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ASSOCIATION OF LIVER ENZYMES AND SEVERITY OF DENGUE FEVER IN CHILDREN: A RETROSPECTIVE ANALYSIS

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Abstract

Unusual manifestations involving liver and central nervous system in dengue infection have been reported. We present a retrospective analysis of 217 children admitted at our institute between September 2021 –December 2021, with confirmed dengue fever in which higher values of altered liver enzymes (ALT>AST) were found, which is contrary to previous studies where AST was found to be more raised than ALT. Our analysis also found that blood product transfusion requirement was also higher in children with raised transaminases. The value of transaminases, at the time of admission, was more than 20 times raised in all the 8 children who did not survive. Hence, raised transaminases at the time of presentation in case of dengue fever can be used as a marker of poor prognosis.

Keywords: Liver Injury, Altered Liver Enzymes, Raised Transaminases, Poor Prognosis, Rash

INTRODUCTION

Dengue is an arboviral disease and India contributed to 34 % of the 96 million apparent dengue virus infections estimated to have occurred globally in 2010. (1).During 2017, about 8.8-12.9 million primary dengue infections occurred among individuals aged 5-45 years from 30 Indian states. In all regions, younger children had severe form of infection. (2) The degree of liver dysfunction in children with dengue infection varies from mild injury with elevation of transaminases to severe injury with jaundice and liver cell failure. (3, 4).Deranged liver enzymes are usually in mild to moderate range and severe hepatitis with transaminases 10 times above the upper limit of normal is less common at 3-11% only. As hepatic dysfunction is transient and reversible, early identification of the same would help to reduce life threatening complications. (5).

METHODOLOGY

A retrospective analysis on patients admitted at our institute in Paediatric department of SMS and R, Sharda Hospital, Greater Noida, Uttar Pradesh from September 2021 to December 2021 with Dengue fever. Records of all patients admitted with dengue like illness (275 cases) were analysed and those who tested positive for Dengue IgM or NS1 Antigen (217 cases) were included. Those patients who tested negative for both were excluded. The children with underlying liver disease were also excluded from the study. SPSS software was used to analyse the data and mean and standard deviation were calculated. Discontinuous variables were analysed by median values and interquartile ranges.

RESULTS

A total of 583 patients were admitted in the above mentioned period, of which 275 had dengue like illness and 217(137 males, 80 females) had confirmed Dengue Fever (Ns1 Antigen and or Dengue Ig M positive).Of which 171 patients (78.8%) had dengue fever with or without warning signs and 46(21.1%) had severe dengue; as per the definition guidelines. Out of the 46 patients diagnosed with severe dengue, one had suspected Hemp phagocytic Lymphohistiocytosis. (Investigations could not be performed due to patients' financial constraints).

181 patients (83.4%) were discharged, 28(12.9%) left against medical advice and 8(3.68%) patients died.

The mean age was recorded as 7.82 (+/- 3.73) years, mean duration of symptoms before admission as 4.3 days (+/-2.1) & mean hospital stay was 4.2 (+/- 2.2) days. The chief complaints at admission noted were fever (217, 100%), vomiting (127, 58.5%), abdominal pain (71, 32.71%), bleeding (22, 10.1%), abnormal body movements (9, 4.1%) and altered sensorium (7, 3.2%).

At the time of admission rash was present in 80 (36.3%) patients and shock in 41(18.8%).

The mean liver span was found to be 6.4 cm (+/- 1.5).

Out of 217, 26(11.9%) patients required inotropes and 19(8.7%) required ventilator care. The peak of transaminases was found to be 12th day of illness ($\pm$ 2.3).

Raised ALT (>40IU/L) was found to be 206(94.9%) cases and raised AST (>35IU/L) in 182(83.8%) cases.

The need for packed Red blood cell (PRBC) transfusion was present in 10(4.6%) children; of which 8 (80%) had raised transaminases; platelets transfusion in 17(7.8%) and Fresh Frozen Plasma (FFP) in 18(8.2%); of which 15(88.2%) had raised transaminases respectively.

Table 1 and 2 shows the mean, SD, median and IQR of laboratory investigations done.

The values in brackets in the table are the patients on whom the investigations were performed as many had refused due to financial constraint or left against advice or died before tests could be repeated.

Abbreviations: ALT – Alanine Transaminase, AST – Aspartate Transaminase

PCV- Packed Cell Volume IQR – interquartile range.SD – Standard Deviation.

Table 1

LAB INVESTIGATION	MEAN	STANDARD DEVIATION
Hb on presentation**(gm/dl)**	11.99	2.041
Hb after 24 hours (do)	11.66	1.77
Hb after 48 hours (do)	11.62	1.77
PCV at admission (percentage)	37.46	5.08
PCV after 24 hours(do)	36.40	4.92
PCV after 48 hours (do0	35.65	5.91
Urea at admission (mg/dl)	26.2	15.9
Creatinine at admission(mg/dl)	0.4	0.2

Table 2

LAB INVESTIGATION	MEDIAN	IQR
Platelets at admission(210/217) (per cumm)	80000	1,05,000
Platelets after 24 hours(187/217) (do)	80000	95000
Platelets after 48 hours(151/217) (do)	81000	88000
ALT at admission(157/217) (IU/l)	164	215
ALT after 48 hours(15/217) (do)	194	368
AST at admission(157/217) (do)	76	126
AST after 48 hours(15/217) (do)	94	392
ALT at admission in severe dengue (38/46)	164.9	219.45
ALT after 48 hours in severe dengue(6/46)	194	397.5
AST at admission in severe dengue (38/46)	70	121
AST after 48 hours in severe dengue(6/46)	94	394

DISCUSSION

In our study the values of raised ALT (>40IU/L) was more than raised AST (>35IU/L) as compared to a study by Gupta et al (6) in 2014 where the rise in AST was more compared to ALT. One of the potential insults include direct effects of the virus or host immune response on liver cells causing an inflammatory response. The liver being deprived of oxygen causes injured hepatocytes to release transaminases in peripheral blood. (7).The mean day of illness during which peak of transaminases was found to be 12 days in our study which is equivalent to 2nd week as mentioned in previous studies.

The median values and IQR of ALT and AST at time of admission and after 48 hours in severe dengue and dengue fever respectively were found to be similar in our study. Although all 8 patients who died had transaminases raised to 20 times their normal values; indicating that markedly raised transaminases could be used as a poor prognostic indicator.

Rash was a presenting feature in 22(47.8%) of the patients with severe dengue as compared to 36.3% of total patients presenting with rash. These values are similar to a study conducted in Taiwan in 2014. (8) Unusual manifestations involving liver and central nervous system in dengue infection have been reported. (9, 10). In our study, a significant number of cases with severe liver dysfunction presented with altered sensorium and or seizures.

The objective of the study was to find out the association of severity of liver dysfunction and severity of the illness.

The limitation of the study was that we could not compare the fall of transaminases as disease improved which would have been a better marker for prognostication.

CONCLUSION

Raised transaminases; 10-15 times higher than normal is seen in patients with severe dengue and are associated with poor prognosis. The liver size could be normal at the time of presentation despite severity of illness. The presence of rash at the time of presentation could also be associated with severe dengue.

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