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LABORATORY PROFILE OF DENGUE IN CHILDREN IN A TEACHING HOSPITAL

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ABSTRACT To study the laboratory profile of children with dengue in a Teaching Hospital.

Methods: An observational prospective study conducted in the paediatric ward in a medical college in Jammu, India over 12 months. Patient were classified based on World Health Organization (WHO) 2011 criteria for dengue.

Results: Out of the 54 enrolled, mean age of presentation was 6.82 year with M:F ratio of 1.1 :1. 85% were living in urban areas and most of the children (64.81%) lived above the ground floor and mosquito net was not used by 75% of the total. The haematological parameters showed anaemia (29.62% %), leukopenia (20.37 %) and thrombocytopenia in 50(92.59 %) cases (Table 3) and hemoconcentration in 44.44 % of cases. NS1 antigen was positive in 43 cases (83.33%) and dengue IgG antibody was positive in 9 cases (16.66%). Altered liver and renal tests were seen in 12.96% and 5.55% of cases respectively.74.07% of cases recovered with the use of antipyretics only .And only 12(22.24%) out of all required hospitalization.

Conclusion: Detection of Ns1 antigen to diagnose dengue is proposed to be superior when compared to antibodies detection. It is also concluded that diagnosis of dengue should be made comprehensively by clinical examination with supporting laboratory and radiological investigations. Early recognition and prompt initiation of appropriate treatment are vital to reduce disease related morbidity.

KEYWORDS : Dengue Fever, Children, India, Clinical Profile

INTRODUCTION

Dengue is a mosquito-borne viral disease transmitted by female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, *Ae. Albopictus.* Dengue is caused by a virus of the Flaviviridae family and there are four distinct, but closely related, serotypes of the virus that cause dengue (DENV-1, DENV-2, DENV-3 and DENV-4). Dengue causes a wide spectrum of disease ranging from subclinical disease to severe flu-like symptoms in those infected. Although less common, some people develop severe dengue, which can be any number of complications associated with severe bleeding, organ impairment and/or plasma leakage. Severe dengue has a higher risk of death when not managed appropriately. Recovery from infection is believed to provide lifelong immunity against that serotype. However, cross-immunity to the other serotypes after recovery is only partial, and temporary. Subsequent infections (secondary infection) by other serotypes increase the risk of developing severe dengue.[1]

Although the clinic-pathological profile of Dengue has been studied before, data from the northern part of our country are lacking. In this study, we analyzed various laboratory parameters and possible outcome among Dengue infected children. With there being an increasing number of cases detected, a study of the basic clinical and haematological aspect of the disease is important. Thus, this study was undertaken to study the laboratory profile of the patients with dengue at a tertiary care centre in Jammu, India

METHODS

This was an observational study conducted on patients visiting OPD involving 54 children of either gender up to 15 years of age for a period of 1 year from July 2020 to July2021. Children who came to the OPD for consultation and diagnosed as Dengue cases were enrolled in this survey. The case definition, diagnosis and management used for dengue fever were as per the revised World Health Organization (WHO) guidelines 2011[2]. **Inclusion criteria** All the patients of either gender upto 15 years who attended OPD with symptoms of dengue fever had NS1 or serology positive. The diagnosis was confirmed by NS1antigen-based ELISA test**. Exclusion criteria** were simultaneous infection, severe malnutrition, long term steroid use, haemolytic diseases such as thalassemia, drug induced hepatitis and malignant diseases. All other relevant and other additional investigations were done as per the clinical course of illness. The laboratory findings like haemoglobin estimation, total platelet count, haematocrit estimation, serum calcium, liver function tests, renal function tests, NS1 antigen, and IgM antibody, chest X ray, and ultrasonography of each group of illness were recorded.

In this study we analysed the variation in laboratory parameters and outcome among dengue infected children.

RESULTS

The haematological parameters (Table 1) showed anaemia (29.62% %), leukopenia (20.37 %) and thrombocytopenia in 50(92.59 %) cases and hemo-concentration in 44.44 % of cases. NS1 antigen was positive 43 cases (83.33%) and dengue IgG antibody was positive in 9 cases (16.66%). Altered liver and renal tests were seen in 12.96% and 5.55% of cases respectively.5.5% cases had serum calcium concentration below normal range.74.07% (Table 2) of cases recovered with the use of antipyretics only. However only 25.92% of all the cases were managed by intravenous fluids. None of the patient required any sort of blood transfusion in our study. All the patients recovered and no mortality was seen.

Table1 Laboratory Parameters In Dengue Fever

Investigations	Number	Percentage
Anaemia (Haemoglobin<10gm/dl)	*16*	*29.62*
Leukopenia (TLC<4000/mm3)	*11*	*20.37*
Thrombocytopenia (<1.5 lakh/mm3)	*50*	*92.59*
Hemoconcentration (HCT>40	*24*	*44.44*
Hypoalbuminemia (serum albumin <3gm/dl)	*5*	*9.2*
Hypocalcaemia (serum calcium<9gm/dl)	*3*	*5.5*
NS1 Antigen positive	*45*	*83.33*
NS1 Antigen -ve &IgM positive	*8*	*14.81*
Dengue IgM positive	*29*	*53.70*
Dengue IgG antibody	*9*	*16.66*
Deranged RFTs (Serum creatinine >3mg/dl)	*3*	*5.55*
Deranged LFTs *SGOT* *SGPT* *Both*	*7* *4* *2* *1*	*12.96* *57.14* *28.57* *14.28*

Table 2 Management

Management	Frequency
Antipyretics	*40(74.07%)*
Intravenous fluids	*14(25.92%)*
Platelet transfusion	*0*
Whole blood transfusion	*0*
Dopamine	*0*
Adrenaline	*0*

DISCUSSION

In a study by Mishra [5] tourniquet test was found to be negative in majority of the cases whereas studies in other countries especially Southeast Asian countries reported tourniquet test positivity as the commonest bleeding manifestation [5]. In this study tourniquet test was positive in (44.44%) cases was quite high. In another study in Bangladesh [3] tourniquet test was positive in (32%) cases and in a study in Brazil [4] test was positive in (81.8%) cases. Low proportion of positive tourniquet test in Indian studies may be due to the darker skin colour in Indian children [5].

In laboratory parameters anaemia was seen in 29.62% of cases which was similar to Narayanan et al [3] reported the same in 33.2% respectively. Hemoconcentration is a very important factor. The raised haematocrit is an accurate indicator of vascular permeability and plasma leakageThe classical description of haematocrit >20% is difficult to establish, as the reference standards have not been established for children. Hence the rise in haematocrit was taken one of the diagnostic criteria in identifying dengue fever.Gomber et al [4] had defined a cut off haematocrit value as 36.3% to be diagnostic of DHF in Indian population.According to Saha et al., [10] Hct may not be a good indicator in infants and children in presence of moderate anemia.

Leukopenia was seen in 20.37% of cases in this study however other studies by Alam S et al. leukopenia was found to be less in 9.4% of cases only [11]. 92.59 % of cases in our study presented with thrombocytopenia This finding was in concordance with Shubhankar et al., [5], C.V. Prathyusha [9] and Saha et al [10]. Thrombocytopenia is attributed to following causes like decreased production by the bone marrow [11], virus antigen-antibody complex mediated destruction [12] or increased consumption of platelets induced by secondary infection associated with the release of high level of platelet activating factors or increased adhesion of platelets to endothelial cells of vasculature [13]

In a study by C V Prathyusha et al [9], hepatic dysfunction was seen in 17.5% children, comparable to the study done by Dhooria et al [11] in which it was seen in 14.8%, our results were also similar with 12.96 %. The cause in such rise has been attributed to ischemic hepatitis or virus induced liver damage [12]. Banerjee et al [13] reported an increase in SGOT and SGPT levels in 60% of children and Dutta et al [14] have reported SGOT was raised in 68.5% and SGPT in 39.2% children. Comparable to our study where rise in SGOT was more as compared to SGPT. Elevation of SGOT was more as compared to SGPT. It rises more in dengue probably due to multiorgan failure in Dengue, hence other sources of AST contributes to its rise (erythrocyte , cardiac, skeletal, renal and brain). A significant decrease in serum albumin was observed among the subgroup and it is observed the serum albumin concentrations were decreased in patients diagnosed with dengue fever and its association complications. The results of the present study are in agreement with earlier studies by Srivenu I et al. [15].

The dengue IgM was tested positive in 53.70% of cases; IgG was tested positive in 16.66% and NS1 positive in 83.33% which show the importance of NS1 as an early antigen that can be useful in detection of dengue fever cases.Serology with clinical presentation and other investigations form the mainstay of diagnosis.

Outcome

Out of the 54 patients, maximum number of patients (Table2) were managed on OPD basis (74.07%) by antipyretics and oral fluids alone. However only 25.92% required hospitalization who were managed by intravenous fluids. None of them required any blood transfusion or inotrope support and all the patients recovered. Out of those admitted in hospital maximum got discharged within 4 days of admission.

CONCLUSION

The present Prospective observational study was focused to evaluate the associated laboratory and radiological profiles that may be useful to diagnose dengue fever in North Indian population admitted in a tertiary care hospital. The major strength of the present study is inclusion of Ns1 antigen and combined use of Ns1 antigen, IgM and IgG antibodies in the diagnosis of dengue cases. All the cases in the present study were selected based on the serology testing. This signifies the importance of serological testing as diagnostic tool in the diagnosis of dengue. **Strength** of the present study is comprehensive inclusion of liver function tests, radiological investigations like chest X ray and ultrasonography in arriving the diagnosis of dengue and its associated complications. The major **drawback** of this study is that it is conducted on small sample size with no severe cases. Using ionized calcium rather than serum calcium levels would have given better insights. The relative incidences of dengue and its complications, the various clinical parameters with associated morbidity were assessed in the present study. Hence, it is concluded that dengue is one of the most common viral diseases in the North Indian population affecting the children more commonly. It is inferred that detection of Ns1 antigen to diagnose dengue is proposed to be superior when compared to antibodies detection. It is also concluded that diagnosis of dengue should be made comprehensively by clinical examination with supporting laboratory and radiological investigations.

High index of clinical suspicion, early diagnosis and prompt initiation of fluid therapy remain the most important aspect in treating Dengue patients. WHO guideline-based management should be applied in assessing and managing Dengue cases to reduce mortality and morbidity rate. Above all public awareness should be widened and all measures should be taken to prevent Dengue fever.

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