

## A Study on Liver Enzymes as an Early Predictor of Complicated Dengue Fever

Dr Lakshmanaswamy.A<sup>1</sup>, Dr Senthilkumar .P<sup>1\*</sup>, Dr Veena Surendran<sup>1</sup> ,  
Dr Booma V<sup>1</sup>

<sup>1</sup>Department of Pediatrics, Coimbatore Medical College Hospital, Coimbatore- 641014, India.

\*Correspondence to : Dr Senthilkumar.P ,

Department of Pediatrics, Coimbatore Medical College Hospital, Coimbatore-641014,

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### Abstract

#### BACKGROUND

Dengue Fever(DF) has an unpredictable clinical course which leads to a policy of indiscriminate referral to higher centres from peripheral centres. Diagnosing dengue early is challenging because the initial symptoms are non specific and serological tests can confirm dengue only late in the course of illness. Only few studies have been done on hepatic involvement in paediatric DF.

#### OBJECTIVES

1. To determine whether elevated liver enzymes can be used as an early predictor of DF.
2. To predict the prognosis of the disease according to the degree of elevation of liver enzymes.

#### METHOD

This is a prospective cohort study in paediatric patients admitted with fever and thrombocytopenia during the study period .SGOT, SGPT levels at the time of admission (from day 2-6 of fever) were estimated. All the patients were followed up and IGM dengue test was done after 6 days of fever.

#### RESULTS

A total of 200 patients were included in the study .76 patients (38%) had SGOT elevation of 2-5 times. 69 (35%) had <2 times elevation. 29(15%) had very severe elevation of 5-15 times and 26 (13%) had normal SGOT levels .An SGOT enzyme elevation of 5-15 times was associated with 93 %IGM Dengue positivity, with a p value of <0.01. A positive correlation was found between severity of disease and degree of elevation of SGOT and thrombocytopenia, both with a significant p value of <0.05

**Keywords:** Dengue fever, Liver enzymes, Prediction

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### I. Introduction

Dengue is the most rapidly spreading mosquito –borne viral disease of mankind, with a 30-40 fold increase in global incidence over the last five decades. It is a major public health concern. Potential fatal complications are seen in patients with acute dengue viral infection. The involvement of liver in dengue fever is not rare(1,2,3). It has been reported in literature since 1970. In the Liver Function Tests (LFT), the commonest abnormality detected is elevated amino-transferases. Aspartate Aminotransferase (AST) is higher than the Alanine Aminotransferase (ALT) in about 90% of cases (4,5). DF causes the inflammatory responses leading to hepatic parenchymal changes, releasing aminotransferases into the circulation. So there is a need for monitoring liver function tests. Even though DHF can cause mild to moderate hepatic dysfunction in majority of cases, only a few patients suffer from fulminant hepatic failure resulting in encephalopathy and death.

### II. Materials And Methods

This prospective cohort study was undertaken in the department of Paediatrics, Govt Coimbatore medical college and hospital, during the study period from July 2016 to July2017.

All paediatric patients admitted with fever and thrombocytopenia during the study period were registered for the study after informed consent. Detailed proforma was filled with presenting complaints, clinical features and examination findings. SGOT, SGPT levels at the time of admission (from day2-6 of fever) were estimated. All the patients were followed up and IGM dengue test was done after 6 days of fever. Patients were closely monitored for features of Dengue haemorrhagic fever or Dengue shock syndrome. Final diagnosis at the time of discharge was done based on the IgM Dengue report and the clinical course of the patient.

INCLUSION CRITERIA-All children with fever and thrombocytopenia < 12 years.

EXCLUSION CRITERIA- Known case of liver disease

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### III. Result

Dengue fever is causing major epidemics in different parts of India with a high mortality rate among severe form of the disease. Early diagnosis is crucial in providing optimal care and close monitoring. IgM Dengue ELISA used to diagnose dengue fever can be done only during the second week of illness. This study was done to evaluate the use of liver enzymes in first week of illness as an early predictor of dengue fever. 200 children admitted with fever and thrombocytopenia was included in the study. Most common age group was 6 – 12 yrs. Out of the 200 children, 96 were males and 104 females. At the time of admission based upon the clinical features criteria, the study subjects were divided into three groups: Probable Dengue, Dengue fever with warning signs and severe dengue(6,7).

Abdominal pain and abdominal tenderness which were warning signs are found to be the common presentation among the study group. Hence Dengue fever with warning signs constituted 68 % of the study population. Study population was divided into 6 groups based upon the degree of thrombocytopenia. 31 % had only mild thrombocytopenia of 80,000 to 1, 50,000. 141 (70%) of the 200 children were IgM Dengue positive. 198 out of the 200 children survived. 38 % of the study group had significant elevation of 2-5 times. Significant association was found between the degree of elevation of SGOT and IgM Dengue positivity (Table1). Hence SGOT levels can be used as an early marker for predicting Dengue in the first week of fever with thrombocytopenia. Moreover the degree of elevation of SGOT was associated with the severity of illness. Hence very high elevation of SGOT liver enzyme can be used as an early predictor for severity of the disease. 39 % had normal SGPT values. No significant association was found between SGPT levels and IgM Dengue positivity (Table:2).

**Table :1** Association OF SGOT level with IgM Dengue positivity

SGOT	IgM positive	IgM negative
Normal	16	10
<2 times	40	29
2-5 times	58	18
5-15times	27	2

**Table :2** Association OF SGPT with IgM Dengue positivity

SGPT	IGM POSITIVE	IGM NEGATIVE
Normal	48	29
<2 TIMES	54	16
2-5 TIMES	26	12
5-15 TIMES	13	2

**TABLE :3** Association of SGOT with Severity of Disease

SGOT	Severity of Disease			OTHERS	Total
	DENGUE FEVER	DENGUE FEVER WITH WARNING SIGN	SEVERE DENGUE		
Normal	5	11	0	10	26
< 2Times	10	32	0	27	69
2 - 5 Times	12	44	3	17	76
5 - 15 Times	2	21	4	2	29
Total	29	108	7	56	200

**TABLE:4** Association of SGPT with Severity of Disease

SGOT	Severity of Disease			Others	Total
	Dengue fever	Dengue fever with warning sign	Severe dengue		
Normal	10	39	0	28	77
< 2Times	13	40	2	15	70
2 - 5 Times	4	20	3	11	38
5 - 15 Times	2	9	2	2	15
Total	29	108	7	56	200

### IV. Discussion

A total of 200 patients were included in the study. Of these 138(69%) belonged to 6-12 years age group , 48(24%) belonged to 1-5 years age group and 14 (7%)were infants, which showed that most of the study population was in the age group of 6-12 years. 96(48%) of the study population were males and 104 (52%)were females, with a slight female predominance.

At the time of admission based upon the clinical features and examination 59 (29%) were classified under Probable Dengue ,136(68%) as Dengue fever with warning signs and 5(3%) as Severe dengue presenting

with shock at the time of admission. Most of the children (68%) presented with thrombocytopenia and warning signs. The most common warning sign being abdominal pain and abdominal tenderness(8,9).

Platelet count of 1,50,000 was taken as cut off for thrombocytopenia. The severity of thrombocytopenia was assessed among the study group. Thrombocytopenia was subclassified into 6 groups .35 (18%) had very severe thrombocytopenia of <20,000 , 42 (21%) had platelet count between 20,000 – 40,000, 35(18%) had platelet count between 40,000 to 60,000 , 26(13%) had platelet count between 60,000 -80,000 , 44 (22%) had platelet counts between 80,000-1,20,000 and 18(9%) had platelet counts above 1,20,000. This shows that majority(31%) had only mild thrombocytopenia of 80,000 – 1,50,000.

SGOT levels were measured at the time of admission. 76 patients (38%) had SGOT elevation of 2-5 times. 69 (35%) had <2 times elevation. 29 (15%) had very severe elevation of 5-15 times and 26 (13%) had normal SGOT levels. This shows that most of the children suspected with dengue fever showed an elevation in SGOT levels as previously known(10).

SGPT levels were normal in majority (39%) of the study subjects and < 2 times elevated in 70 (35%) of the study subjects. In 38 (19%) of the patients SGPT showed elevations of 2-5 times and in 15(8%) very high elevations of 5-15 times were seen. This shows that elevation in SGPT levels were not as severe as elevation in SGOT levels.

WBC counts in the study group were studied. 83 had leucopenia (<4000), 109 had normal WBC counts(4000-11,000), 8 had leucocytosis.

Out of the 200 study subjects final IgM Dengue ELISA test showed 70 % (141) to be IGM Positive and 30 % (59) to be IGM Negative.

2(1%) out of 200 study subjects died.

At the time of discharge based on the clinical severity and IgM Dengue results , 105(53%) had a final diagnosis of Dengue fever with warning signs, 29(15%) were diagnosed to have Dengue fever, 7(4%) were diagnosed to have Severe Dengue fever and 59(30%) with IgM Dengue negative results had diagnosis other than Dengue fever.

Association of various factors with IgM Dengue positivity was studied. There was no association between age group and IgM positivity with a p value of >0.05. There was no association found between gender and IgM Dengue positivity with a p value of >0.05.

There was no significant association between Clinical Diagnosis at the time of admission and the final diagnosis made at the time of discharge after IgM Dengue results, with a p value >0.05.

Association of severity of thrombocytopenia and IGM Dengue positivity was studied .A positive correlation was found between severity of thrombocytopenia with IgM Dengue Positivity, with a p value of <0.05.

The association between severity of elevation of liver enzymes with IGM Dengue ELISA was studied .An SGOT enzyme elevation of 5-15 times was associated with 93 % IGM Dengue positivity and 2-5 times elevation was associated with 76% IgM Dengue positivity (Table:3). Significant association was found between SGOT enzyme elevation and IgM Dengue positivity , with a p value of <0.01 .

Association between Severity of SGPT elevation and IGM Dengue positivity was studied.No significant association was found between the two, with a p value >0.05(Table:4).

Association of WBC counts with IGM Positivity was studied. No significant association was found between leucopenia and IGM Dengue positivity.

Association between severity of disease with degree of elevation of liver enzymes were studied. A positive correlation was found between severity of disease and degree of elevation of SGOT, with a significant p value of <0.05.

Significant association has been found between severity of SGPT elevation and severity of disease, with p value of <0.05.

A positive correlation was found between severity of thrombocytopenia and severity of disease, with a significant p value of <0.05.

## **V. Conclusion**

Abdominal pain and abdominal tenderness are the common presentations in Dengue fever .Elevated SGOT levels were found to have significant association with IgM Dengue positivity. Moreover severe elevation of SGOT level more than 5 times was associated with severe forms of dengue fever like Dengue Shock syndrome. Hence elevated SGOT levels during the first week of admission can be reliably used as an early predictor of dengue fever .And degree of elevation of SGOT levels can be used to predict the severity of dengue.

### **LIMITATIONS OF THE STUDY**

This study was conducted in a tertiary care centre where referral bias cannot be avoided.

## **VI. Recommendations**

Larger multicentre based studies need to be done to evaluate the predictive value of elevated SGOT levels in Dengue fever, before implementing it as a early diagnostic tool in the basic standard of care.

### **LIST OF ABBREVIATIONS**

ALT - Alanine Transaminase  
AST - Aspartate Transaminase  
DF - Dengue Fever  
DHF - Dengue Haemorrhagic Fever  
DSS -Dengue Shock Syndrome  
IgM - Immunoglobulin M  
LFT - liver function test  
SGOT - Serum Glutamate Oxaloacetate Transaminase  
SGPT - Serum Glutamate Pyruvate Transaminase

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