



Original Article

Hepatic Transaminases Early Indicator of Dengue Fever Study Conducted In Rural Population of Northern India

Authors

Sushil Kumar¹, Ranjit Kumar Nim², Rajesh Kumar³, Dheeraj Kela⁴

^{1,2}Lecturer, Dept of Medicine, UP UMS, Saifai, Etawah (Uttar Pradesh)

³Junior Resident 3rd year, Dept of Medicine, UPUMS, Saifai, Etawah (Uttar Pradesh)

⁴Junior Resident 2nd year, Dept of Medicine, UP UMS, Saifai, Etawah (Uttar Pradesh)

Corresponding Author

Ranjit Kumar Nim

Lecturer, Dept of Medicine, UP UMS, Saifai, Etawah (Uttar Pradesh)

ABSTRACT

Aim of the study: Measurement of S.SGOT and SGPT and its use as a early indicator of Dengue Fever.

Material and Method: Study conducted in rural population of central India. 120 Positive cases of dengue fever was included in study out of which 72 male and 48 female patients.

The serum glutamic oxaloacetic transaminases (SGOT) and serum glutamic pyruvic transaminases (SGPT) were estimated by enzyme kinetic method by adding 100 μ l of patient's serum with 1000 μ l of reagent and the concentration was read immediately in semi-automated analyser at 340nm wavelength with 1cm optical path at 37oC temperature for 120 dengue positive cases.

Results: The serum glutamic pyruvic transaminases (SGPT) levels were found to be elevated more in females when compared with males. The serum glutamic oxaloacetic transaminases (SGOT) levels were also found to be higher in females. Overall, 70% of dengue fever cases of this study showed increased values of both SGOT and SGPT. SGOT was increased more compared to SGPT.

Conclusion: This study showed increased values of serum transaminases (SGOT&SGPT) reflects hepatic parenchymal damage and its rising level can be use as early indicator of Dengue Fever.

Keywords: Dengue fever, serum glutamic pyruvic transaminases, serum glutamic oxaloacetic transaminases, hepatic injury.

INTRODUCTION

Dengue fever is a dreadful viral disease in developing countries like India with high mortality, without early and adequate intervention. It is an acute febrile disease diagnosed clinically by high fever. Clinical manifestation of dengue viral infection varies widely from no symptoms to dengue shock syndrome^{1,2}. It is characterised by

weak rapid pulse, narrow pulse pressure (<20mmHg) & cold clammy skin and restlessness. Some 2.5 Billion people i.e 2/5th of world population in tropical and subtropical countries are at risk of the disease. An estimated 50 million dengue infections occurs worldwide annually and about 500,000 people with DHF require hospitalization each year³. The incidence of

hepatic dysfunction in dengue fever is high. The serum glutamic oxaloacetic transaminases (SGOT) and serum glutamic pyruvic transaminases (SGPT) were found to be increased 5-10 times in dengue fever due to liver parenchymal damage caused by the virus. The virus is not contagious and cannot be spread directly from person to person. There must be a person-to-mosquito-to-another-person pathway. After being bitten by a mosquito carrying the virus, the incubation period ranges from three to 15 (usually five to eight) days before the signs and symptoms of dengue appear. Dengue fever is an acute febrile illness diagnosed clinically by high fever, and chills, intense headache, muscle and joint pains which prevents all movements. within 24 hr retro orbital pain, particularly on eye movements.^{2,4} Dengue strikes people with low levels of immunity. Because it is caused by one of four serotypes of virus, it is possible to get dengue fever multiple times. However, an attack of dengue produces immunity for a lifetime to that particular serotype to which the patient was exposed. Dengue is caused by a Flavi Virus with 4 serotypes (DENV1,2,3,4)^{2,7} inoculated into humans by females *Aedes aegypti* or rarely by *Aedes albopictus* mosquito.

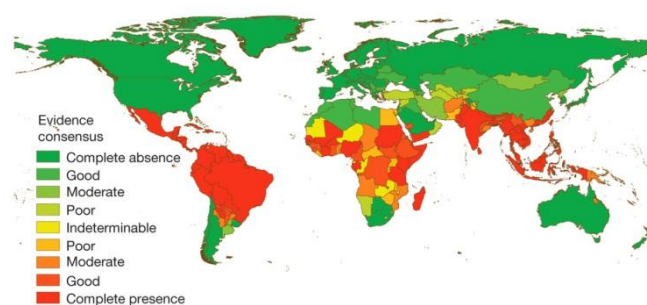
Liver dysfunction in Dengue is due to direct effects of the virus on liver cells and an adverse effects of host immune reaction against the virus. Virus has been identified in liver tissue and dengue antigen identified within liver cells of affected individuals⁸, leading to kupffer cell hyperplasia^{9,10}. Dengue viral antigens are mostly found in the liver cells surrounding necrotic areas of the liver. Apoptotic hepatocytes are found to be colocalised with dengue virus infected hepatocytes, suggesting that hepatocytes are the major site of dengue virus replication in the liver. Therefore, the aim of the present study is to analyse the role of liver enzymes in Dengue viral infection.

Epidemiology

Risk of dengue fever if increases in recent years due to rapid urbanization, life style changes and deficient water management including improper water management. Disease has a seasonal pattern i.e cases peak in monsoon season and it is not uniformly distributed throughout year. However in gujarat and southern state transmission is perennial¹¹.

Dengue transmission spread from Southeast Asia¹² into surrounding subtropical and tropical Asian countries, southern China and southern Taiwan, the Indian subcontinent and Sri Lanka, and down the island nations of Malaysia, the Philippines, New Guinea, North-eastern Australia, and several Pacific islands, including Tahiti, Palau, Tonga, and the Cook Islands. Hyperendemic transmission is reported in Vietnam, Thailand, Indonesia, Pakistan, India, Malaysia, and the Philippines¹³.

FIGURE-1



GLOBAL DISTRIBUTION OF DENGUE FEVER

The Aedes mosquito

Dengue viruses are transmitted by the bite of an infected *Aedes* (subgenus *Stegomyia*)¹⁴ mosquito. Globally, *Aedes aegypti* is the predominant highly efficient mosquito vector for dengue infection, but the Asian tiger mosquito, *Aedes albopictus*, and other *Aedes* species can also transmit dengue with varying degrees of efficiency (see the images below).

Aedes mosquito species have adapted well to human habitation, often breeding around dwellings in small amounts of stagnant water found in old tires or other small containers

discarded by humans. Humans are their preferred hosts.

Female *Aedes* mosquitoes are daytime feeders. They inflict an innocuous bite, usually on the back of the neck and the ankles, and are easily disturbed during a blood meal, causing them to move on to finish a meal on another individual, making them efficient vectors. Not uncommonly, entire families develop infection within a 24- to 36-hour period, presumably from the bites of a single infected mosquito.

FIGURE-2



Aedes aegypti mosquito. Picture from the Centers for Disease Control and Prevention (CDC) Web site.

MATERIALS & METHODS

This study was done in a tertiary care hospital, from June 2016- November 2016, in Uttar Pradesh University of Medical Sciences, Saifai, Etawah. The study included 120 positive cases of dengue fever.

Inclusion Criteria-

- Age: More than 18 years but less than 65yrs.
- Sex: Both males and females were selected for the study.
- Patients admitted with history of acute fever.

Exclusion Criteria- The liver diseases with elevated serum transaminases

- 1) Other than dengue fever,
- 2) History of concomitant diseases such as diabetes mellitus, acquired immunodeficiency syndrome (AIDS), hepatitis B,C, hematologic disorders, cancer or cardiac disease,

- 3) History of consumption of drugs which are hepatotoxic&
- 4) History of fever excluding dengue fever were excluded in this study.

Dengue fever was confirmed by immunochromatographic method identifying the antibodies against dengue virus –IgM and IgG and dengue viral antigen – NS1. The SGOT, SGPT levels were estimated by enzymatic (kinetic) method. The SGOT, SGPT levels were estimated by kinetic method by adding 100µl of patient’s serum with 1000µl of reagent and the concentration was read immediately in semi-automated analyser at340nm wavelength with 1cm optical path at 37oC temperature.

RESULTS

Table 1

Sample	No.of patients	% of patients
Male	72	60
female	48	40

Table 2

Parameter	No. of male(%)	No. of female(%)	Total (%)
SGPT	40(33%)	42(35%)	64(68%)
SGOT	56(46%)	38(31%)	90(77%)

The serum glutamic pyruvic transaminases (SGPT) levels were found to be elevated more in females when compared with males. The serum glutamic oxaloacetic transaminases (SGOT) levels were also found to be higher in females. Overall, 70% of dengue fever cases of this study showed increased values of both SGOT and SGPT. SGOT was increased more compared to SGPT.

FIGURE-3

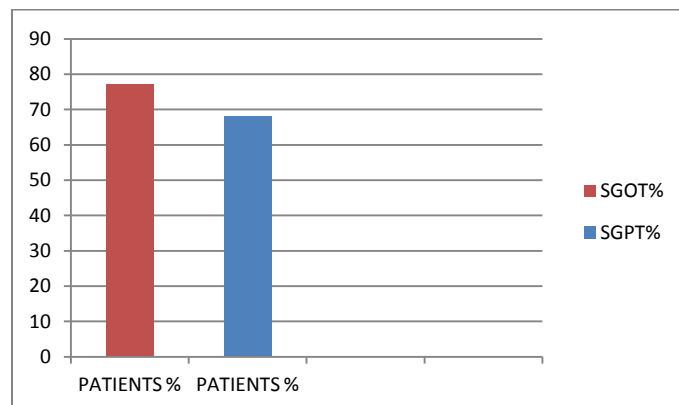


Table 3

Now we put all these values in 2x2 Contegency table. SGOT was increased in 90 patients while it is within normal limit in 56 patients. Similiarly SGPT was increased in 64 patients and WNL in 30 patients.

Parameter	Normal	Increased
SGPT	56	64
SGOT	30	90

P- Value is calculated by using Fisher's Exact Test (Small Sample Size)

Fisher showed that the probability of obtaining any such set of values was given by the hypergeometric distribution.

$$P=(a+b)(c+d)/(a+c)=$$

Fisher showed that the probability of obtaining any such set of values was given by the hypergeometric distribution:

$$p = \frac{\binom{a+b}{a} \binom{c+d}{c}}{\binom{n}{a+c}} = \frac{(a+b)! (c+d)! (a+c)! (b+d)!}{a! b! c! d! n!}$$

Table 4

Parameter	Normal	Increased	Total
SGOT	30	90	120
SGPT	56	64	120
TOTAL	86	154	240

The two tailed p value equals 0.0007.

The association between two rows (groups) and columns (outcomes) is considered to be extremely statistically significant.

P-Value is less than 0.005 so these results are very significant and shows association of elevation in SGOT and SGPT because of hepatic dysfunction in dengue fever.

DISCUSSION

India is one of the seven identified countries in the South-East Asia region regularly reporting dengue fever (DF)/dengue hemorrhagic fever (DHF) outbreaks and may soon transform in to a major niche for dengue infection in the future with more and more new areas being struck by dengue epidemics. The importance of early investigations and diagnosis is being emphasized here because most of these patients improved only by proper fluid management. The impact of the liver enzyme levels in the patients suffering from Dengue viral infection was studied in 120 cases admitted in a tertiary care hospital, Saifai, Etawah, Uttar Pradesh. Here, none of the patients in our study had previous liver illness or abnormal SGOT and SGPT levels. This study supports the association between development of dengue fever and early alteration of the serum transaminases^{15,16}. About 77% of the patients in our study had abnormal SGOT levels. This is in accordance with a study by Kuo *et al*¹⁷ who had reported 90% of his study population had such abnormal SGOT levels. But other studies reported a higher percentage of Dengue cases with abnormal transaminases. The SGPT level has been found to be elevated in 68% of the Dengue cases which is lesser than that reported in a study by Kuo *et al*. These biomarkers have been proposed as indicators of severity in dengue patients. Alteration in the serum levels of transaminases¹⁸ may be caused by damage of the liver parenchyma. In our study, Dengue was found to be more prevalent in males (60%) compared to female (40%), in contrast to the previous studies where Dengue has been reported more in females. Previous studies suggest that biomarkers can predict a more severe form of dengue and could also be indicators of early tissue damage in the acute phase of dengue fever.

CONCLUSION

The study suggested that an increased level of serum transaminases is possible in dengue fever due to liver parenchymal damage caused by the virus. So estimating the levels of serum

transaminases in dengue fever may help in early detection of liver cell damage. The hepatic enzymes are the most affected as compared to other liver functions, and in spite of their gradual decline, they may be altered up to the second month. Male dengue patients were more severely affected than females although females presented higher percentage of abnormal hepatic transaminases in the acute phase, This study help to find out cases where liver transaminases level are increases and progression of disease can be asses. Application of these findings may help optimize resource allocation, leading to a more opportune and effective care of those patients with Dengue endemic areas. Similar studies are required for the establishment of predictor biomarkers of Dengue severity that will help to decrease morbidity and mortality caused by this disease.

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