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Original Research Article

A Prospective Clinico-Hematological Assessment of Profile in Dengue Fever in Bihar Region

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Abstract

Aim: To elucidate the positive laboratory profile of serologically diagnosed dengue patients so as to facilitate early diagnosis, treatment, management and vector control measures, to reduce the morbidity and mortality because of this disease.

Material & Methods: This was a descriptive study with analysis of patients who were admitted for dengue fever in the Department of Medicine, Government Medical College, Bettiah, Bihar, India for duration of 15 months. This study was conducted on 100 indoor patients.

Results: Raised hematocrit (>47%) was noted in 20 patients at presentation and the hematocrit ranged from 20-51%. In the present study out of 100 cases of dengue fever, 88% cases had thrombocytopenia and 12%.

Conclusions: Hemoconcentration, leucopenia, thrombocytopenia, and raised liver enzymes SGOT and SGPT along with reactive/ plasmacytoid lymphocytes on peripheral smear gives enough clues to test for dengue serology so that dengue cases can be diagnosed in their initial stages.

Keywords: Dengue, Hemogram, Hematocrit, Leucopenia

Introduction

Dengue is an acute self-limited systemic viral infection caused by the dengue virus belonging to the family flaviviridae. [1] Incidence of dengue fever (DF) has been increasing from past few years and dengue has become a global problem in recent times. [2] Dengue fever with warning signs (DFWS) and severe dengue (SD) with severe plasma leakage, severe bleeding or severe organ involvement have emerged as important public health threat in urban areas. This is attributable to population migration to cities resulting in urban overcrowding and infrastructure construction in these areas providing unhindered opportunities for breeding of the vector. [3] There is a seasonal rise in the number of cases especially during the months of May to September presenting to the emergency and outpatient departments

which imposes an additional load to an already overburdened system especially for staffing, laboratory and acute ward admission. The clinical presentation of DF is triphasic with the febrile phase typically characterized by high fever, headache, myalgia, body ache, vomiting, joint pain, transient rash and mild bleeding manifestations such as petichiae, ecchymosis at pressure sites and bleeding from venipunctures. [4]

The period of transmission from humans to mosquitoes begins one day before the start of fever up to the sixth day of illness corresponding to the viremia phase. After a female bites an individual in the viremia phase, viral replication (extrinsic incubation) begins in the vector in from eight to twelve days. In humans, the incubation period ranges from 3 to 15 days (intrinsic incubation) with an average of 5 days. [5-6]

According to estimates of the World Health Organization (WHO), about 50 million cases of dengue fever occur annually worldwide and 2.5 billion people live in risk areas.[7] In 2005, the World Health Assembly, through WHA Resolution 58.3, in a review of the International Health Regulation (IHR), included dengue fever as an emergent public health disease, with implications for health safety due to the spread of the epidemic beyond national boundaries. [8]

The WHO 2009 classification divides dengue fever into two groups: dengue with or without warning signs and severe dengue, though the 1997 WHO classification is still widely used. The 1997 classification divided dengue into undifferentiated fever, dengue fever (DF) and dengue hemorrhagic fever (DHF). DHF is further divided in to I to IV grades. III and IV grades are called as dengue shock syndrome (DSS). [9-10] Four main characteristic manifestations of dengue illness are continuous high fever lasting 2-7 days, haemorrhagic tendency as shown by a positive tourniquet test, petechiae or epistaxis thrombocytopoenia (platelet count <100×109/l); and evidence of plasma leakage manifested by hemoconcentration (an increase in hematocrit 20% above average for age, sex and population), pleural effusion and ascites, etc. [11-12]

Thus, we aim to elucidate the positive laboratory profile of serologically diagnosed dengue patients so as to facilitate early diagnosis, treatment, management and vector control measures, to reduce the morbidity and mortality because of this disease.

Material & Methods:

This was a descriptive study with analysis of patients who were admitted for dengue fever in the Department of Medicine, Government Medical College, Bettiah, Bihar, India for duration of 15 months. This study was conducted on 100 indoor patients. Patients presenting to the emergency department, outpatient department (OPD) or pediatric OPD with complaints of fever and clinical features of dengue with positive NS1 antigen test or dengue antibody serology IgM or IgG or both were included in the study.

Inclusion criteria:

Inclusion criteria were febrile patients with positive NS1 antigen or IgM or both on rapid card tests. IgG may be positive or negative.

Exclusion criteria:

Age, gender, clinical presentation, duration of fever, dehydration, hemodynamic status, urine output, hepatomegaly, ascites, pleural effusion, presence of petechiae, positive tourniquet test, other bleeding manifestations, hematocrit and platelet count were recorded at presentation.

Patients with only IgG positive on rapid card tests were excluded from the study. Patients with other identified illnesses like typhoid, malaria which were coexisted with dengue positive serology were excluded from the study.

Hemogram was done on automated cell counter analyzer (Sysmex XP 100) which included hemoglobin, hematocrit, total leucocyte count (TLC), differential leucocyte count (DLC) and platelets count.

Platelets counts were cross checked on stained smears. Hematocrit raised >20% of normal was considered as hemoconcentration. Leukopenia was taken as total leucocyte count <4,000/mm3. Thrombocytopenia was taken as platelets count <1, 00,000/mm3.

Biochemical parameters included serum Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), total bilirubin (T. Bil.) and alkaline phosphatase (ALP) were done on Cobas c 311 from Roche (Hitachi) biochemistry machine.

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results:

Most of the cases were seen in the 20-30 years age group (Table 1).

Table 1: Age wise distribution of study participants

Age in years	Number
20-30	42
31-40	20
41-50	21
51-60	12
>61	5
Total	100

Majority of the patients were males compared to females and the male to female ratio was 2:1. Fever was the most common presentation and was seen in 48% cases (Table 2).

Table 2: Distribution of clinical features

Clinical features	Number
Fever	48
Myalgia	20
Fever and myalgia	24
Headache	6
Nausea and vomiting	8
Fever and skin rashes	7
Petechiae	6
Fever and itching	4
Total	100

Present study showed hemoglobin range of 6 gm% to 17 gm% (Table 3).

Table 3: Distribution of study population by hemoglobin and hematocrit level

Hemoglobin level		Hematocrit	
Hb (gm/dl)	No. of cases	HCT (%)	No. of cases
6-8.9	13	20-26	-
9-11.9	37	27-36	46
12-14.9	33	37-46	34
15-17.9	17	47-56	20
Total	100	Total	100

Raised hematocrit (>47%) was noted in 20 patients at presentation and the hematocrit ranged from 20-51%. The total leukocyte count ranged from 1500 cells/cumm to >11000 cells/cumm. Leucopenia with less than 4000 cells/cumm was present in 28% cases. In the present study out of 100 cases of dengue fever, 88% cases had thrombocytopenia and 12%.

Discussion:

The study done by Kulkarni et al. [13] observed that 94.12% of cases which were positive for both NS1 and IgM and 79.2% of cases which were positive for NS1 alone had thrombocytopenia. However, no study has made a note on leukocytosis and normal count. Leukopenia is seen in 15.38% of the cases in a study done by Malavige et al. [14] Oliveira et al., [15] Mahmood et al., [16] and Wilder-Smith et al. [17] observed leukopenia in much higher number of cases.

The frequency of dengue fever in the study was higher in the group aged 15 years old or over. These results are similar to those of Rocha & Tauil[18] in an epidemiological study conducted in Manaus, AM. There was a slight predominance of women in this study; in most published studies, there is no significant difference in the proportions by gender. [18] The correlation between gender and the clinical form showed a significant difference for SD, with a predominance of women, a result that is in disagreement with the literature. [19-20]

Regarding the clinical forms of dengue, only DHF showed peak elevations in Hb and Ht during the course of the disease, a change most likely attributed to hemoconcentration, which can lead to hypovolemic shock. [21]

There has been increasing atypical and rare presentations of DF resulting in the expanded dengue definition. [22-23] Some studies similar to ours from other parts of the country have reported significant differences in the incidence of atypical presentation like neurological signs or the incidence of serositis [24-25] while others have reported similar findings. [26] These differences may be due to co-infection with other pathogens [27]. Dengue is grossly underreported in our country. [28] The WHO estimates that nearly 5 lac people are admitted with dengue in our country annually and that India accounts for nearly 20% of all cases in the south-east Asian region (SEAR). [29]

Study done by Shekar et alreported thrombocytopenia in 61% cases[30]. While in studies done by Gajera et al and Tahlan et al platelet count <1 lakh/mm^3 was seen in 81% and 67.39% cases respectively.[31-32] Reason for discrepancy was we were having more early cases of dengue fever as compared to these studies. In study done by Ahmed et al Platelet count <1 lakh/mm^3 was observed in 54.7% of the cases. Moderate thrombocytopenia and severe thrombocytopenia were found in 16.98% and 3.77% of the patients respectively which is very much similar to our study. [33,34]

Conclusion:

Hemoconcentration, leucopenia, thrombocytopenia, and raised liver

enzymes SGOT and SGPT along with reactive/ plasmacytoid lymphocytes on peripheral smear gives enough clues to test for dengue serology so that dengue cases can be diagnosed in their initial stages.

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