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Original Research Article

Pattern of changes in liver enzymes SGPT, SGOT level during Dengue infection in hospitalized pediatrics patients in tertiary care centre

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ABSTRACT

Background: Hepatic involvement is not an uncommon in dengue viral infection, which presents with elevation in serum aminotransferases due to reactive hepatitis. The study is aimed to know the pattern of changes in hepatic enzyme levels in dengue infection in pediatric patients and to assess it with clinical presentation of dengue in particularly patients without and with shock.
Methods: Pediatric patients with serologically confirmed Dengue viral infection were enrolled in the study and divided clinically into a shock group and a non-shock group. SGPT and SGOT levels were measured from day one of fever onset till 7 days and within 3 days after shock in the shock group. Student t-test was used to analyze the statistical data.
Results: 100 patients with a mean age of 8±2.6 years were included in the study. The incidence of abnormal SGOT and SGPT levels were 96.9% and 51.1% in the shock group, and 92.2% and 45% in the non-shock group respectively. 30% and 17.9% of the patients in shock group and only 9.9% and 4.2% in non-shock group had the respective SGOT and SGPT levels > 200 U/L. Patients in shock group had statistically higher levels of Serum aminotransferase compared to the non-shock group. SGOT tended to increase starting from one day before shock and continued to increase within a few days whereas SGPT was less likely to be affected.
Conclusions: Pediatric patients with Dengue infection have raised Aminotransferases in particular SGOT, which is higher than SGPT level. Aminotransferase levels in shock patients are significantly high and increases up to 3 days.

Keywords: Aminotransferases, Dengue, Liver, Shock

INTRODUCTION

Dengue virus infection is most common arthropod born viral infection in human and present with diverse clinical spectrum which varies from asymptomatic, mild undifferentiated fever, dengue fever (DF), dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).[1] Hepatic involvement may present as elevation of serum aminotransferases, fulminant hepatic failure, hepatic encephalopathy, severe coagulopathy.[2] The liver is one of target organ of dengue virus which was demonstrated by confirming dengue-2 virus replication in human liver cell lines and liver cells of mice.[3,4] Patients with DSS have significantly higher aminotransferases. Heptocellular damage in dengue may be due to direct effect of virus, hypoxic insult due to hypovolemic shock or host response to infection.[5] There have been raising reports of atypical manifestations of dengue infection.[6] However, many studies there have concluded sequential changes of serum aminotransferases in patients with DF but not much studies are there for DSS.[7]

Therefore, this study is aimed to evaluate the pattern of serum aminotransferases and sequential changes before and after shock in pediatric patients with dengue infection.

METHODS

After institute ethical committee approval, A total of 100 pediatric patients aged 0-16 years admitted in tertiary care hospital with clinical diagnosis of dengue virus infection, using World Health Organization (WHO) criteria, confirmed by using hemagglutination inhibition (HI) test and enzyme-linked immunosorbent assay (ELISA) were enrolled in the study over a period of 6 months from July to December 2018.[8] Patients with congenital heart diseases, chronic liver and gastrointestinal diseases were excluded from the study. According to WHO criteria, the patients were divided into a non-shock group (Dengue fever, Dengue Hemorrhagic Fever grade I and II) and a shock group (Dengue Hemorrhagic Fever grade III and IV). Patients details, age and sex, clinical manifestations with disease grading was collected from the medical records. Blood sample was collected to estimate the serum aminotransferases including SGOT (Aspartate aminotransferase) and SGPT (Alanine aminotransferase) from day one of fever till 7 days in non-shock group and until 3 days after shock in the shock group. Serum aminotransferases were measured every day. SGOT and SGPT levels > 38 U/L were taken as abnormal. To know the sequential changes before and after the shock, authors had taken, the day 0 as the day of shock, the day prior to shock was designated day-1 and Days after shock were day 1, day 2, and so forth.

Statistical analysis

Cross sectional, descriptive statistical analysis has been carried out in this study. Results on continuous measurements presented on Mean±Standard deviation and results on categorical measurements are presented in Number (%). Student's t-test was used for statistical analysis. P value < 0.05 was considered to be significant.

RESULTS

Authors enrolled 100 children who were clinically and serologically diagnosed as dengue virus infected. Of these, 45 were males and 55 females. Age distribution varied from 1 year to 16 years with a mean age of 8±2.6 years. Concerning disease severity, 38 were classified as a non-shock group i.e. DF (19), DHF grade I (8) and DHF grade II (21), whereas 62 were classified as a shock group i.e. DHF grade III (54) and DHF grade IV (8). The incidence of abnormal SGOT and SGPT levels (> 38 U/L) were 96.9% and 51.1% in the shock group, and 92.2% and 45% in the non-shock group respectively. There was no significant difference in serum aminotransferases at cutoff level of > 38 U/L between groups. 30% and 17.9% of the patients in the shock group and only 9.9% and 4.2% in the non-shock group had the respective SGOT and SGPT levels > 200 U/L. There was significant difference in serum aminotransferases at cutoff level of > 200 U/L between groups (P < 0.05). Abnormal SGOT and SGPT levels classified by severity of dengue infection are shown in Tables 1 and 2.

Table1: Percentage of patients with abnormal SGOT and SGPT classified by severity of dengue infection.

Enzyme level, U/L	Non-Shock (n=38)	Shock (n=62)	p value
SGOT > 38	92.2	96.9	0.292
SGOT > 200	9.9	30	0.019
SGPT > 38	45	51.1	0.555
SGPT > 200	4.2	17.9	0.046

SGOT (aspartate aminotransferase), SGPT (alanine aminotransferase) Values expressed as Number (%).

Table 2: The difference of serum aminotransferase levels classified by severity of dengue infection.

Enzymes level, U/L	Non-shock	Shock	p value
SGOT	143.4±240.5	474.2±1167.3	<0.05
SGPT	49.4±58.3	242.4±714.2	<0.05

SGOT (aspartate aminotransferase), SGPT (alanine aminotransferase) Values expressed as mean±SD.

Serum aminotransferase levels were significantly higher in the shock group, compared to the non-shock group. Concerning sequential changes of aminotransferases, SGOT tended to increase starting from one day before shock and was continuously increasing up to 3 days after shock whereas SGPT was less likely to be affected (Figure 1 and 2).

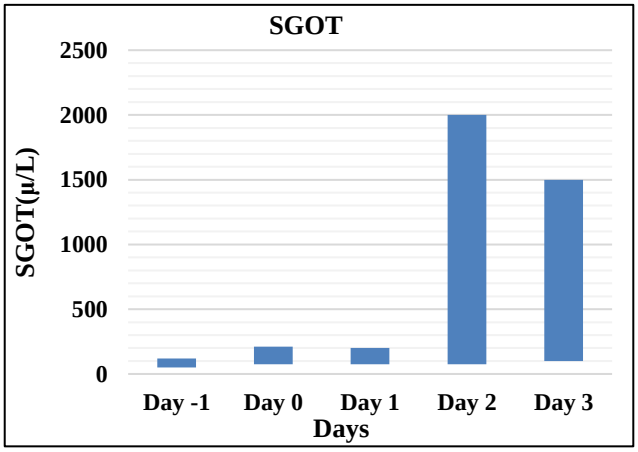

Figure 1: Sequential changes of serum SGOT before and after shock.

DISCUSSION

Dengue infection can present with varying degree of hepatic dysfunction, which varies from elevation of

serum aminotransferases to fulminant hepatic failure. Dengue infection is one of the important causes for acute hepatic failure in children aged 1 - 15 years contributing to 34.3% of the cases.[9,10] There is good correlation between Serum aminotransferase levels and occurrence of hepatic dysfunction and spontaneous bleeding and can be used to predict the same.[11] In this study, hepatic dysfunction was found in both the non-shock group (4.2%) and the shock group (17.9%) as defined by those who had SGPT more than 5 times upper normal values (SGPT > 200 U/L).

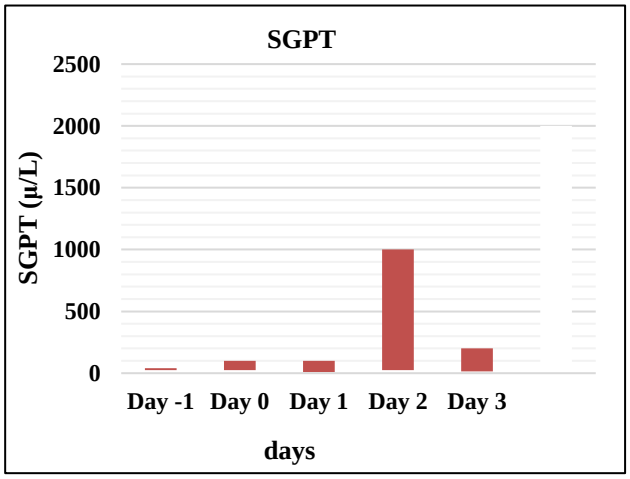

Figure 2: Sequential changes of serum SGPT before and after shock.

In the study of Roy A, Sarkar D et al, they assessed the biochemical and clinical profile of hepatic involvement by dengue virus in 120 serologically positive patients aged 2 months to 14 years and were grouped into three categories 'according to WHO classification, Group 1 (DF without warning signs), Group 2 (DF with warning signs) and Group 3 (severe dengue), concluded that in group 2 there was 84.4% and 93.75% ALT and AST elevation respectively and in group 3 there was 94.5% and 95.9% ALT and AST elevation respectively and fulminant hepatic failure was observed in Group 3.[12] Hence, in a child with fever, jaundice, hepatomegaly and altered liver function tests, the diagnosis of dengue infection should be strongly suspected in areas where dengue infection is endemic.

Kalenahalli Jagadishkumar, Puja Jain et al, in their study showed that hepatic dysfunction was found in Dengue infected patients and associated with significant increase in SGPT (ALT) levels in DSS and DHF group.[13] The rise of AST levels were higher than the rise of ALT levels in both the non-shock group and the shock group and this differs from other forms of viral hepatitis.[14]

M Mahmuduzzaman et al, concluded in their study that increases in Serum aminotransferases specially SGOT is associated with severity of disease and can be used as an early predictor of dengue viral infection.[15] For patients with DSS in this study, AST tended to increase starting from one day before shock and continued to increase within a few days whereas ALT was less likely to be affected.

Although, Azin FR, Goncalves RP et al, in their retrospective study reported that increase in the AST enzyme occurred during initial period of the dengue infection and remained same in all clinical profile of dengue i.e classical dengue fever, DHF and severe dengue, this was more common in children less than 15 years of age . While ALT levels were above normal in the severe form and remained same during whole the disease period but in the classic and hemorrhagic forms there is progressive increase.[16]

CONCLUSION

This study concludes that Pediatric patient with dengue infection commonly have increased levels of serum aminotransferases, in particular SGOT levels which are higher than the SGPT levels and Serum aminotransferase levels can be used to differentiate dengue infection from other viral hepatitis. Further, Patients with dengue shock have a significantly higher aminotransferases level, which increases up to 3 days post shock.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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