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Pattern of change of some haematological parameter in dengue fever

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Abstract

Background: Dengue viral infection is one of the common arboviral infections in tropical and subtropical countries. Haematological examination is an essential step in the management. In few cases it can give clue to the underlying diseases. Early diagnosis of dengue is important for provision of special care which ensure marked reduction of morbidity and mortality. This study was conducted document the haematological changes in Dengue fever. **Aims and Objectives:** To describe the haematological changes during this evaluation of dengue fever. **Materials and Methods:** This descriptive cross sectional study was conducted in TMSS Medical College, Bogra and Popular Diagnostic Center Ltd. Bogra during March 2016 to November 2016. It Including 66 cases of dengue and there haematological profile was done. **Results:** The most common haematological abnormality was thrombocytopenia followed by leucopenia, atypical lymphocytes, and lymphocytosis. **Conclusion:** Thrombocytopenia is this most common haematological change followed by increased haematocrit, leucopenia, neutropenia and presence of atypical lymphocytes in dengue fever.

Keywords: dengue fever; thrombocytopenia; neutropenia; leucopenia; NS1 antigen.

Introduction

Dengue is an emerging tropical viral infection caused by an ssRNA virus of the flaviviridae family and transmitted by the bite of *Aedes aegypti* and *Aedes albopictus* mosquitoes.^{1,2} WHO estimates 50-100 million cases of dengue each year. More than three hundred thousand cases of dengue hemorrhagic fever (DHF) are diagnosed each year resulting in 24,000 deaths per year³. Dengue is a self-limiting infection which causes a spectrum of illness ranging from no symptoms to life threatening DHF/dengue shock syndrome. It shares some symptoms with others infectious diseases, most of which go undiagnosed and under reported³. It is a major cause of morbidity and mortality in tropical and subtropical regions comprising more than 100 countries. Two –fifths of the world's population or 2500 million people are now at risk for dengue. The global prevalence of dengue infection has increased dramatically in the recent decades, particularly in the Americans, Western Pacific and South-East Asian regions.⁴

Early diagnosis and aggressive fluid replacement therapy with good nursing care can reduce the fatality rates to 1% or less. Serological testing is currently the standard diagnostic practice for confirmation of dengue infection.^{5,6}

Materials and Methods

This descriptive cross sectional study was conducted in TMSS Medical Collage, Bogra and Popular diagnostic center Bogra for a period of 9 month from March to November 2016. The study included 66 of proven dengue cases. All the patients had fever of at least 3 days duration and the blood tests were performed on the 3rd to the 5th day of illness. All patients who tested positive for dengue infection were included in the study. Patients with fever but negative for dengue testing were excluded from the study.

Test variables

Haematological and serological investigations were studied in such patients. 5ml of blood was

drawn, 2ml of blood was kept in EDTA vacutainers for complete hematological study and 3ml of blood in plain vacutainers for serological investigations.

The test for dengue was done using a rapid test device of immuno-chromatographic test for the qualitative detection of NS1 antigen and differential detection of IgM and IgG antibodies to dengue virus in human serum.

The hematological investigations included a complete blood counts and peripheral smear. The blood counts were performed on the fully automated hematology analyzer with a five part differential. The peripheral smears were stained with Leishman stain and studied by an experience pathologist.

Results

In this study total 66 dengue NS1 antigen positive patients were included and analyzed.

There were 40 (60.6%) male & 26(39.4%) females patients. The age of the patients ranged from 1 to 70 years.

Table 1: Pattern of dengue antigen and antibody positivity (n = 66)

<i>Antigen/antibody</i>	<i>Frequency</i>	<i>Percentage (%)</i>
NS1+	53	80.30
NS1+, IgM+	04	6.06
NS1+, IgG+	02	3.03
IgM+ IgG+	02	3.03
IgM+	02	3.03
IgG+	03	4.54

Table 2: Haemoglobin (n = 66)

<i>Haemoglobin (gm/dl)</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<10.0	8	12.12%
10-15	46	69.70%
>15	12	18.18%

Table 3: Haematocrit (n = 66)

<i>Haematocrit (%)</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<35	14	21.22%
35-45	43	65.15%
>45	9	13.63%

Table 4: Total leucocyte count

<i>Total leucocyte count (Cells/cumm)</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<4,000	24	36.36%
4,000-11,000	32	48.48%
>11,000	10	15.16%

Table 5: Percentage of Lymphocytes (n = 66)

<i>Lymphocytes</i>	<i>Frequency</i>	<i>Percentage %</i>
Lymphocytes>45%	30	45.45%
Atypical lymphocytes	36	54.56%

Table 6: Platelet Profile (n = 66)

<i>Platelet Count (per cumm)</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<20,000	03	4.54 %
21,000-50,000	24	36.36 %
51,000-1,00,000	25	37.87 %
1,00,000-1,50,000	10	15.15 %
>1,50,000	04	6.06 %

Laboratory investigations revealed that the most common haematological abnormality was thrombocytopenia in 52(78.78%) patients. (platelets count <100,000 per cu mm.) followed by leucopenia (total leucocyte count <4000) in 24 (36.36%) patients. In 27 (40.9%) patients platelet count was below 50000/cumm. at the time of presentation. Atypical lymphocytosis was reported in 36 (54.56%) cases. Leucopenia was seen in 24 (36.36%) patients and lymphocytosis in 30(45.45%) patients.

Discussion

Dengue viral infections are the major cause of morbidity and mortality in tropical and subtropical countries. The routine hematological examination forms an important investigation for the management of such patients and also in few cases it helps to predict the diagnosis. Based on the clinical and laboratory parameters dengue is classified into milder dengue fever and severe dengue hemorrhagic fever (DHF). Presence of high continuous fever, hemorrhagic manifestation, hepatomegaly, platelet count less than 1 lakh and hemoconcentration more than 20% quantifies for the diagnosis of DHF³.

A range of hematological parameters are observed in dengue fever, most common being thrombocytopenia, presence of atypical lymphocytes, neutropenia and increased hematocrit more than 20%⁵. In the present study thrombocytopenia was the most frequent abnormality observed constituting 79% and the findings are consistent to the literature²⁺⁶. Thrombocytopenia is due to the direct and antibody mediated destruction of the platelets and megakaryocytes and the suppression of the bone marrow by virus⁵ as well.

Hemoconcentration is an abnormality observed in the disease measured by increased HCT. Leucopenia and neutropenia are well established haematological abnormality due to the direct

marrow suppression by the virus⁴. The findings of the present study are consistent with the literature.^{2,4,5} Atypical lymphocytes are seen in 36(54.36 %) of patients. However atypical lymphocytes are seen as a non specific response to any viral infection⁴.

Banerjee et al.² in their study observed normocytic normochromic anaemia in 11% patients 19% of patients showed thrombocytopenia and leucopenia in 26% of cases. Batra et al¹³. Observed haemoglobin <10% in 57% cases, 43% showed leucopenia and neutropenia in 20% of patients. The observation of present study is in consistent with literature^{4,10,11}

Diagnosis of dengue fever is established by serological examination. In the identification of NS1 antigen and IgM antibody establishes the acute infection with dengue (as done in present study)². However false positive reaction are seen with other flavivirus infection². Presence of IgG antibodies indicate carrier status and is needed to know the disease burden in geographic area. Molecular diagnostic method like RT- PCR and Isothermal RNA – specific amplification can also be used³.

Conclusion

Thrombocytopenia is the most common hematological change observed with Dengue fever. Others are increased haematocrit, leucopenia, neutropenia and presence of atypical lymphocytes. These indicators, if rightly and timely assessed, can be of value for better care of dengue patients.

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