Original Research Article

A study of abnormal hematological parameters in dengue fever

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Abstract

Introduction: Dengue fever epidemics pose a serious issue of public health in India. Early clinical features of dengue infection are variable among patients, and initial symptoms are often non-specific resembling any viral illness. Therefore, specific laboratory tests are necessary for an accurate diagnosis. In the present study, we planned to study hematological profile of seropositive (Igm) dengue fever patients.

Materials and methods: Total 100 patients with positive serology for dengue infection were studied in detail to evaluate the haematological changes. Case definition of dengue fever was based on W.H.O criteria and confirmed by positive serology to dengue fever.

Results: Most common hematological abnormality was thrombocytopenia (92%) followed by leucopoenia (68%) in present study. Raised hematocrit was found in 23 patients. Thromboplastin time was significantly raised in 15 patients. Peripheral smear examination showed atypical lymphocytes in 49 patients, the characteristic findings were plasmacytoid lymphocytes.

Conclusion: Dengue fever does not have specific medical therapy hence clinical recovery monitoring is largely dependent on hematological parameters. The study results are relevant in the characterization of evolution of the disease as well as the hematological dynamics involved and can be used as screening tools by physicians to chart early therapeutic response.

Key words

Dengue fever, Hematological parameters, Seropositive.

Introduction

Dengue fever epidemics pose a serious issue in public health as they are conditioned to the existence of the so-called social determinants in the health-disease process, which potentiate the emergence of new mosquito breeding sites, limit the results of vector control measures and hamper access to health services.

Dengue fever is caused by one of the four serotypes of the dengue virus (DEN-1, DEN-2, DEN-3 and DEN-4) also referred to as an arbovirus (arthropod-borne viruses) that belongs to the genus *Flavivirus* of the family Flaviviridae. Transmission of dengue fever to humans occurs by the bite of the female *Aedes aegypti* mosquito infected by one of four serotypes of the virus. This mosquito, a domestic species adapted to urban conditions, is the main vector in India.

Dengue fever is an acute febrile disease characterized by sudden onset of fever of 3-5 days, intense headache, myalgia, retro-orbital pain, anorexia, gastrointestinal disturbances and rash [1]. Early clinical features of dengue infection are variable among patients, and initial symptoms are often non-specific resembling any viral illness. Therefore, specific laboratory tests are necessary for an accurate diagnosis. In the present study we planned to study hematological profile of seropositive (Igm) dengue fever patients.

Materials and methods

The material comprised of 208 cases of clinically suspected dengue infection admitted to Medicine Department of our hospital from January 2016 to December 2016. Out of these 208 cases, 100 patients with positive serology for dengue infection were studied in detail to evaluate the hematological changes. Case definition was based on W.H.O. criteria and confirmed by positive serology to dengue fever. Performa was prepared which included clinical details and information on various parameters of blood count, coagulation profile and biochemical tests. Details of chest X-ray and other imaging modalities were also recorded wherever required. Serum from all clinically suspected cases was tested in central laboratory of our hospital for antidengue immunoglobulin (IgG and IgM) by solid phase enzyme immunoassay based on immunocapture principal. Cases positive for dengue infection were followed for clinical and laboratory profile including peripheral smears for atypical lymphocytes.

Results

During the study period 208 cases were admitted with suspected dengue infection. Out of these 100 patients were confirmed by serology (ELISA method) to be dengue infection positive. Age range was from 11 years to 56 years. There was variation in frequency of cases in different months. Maximum numbers of cases were seen during entire rainy season i.e. June to September. The clinical features included fever, headache, vomiting, myalgia, body rash and mucosal bleeding. **Table - 1** shows the summary of clinical features.

Table - 1: Clinical manifestations of patients with dengue infection.

Features	No. of cases	%
Fever	91	91
Vomiting	76	76
Headache	70	70
Myalgias	69	69
Rash	31	31
Gingival bleeding	30	30
Hepatomegaly	28	28
Diarrhea	25	25
Splenomegaly	6	6

Amongst the haematological features, most common abnormality was thrombocytopenia (92%) followed by leucopoenia (68%) as per **Table - 2**. Four patients had features of dengue hemorrhagic fever and two had features of dengue shock syndrome. Raised hematocrit was found in 23 patients. Thromboplastin time was significantly raised in 15 patients. Peripheral smear examination showed atypical lymphocytes

in 49 patients, the characteristic findings were plasmacytoid lymphocytes.

Table - 2: Profile of abnormal laboratory investigations in patients with dengue infection.

Investigations	No. of cases	%
Platelet count (per mm^3)	92	92
>100000	26	26
50000-100000	13	13
<50000	61	61
Leukopenia (per mm^3)	68	68
Partial thromboplastin time >2 fold (PTT) versus controls	15	15
Atypical lymphocytes	49	49

Discussion

Dengue fever is the one of the most important arboviral infection. In India dengue virus was first isolated in 1946 and major outbreaks have been reported since then. Dengue hemorrhagic fever was first reported in Calcutta in 1963 [2]. The hematological effects observed are changes in blood counts, hemoconcentration due to plasma leakage, leukopenia because of decreased neutrophils near the end of the febrile phase, presence of atypical lymphocytes and relative lymphocytosis before shock, thrombocytopenia and changes in blood hemostasis with frequent presence of hemorrhagic manifestations [3]. As dengue fever can present with serious consequences and can even be fatal, this study aimed at analyzing clinical and laboratory dynamics in order to increase the sensitivity of early diagnosis.

In the present study emphasis was laid upon haematological investigations of patients along with clinical features. Out of 100 cases studied 4 cases turned out to be dengue hemorrhagic fever and 2 case of shock syndrome. Clinical features are illustrated in **Table - 1**. Total 91 patients had fever on presentation in the present study. Besides fever, headache myalgia and vomiting were other common clinical features. Studies done earlier also show similar presentation of dengue fever [4, 5, 6].

Most significant laboratory abnormality in present study was thrombocytopenia (92%). **Table - 2** shows the haematological parameters. It may be attributed to depression of bone marrow due to acute stage of viral infection [7]. In the present study leucopoenia was found in 68% while incidence of leucopoenia was 31% in a study by Jain P.K., et al. [8].

In our study only 1% of cases had gingival bleeding while Jain P.K., et al. reported bleeding in 32% cases [8]. In a study by Irfan Arshad, et al. it was concluded that hematological parameters like prolonged APTT and raised hematocrit and biochemical parameters have strong association with the complications of dengue fever and hence are associated with poor outcome of disease [9]. In the present study partial thromboplastin time (PTT) was raised two folds in 15% cases. Irfan Arshad has reported prolonged APTT in 26% cases, whereas Ayub, et al. has reported 10% in their studies [7, 9]. Ali Netal (2007) have found 26.6% leucopenia and 77.1% thrombocytopenia at the time of admission [10].

In our study, we studied the peripheral smear of all the patients, out of which 49% of smears showed reactive lymphocytosis with atypical lymphocytes. These included plasmacytoid type of lymphocytes with nucleus pushed to periphery, slicing of nucleus, irregular border of nucleus, bilobed nucleus. Few authors have studied the smears and reported similar findings. Thisyakorn, et al. (1984) have reported atypical lymphocytes in majority of cases of dengue hemorrhagic fever whereas Gawoski J M, et al. (2003) have reported 9% abnormal plasmacytoid lymphocytes [11, 12].

Conclusion

Dengue fever does not have specific medical therapy hence clinical recovery monitoring is largely dependent on hematological parameters. This study concludes that parameter like platelet count, hematocrit, leukocyte count and coagulation studies aid greatly in clinical

monitoring of patient. The study results are relevant in the characterization of evolution of the disease as well as the hematological dynamics involved and can be used as screening tools by physicians to chart early therapeutic response.

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