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Original Research Article

Retrospective analysis of biochemical profile of dengue infection in a tertiary care hospital

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ABSTRACT

Background: Dengue is an exceedingly common infection of the tropics. The aim of the research to study the biochemical parameters of serologically proven dengue cases.
Methods: The study included Dengue patients admitted in PSG Hospital between January 2011and December 2012.
Results: Analysis of aspartate aminotransferase results showed that 19.1% had two-fold rise, 13.3% had three-fold rise and 19.6% had more than threefold rise. Analysis of alanine aminotransferase showed that 35.7% had normal values, 14.95% had two-fold rise, 11.1% had three-fold rise and 11.5% had more than threefold rise. Serum proteins were normal in 35.7% and low in 19.6%. Analysis of serum albumin showed low values in 10.6% Serum sodium levels were low in 11.1% of patients. Albuminuria was positive in 53% of patients. Serum ionised calcium levels were low in 26.8% of patients.
Conclusions: The biochemical abnormalities noted in our study included include elevated liver enzymes, low sodium and ionised calcium levels, hypoalbuminemia and increased urine albumin excretion.

Keywords: Dengue infection, Elevated liver enzymes, Hypocalcemia

INTRODUCTION

Dengue infection is an Arboviral disease which is transmitted by infected Aedes mosquito.

The incidence of Dengue infection has grown exponentially in the last 5 decades. There are about 2.5 billion people living in dengue endemic areas worldwide 9.[1] 75% of the global burden is from South East Asia. There are about 50 million dengue infections in a year worldwide. Cyclic epidemics are happening in countries such as India and Bangladesh.

The reason why dengue is spreading so rapidly is international travel which allows transmission of disease from endemic areas to areas of less prevalence.

The virus is a single stranded RNA virus which has four serotypes. Dengue had been endemic in 16 states in India and after 2010 has been present in all states. There have been lots of reports of demographic and haematological profile of dengue patients. There have been only a few studies looking at biochemical and metabolic parameters of dengue patients.

METHODS

This study was a retrospective analysis of patients who were admitted in the medical wards of PSGIMSR with febrile illness and diagnosed to have dengue infection by serological analysis. These were mainly adult patients and were admitted between January 2011 and December 2012. All patients screened for this study had undergone

dengue serology and only patients who were dengue IgM positive were included in this study. Patients with other causes for fever and with coexisting infections were excluded from this study. Inclusion criteria included patients above 15 years of age, Dengue IgM positive patients. Dengue serology was done by the ELISA method. Patients with other tropical illnesses including malaria, typhoid, scrub typhus were excluded from this study. Aminotransferases were tested by IFCC method, serum proteins were done by biuret method. Serum electrolytes (sodium, potassium and calcium) were analysed via the ISE method (Direct and indirect ion sensing electrode method). Urine albumin analysis was done by reflectance photometry method.

RESULTS

Analysis of the serum creatinine levels showed that 52.3% had normal levels, 6% had higher than normal levels. Analysis of serum bilirubin levels showed that in 52.3% it was normal, 6% of patients, it was high. Analysis of aspartate aminotransferase (AST) results showed that 15.7% had normal values, 19.1% had two-fold rise, 13.3% had three-fold rise and 19.6% had more than threefold rise. Analysis of alanine aminotransferase (ALT) showed that 35.7% had normal values, 14.95 had two-fold rise, 11.1% had three-fold rise and 11.5% had more than threefold rise. Analysis of alkaline phosphatase showed normal values in 48.5%, high in 5.1%.

Table 1: Distribution of range of serum bilirubin levels.

Bilirubin	Frequency	Percent
Normal	123	52.3
High	14	6.0
Not done	98	41.7
Total	235	100.0

Table 2: Distribution of ranges of aminotransferase elevations.

	AST Frequency	AST %	ALT Frequency	ALT %
Not done	78	33.2	63	26.8
Normal	37	15.7	84	35.7
2-fold rise	45	19.1	35	14.9
3-fold rise	29	12.3	26	11.1
>3-fold rise	46	19.6	27	11.5

Analysis of serum proteins showed normal values in 35.7%, low in 19.6%. Analysis of serum albumin showed normal values in 44.7%, low in 10.6%. Analysis of serum globulin showed normal values in 54.5%, low in 1.7%. Analysis of blood sugars showed normal values in 65.1%, high values in 9.4%. Analysis of serum sodium levels showed that it was normal in 53.2%, low in 11.1%. Analysis of serum potassium showed that it was normal in 51.9%, low in 10.6%. Analysis of ionized calcium showed that it was normal in 29.4%, low in 26.8%.

Table 3: Distributions of different ranges of serum sodium, potassium and ionised calcium levels.

	Sodium (%)	Potassium (%)	Calcium (%)
Not done	84 (35.7)	85 (36.2)	103 (43.8)
Normal	125 (53.2)	122 (51.9)	69 (29.4)
Low	26 (11.1)	25 (10.6)	63 (26.8)
High	0	3 (1.3)	0

Table 4: Distribution of ranges of albuminuria.

Urine albumin	Frequency	Percent
Negative	96	40.9
1+ albuminuria	73	31.1
2+	52	22.1
3+	1	.4
Not done	13	5.5

Analysis of urine albumin levels showed 31% of patients with 1+ albuminuria, 22.1% with 2+ albuminuria and 0.4% with 3+ albuminuria and negative in 40.9%.

DISCUSSION

Dengue fever is an exceedingly common infection of tropical countries such as India. The spectrum of dengue infection varies from classical dengue fever, to dengue hemorrhagic fever and dengue shock syndrome. Some of the biochemical abnormalities in dengue include elevation of liver enzymes, hypoproteinemia due to possible third space losses and albuminuria. Some studies have shown changes in ionized calcium levels especially in dengue hemorrhagic fever.

The spectrum of hepatic involvement in Dengue infection varies from mild involvement to fulminant hepatitis. In a study by Luiz Jose de Souza et al, 34.9% of patients had normal values of transaminases, 48.5% had values between 1-3-fold elevation, 14.8% had values between 3-10-fold elevation and 1.8% had values greater than 10 fold elevation.[2] This was comparable to our study which had 33% of patients with 1-3 fold elevation of ALT and 11.5% with greater than 3 fold elevation. Liver involvement is thought to be due to an inflammatory process in the hepatic parenchyma. None of these patients had underlying liver disease. In a study by Nguven et al, AST was more elevated compared to ALT (93% vs 37%). Our study also had greater AST elevation compared to ALT levels.[3]

In our study ionised calcium was low in 26.6% of patients. In a study by NJ Dahanayaka et al it was shown that low ionized calcium levels were a marker of plasma leakage and that hypocalcemia was usually transient.[4]

Our study did not differentiate between Dengue fever and Dengue hemorrhagic fever.

In our study serum proteins were reduced in 19.6% of patients and serum albumin was reduced in 10.6% of patients. In a study by Brito et al, serum albumin was low in 71% of patients with Dengue hemorrhagic fever.[5] It is believed that a low serum albumin may be an indicator of plasma leakage.

Serum sodium was low in 11.1% of our patients. In a study by Caroline Rose et al the prevalence of hyponatremia was 58% which is a much higher value compared to our study.[6] The reason for hyponatremia is thought to be salt depletion, reduced excretion by the kidneys. In another study by Bhayagayamma et al, it was shown that mild hyponatremia was a common feature of dengue infection.[7]

Our study had a urine albumin prevalence of 59.1%. In a study, be Sakthi Selvakumar et al it was shown that urine albumin excretion may be a predictor of dengue disease severity with proteinuria increased in patients with Dengue hemorrhagic fever.[8] Urine albumin excretion usually increases between days 4-7 of dengue fever just before defervesence. In a study by Vasanwala et al concluded that urine protein creatinine ratio done at onset and around the time before fever subsided predicted the likelihood of developing dengue hemorrhagic fever.[9] In a report by Mendez et al it was shown that the incidence of proteinuria in dengue was 62% which was comparable to our study.[10]

CONCLUSION

Dengue fever is a condition very commonly encountered in India. In addition to the haematological effects it may be accompanied by some biochemical abnormalities which include elevated liver enzymes, low sodium and ionised calcium levels, hypoalbuminemia, increased urine albumin excretion. Many of the features require studies in greater detail. The drawback of this study is that not all the tests were done in all the patients since this was a retrospective analysis.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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