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Case Report

LIVER DYSFUNCTION AND DENGUE SHOCK SYNDROME: A CLINICAL AND LABORATORY STUDY OF PEDIATRIC DENGUE PATIENTS

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ABSTRACT

Availability of practical simple early indicators of worsening risk of dengue infection in pediatric patients would serve alert for monitoring and timely fluid replacement to avert the shock syndrome. Liver involvement in dengue shock syndrome(DSS) is known, hence role of serum liver enzyme monitoring as practical predictor of risk of DSS was investigated

50 DSS and 63 non-DSS pediatric dengue patients were compared on clinic laboratory parameters at admission to draw relevant distinctions .

DSS patients were distinguished by frequent complaint of abdominal pain,hepatomegaly,elevated hematocrit and serum aspartate transaminase levels relative to non-DSS cases.

Regular serum liver enzyme monitoring is suggested as worthwhile for predicting patients at greater risk of developing DSS.Close monitoring of shock and timely fluid replacement in such patients should improve outcome.

Keywords: Aspartate amino transferase; **D**engue shock syndrome; **L**iver dysfunction.

INTRODUCTION

Dengue is mosquito borne viral disease responsible for significant morbidity and mortality in the tropical countries [1]. Disease severity in dengue ranges from undifferentiated acute febrile illness to dengue fever (DF), to dengue hemorrhagic fever (DHF), to dengue shock syndrome (DSS), associated with vascular plasma leakage [2]. Dengue affects liver too [3]. Hepatic dysfunction is common is common in dengue infection and attributed to direct viral damage to liver cells or as a consequence of deregulated host immune response etc [4]. Hepatic dysfunction is reflected by mild to severe elevation of transaminase levels. Some studies found DF, DHF and DSS cases showing different degrees of elevations in aspartate aminotransferase (AST) and alanine amino transferase (ALT) levels [5,6], while other studies have not reported this[7,8]. Present study gathers the evidence in pediatric patients from northern India region, managed at Gorakhpur medical college hospital.

PATIENTS AND METHOD

The study is based on data of hospitalized dengue patients in pediatrics ward of BRD medical college Gorakhpur, between January 2012 to June 2013. Protocol of the observational study was approved by administration. Patients guardians were explained that information relating the treatment of patient is worthwhile inclusion in research and identities would not be revealed without their concurrence, and their verbal consents were obtained. All patients in age range from 2 year to 15 years, clinically diagnosed dengue as per WHO criteria [1], were included. Children with history of hepatitis or otherwise diagnosed with immune disorders, hemato-oncological disease were excluded. Patients receiving standard care were monitored for presumable DSS. Those developing DSS were categorized as cases and others not developing DSS served as control group for comparison.

Complete blood examination were carried out upon diagnosis and serum aliquots were collected and stored at 4^0C till estimation of transaminase levels. Clinical history of fever duration, symptoms of abdominal pain, nausea and vomiting; examination for cutaneous or mucosal bleeds and hepatomegaly were particularly made. Baseline hematocrit, leukocyte count, platelet count and hemoglobin concentration were determined as well. Chi square statistic was employed for bivariate analyses of comparison. Distribution frequency of patients in case and control groups around common median and other category variables was studied.

OBSERVATIONS AND RESULT

Following the eligibility criteria during the study period, 50 patients got assigned as DSS cases while 63 non DSS cases roughly matching fever duration were enrolled from contemporary admissions as control. Baseline clinic-laboratory characteristics of cases in the two groups are presented in Table.1.

Median age of the studied patient sample was 68 months and composition of compared groups did not significantly differ in age or gender. Median fever duration at admission was 4 days and no significant difference in the groups was observed. Frequencies of petechial or mucosal bleeds also did not significantly differ in two groups. Abdominal pain was complained by significantly high proportion(78%) of DSS patients in contrast to only 25% of non-DSS controls. Nausea and vomiting was also insignificantly more frequent in DSS group. Significantly high76% of DSS cases had hepatomegaly as opposed to in only 30% among controls. Among the hematological tests, Leukocyte counts did not decline in majority of DSS patients while majority of control had lower counts, however difference was not significant. No significant difference was seen among two groups in respect of platelet counts. Hematocrit was increased in significantly higher proportion (72%) of DSS cases in contrast to just in 3% of controls.DSS patients also had significantly very high prevalence(94%) of low hemoglobin contrary to only 50.8% in control. Serum transaminase AST profile was elevated in significantly high proportion(80%) of DSS cases as opposed to only in 20% of controls.ALT levels were higher only in 42% of DSS cases but this proportion was significantly high than bare 3% observed in non-DSS control group. Finally, there was no significant difference in rate of positive serological tests for dengue in the two groups.

Table 1: Clinical and laboratory characteristics of DSS cases and non-DSS control group among pediatric dengue infection patients

Charecteristic		DSS group(n=50)	Control group(n=63)	p
Age(median 68 months)	<68 m	29	26	
	>68m	21	37	
Gender	Male	27	34	
	Female	23	29	
Fever duration at adm.(median 4 days)	< 4d	30	28	
	>4d	20	35	
Clinical features				
Bleeds	Present	28	26	
	Absent	22	37	
Abdominal pain	Present	39(78%)	16(25.4%)	*
	Absent	11	47	
Nausea/vomiting	Present	28(56%)	27(42.8)	
	Absent	22	36	
Liver enlargement	Present	38(76%)	19(30%)	*
	Absent	12	44	
Leukocyte ct.Median 4000/mcr.l	<4000	16 (32%)	33 (52%)	
	>4000	34	30	
Platelet ct.Median 52000/mcr l	<52000	32	45	
	>52000	18	18	
Hematocrit level	>46%	36(72%)	2(3.2%)	*
	<46%	14	61	
Haemoglobin %	<14%	47(94%)	32(50.8%)	*
	>14%	3	31	
Transaminases IU/L				
AST	>130	40(80%)	13(20.6%)	*
	< 130	10	50	
ALT	> 40	21(42%)	2 (3.2)	*
	<40	29	61	
Serology Dengue IgG &IgM	positive	40	45	
	Negative	10	18	

*Indicates statistically significant difference

DISCUSSION

Only a modest cut off for rise in AST (about 3 times upper normal), and very minor rise above normal for ALT were adopted for balanced comparison. Association of raised AST level but not ALT level in DSS has been reported[4,6].Liver cell damage in dengue may be due to direct cytopathic effect of virus; immunologic liver cell destruction or shock that leads to ischemia of hepatocytes [7]. Necrosis of liver cells in dengue is found to occur in mid and centrolobular zones, which are very sensitive to anoxic and cytokine mediated injury [8]. Serum transaminase levels are reported to begin rising on third day of dengue fever, reaching peak by 9th day and gradually subsiding thereafter over 2 to 3 weeks[9,10].Upon an overview, presenting features as abdominal pain, hepatomegaly, elevated hematocrit and AST enzyme levels should warn of the risk of patient worsening to DSS. Although plasma leakage and bleeding are hardly preventable, the understanding of variables related to DSS should alert for monitoring early onset of DSS. Close monitoring of imminent shock and timely fluid replacement would halt deterioration of the patient[11].Hepatic injury in dengue patients associates complications and hence it is prudent to regularly monitor serum transaminase levels in dengue patients as quality care and better outcomes[12].

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