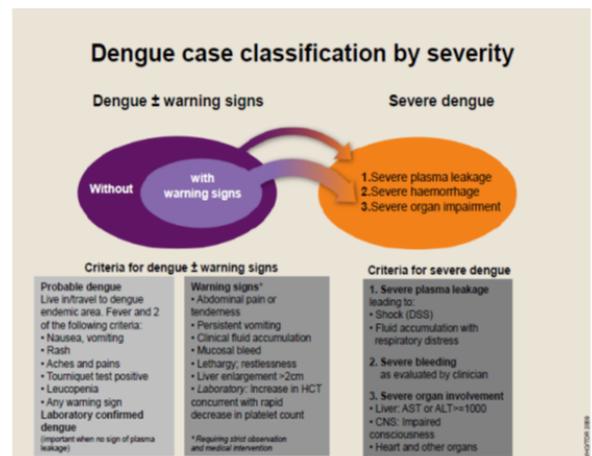
The present study was conducted in the Department of Pediatrics Kanachur Institute of Medical Sciences Mangalore during the study period from May 2017 to April 2018.

ENROLLMENT OF CASES

All the clinically suspected cases of dengue infection aged between 2months to 15years of age as per the WHO guidelines were screened and only confirmed cases by dengue NS1 antigen detection by rapid test were included in this study. A detailed history and a thorough clinical examination were done for all the cases. Data was collected in a prewritten proforma. All the cases were subjected to following investigations.

- 1) NS1 antigen detection by rapid test.
- 2) Platelet count.
- 3) SGOT and SGPT

The Cases were classified and put into specific groups and the various clinical manifestations were studied.



ALT = alanine aminotransferase; AST = aspartate aminotransferase; CNS = central nervous system; DSS = dengue shock syndrome; HCT = haematocrit

Study design

Prospective/descriptive study

Sample size

For the study to be statistically significant required sample size was calculated online by sample size calculator through "CREATIVE SYSTEM INC", which is 100 for the present study.

Inclusion criteria

Cases positive for dengue NS1 antigen.

STATISTICAL METHODS APPLIED

Descriptive statistics

The Descriptive procedure displays univariate summary statistics for several variables in a single table and calculates standardized values (z scores). Variables can be ordered by the size of their means.

Frequencies

The Frequencies procedure provides statistics and graphical displays that are useful for describing many types of variables. For a first look at your data, the Frequencies procedure is a good place to start.

Chi-Square Test

The Chi-Square Test procedure tabulates a variable into categories and computes a chi-square statistic. This goodness-of-fit test compares the observed and expected frequencies in each category to test either that all categories contain the same proportion of values or that each category contains a user-specified proportion of values.

Fisher's exact test

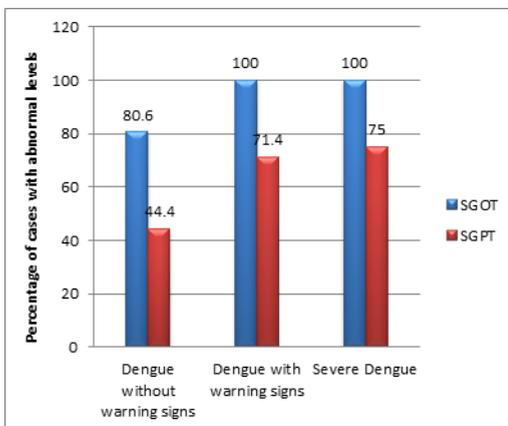
It is a statistical significance test used in the analysis of contingency tables. Although in practice it is employed when sample sizes are small, it is valid for all sample sizes. It is one of a class of exact tests, so called because the significance of the deviation from a null hypothesis. The test is useful for categorical data that result from classifying objects in two different ways; it is used to examine the significance of the association (contingency) between the two kinds of classification.

ANOVA

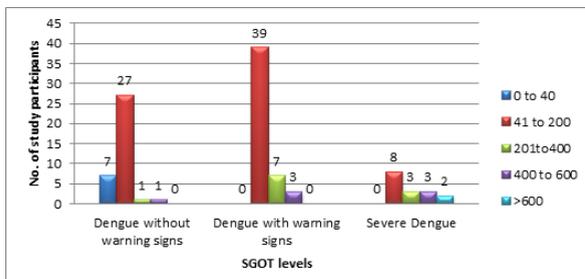
Analysis of variance (ANOVA) is a collection of statistical models used to analyze the differences between group means and their associated procedures. It provides a statistical test of whether or not the means of several groups are equal, and therefore generalizes the t-test to more than two groups.

Results:

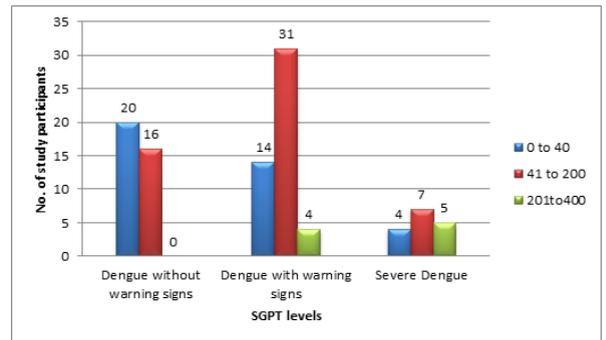
Graph 1: Comparison of SGOT and SGPT in different groups of dengue



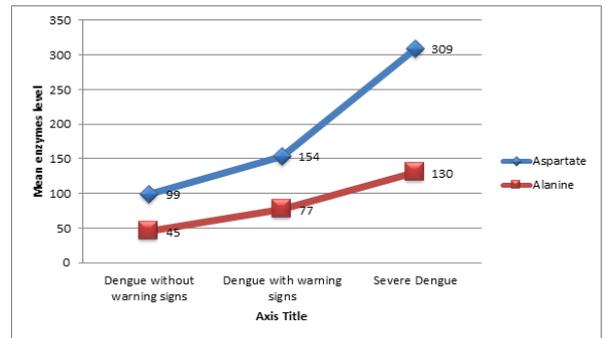
Graph 2: SGOT levels in dengue without warning signs, dengue with warning signs and severe dengue



Graph 3: SGPT enzyme levels in dengue without warning signs, dengue with warning signs and severe dengue



Graph 4: Mean values SGOT and SGPT in dengue without warning signs, dengue fever with warning signs and severe dengue



In the present study comparing the platelet at admission and lowest during the course of stay in hospital, SGOT (aspartate) and SGPT (alanine) of dengue without warning signs, dengue with warning signs and severe dengue groups at admission, lowest platelets during hospital stay were significantly low. SGOT and SGPT were significantly higher in severe dengue cases as compared to other cases.

Table 1: Status of SGOT in mortality due to dengue

	Total	Death	Death rate (%)
Normal SGOT	7	0	0.00
Abnormal SGOT	94	3	3.19
Total	101	3	2.97

Fisher's Exact Test, P=0.804

Table 2: Status of SGPT in mortality due to dengue.

	Total	Death	Death rate (%)
Normal SGPT	38	3	7.89
Abnormal SGPT	63	0	0.00
Total	101	3	2.97

Fisher's Exact Test, 0.051

As depicted in the above graphs SGOT was elevated in all 3 deaths associated with dengue and SGPT was normal.

Discussion:

Mildly elevated liver enzymes have been reported in dengue infection. Dengue infection leads to liver parenchyma involvement which releases these markers into the blood.⁷ The significance of elevated liver enzymes in dengue infection is that it is an early marker of dengue infection. It can also be used as a predictor for assessing the disease severity and higher the levels of liver enzymes poorer is the prognosis of the disease.⁸

Most of the studies showed that unlike other viral infections, in dengue the rise of SGOT is usually more than SGPT and is believed to be due to release from the damaged myocytes. In view of this biochemical pattern, it is possible to confuse liver involvement in dengue infection with typical acute viral hepatitis, especially in countries where outbreaks of hepatitis A and E are common. However, the presence of thrombocytopenia and persistence of fever with elevated hepatic enzymes should help to make a diagnosis of dengue infection.

Serological tests for infection dengue virus will help in confirming the etiology of liver injury.

SGOT:

Table 25: Comparison between groups with respect to SGOT

Study	DF	DHF	DSS
M Narayanan et al ⁹	76.1%(non shock)		63.7%
Srivenu Itha et al ¹⁰	35%	47%	81%
Jagadish kumar et al ¹¹	88.1%	100%	96%
	Dengue without warning signs	Dengue with warning signs	Severe dengue
Present study	80.6%	100%	100%

SGPT

Table 26: Comparison between groups with respect to SGPT

Study	DF	DHF	DSS
M Narayanan et al ⁹	58.7% (non shock)	63.7%	
Srivenu Itha et al ¹⁰	22%	27%	86%
Jagadishkumar et al ¹¹	69.4%	84.6%	92%
	Dengue without warning signs	Dengue with warning signs	Severe dengue
Present study	44.4	71.4	75

In our study SGOT levels were elevated in more number of children in all the three groups compared to SGPT values.

Like other studies in the present study majority of our patients had elevated liver enzymes, with SGOT being more elevated than SGPT values. Patients with severe dengue had higher level of hepatic enzyme dysfunction.

Conclusion:

- Elevated hepatic enzymes (in hundreds) are consistent features in dengue infection.
- SGOT is significantly elevated in severe dengue cases than SGPT.
- In endemic areas elevated liver enzymes should alert the clinician to suspect severe dengue which in turn helps to bring down morbidity and mortality.

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