

# A Prospective Assessment of Clinic- Hematological Profile of the Patients Suffering from Dengue Fever

Nilashish Dey

Senior Resident, Department of General Medicine, Seikh Bhikhari Medical College, Hazaribagh, Jharkhand, India

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Corresponding author: Dr. Nilashish Dey

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## Abstract

**Aim:** The aim of the study was to Assessment of clinical and hematological profile in dengue fever.

**Methods:** A prospective study was conducted in the department of General medicine, Seikh Bhikhari Medical College, Hazaribagh Jharkhand, India for 1 year. Total 100 patients 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.

**Results:** Most of the cases (44%) were seen in the 20-30 year age group followed by 40-50 years 21%, 30-40 years 14%. Majority of the patients were males 64 (64%) compared to females, 36 (36%). Fever was the most common presentation and was seen in 50 cases (50%) cases and followed by Fever and Myalgia 12%, Myalgia 10%, Petechiae 9%. Present study showed hemoglobin range of 6.5 gm% to 16.5 gm%. 46 (46%) cases showed Hb of 9-12 gm %, followed by 31(31%) cases showed Hb of 12-15 gm %, 8(8%) had Hb of below 9 gm % and 15 (15 %) had Hb of above 15 gm%. In the present study, 55(55 %) cases showed hematocrit of 25-35% and 27 (27 %) showed hematocrit of 35-45%. Raised hematocrit (>45%) was noted in 18(18%) of patients at presentation. The total leukocyte count ranged from 1500 cells/cumm to >11000 cells/cumm. Leucopenia with less than 4000 cells/cumm was present in 20 (20%) cases , count of 4000- 11000 cells/cu mm seen in 62(62%) cases and >11000/cumm was seen in 18 cases (18%). In the present study out of 100 cases of dengue fever, 87% cases had thrombocytopenia and 13% cases had severe thrombocytopenia (< 20,000/cumm) with bleeding manifestations.

**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. This facilitates early treatment and aggressive fluid replacement therapy with good nursing care so that fatality rates can be reduced.

**Keywords:** Hemoconcentration, leucopenia

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## Introduction

Dengue is the most rapidly spreading mosquito-borne viral disease of mankind, with a 30 fold increase in global incidence

over the last five decades. It is a major public health concern throughout the tropical and subtropical regions of the

world. Almost half the world's population lives in countries where dengue is endemic. According to WHO (World Health Organization), about 50-100 million new dengue infections are estimated to occur annually in more than 100 endemic countries, with a steady increase in number of countries reporting the disease.[1] Dengue is the most rapidly spreading mosquito-borne viral disease of humankind, with a 30-fold increase in global incidence over the past five decades. It is a major public health concern throughout the tropical and subtropical regions of the world. Almost half the world's population lives in countries where dengue is endemic. According to the World Health Organization (WHO), about 50–100 million new dengue infections are estimated to occur annually in more than 100 endemic countries, with a steady increase in the number of countries reporting the disease. Approximately 1.8 billion (>70%) of the population at risk for dengue worldwide live in member states of the WHO South-East Asia Region (SEAR) and Western Pacific region, which bear nearly 75% of the current global disease burden due to dengue. Of the 11 countries of SEAR, 10 countries including India are endemic for dengue[2] Over the past two decades, there has been a global increase in the frequency of DF, dengue hemorrhagic fever (DHF), and its epidemics, with a concomitant increase in disease incidence. Various factors responsible for the resurgence of dengue epidemic are as follows: (i) Unprecedented human population growth; (ii) unplanned and uncontrolled urbanization; (iii) inadequate waste management; (iv) water supply mismanagement; (v) increased distribution and densities of vector mosquitoes; (vi) lack of effective mosquito control which has increased movement and spread of dengue viruses and development of hyperendemicity, and (vii) deterioration in public health infrastructure.[3] "Dengue" is a Spanish altered word evolved from the roots in the Swahili language as "Kidinga"[4] An estimated 50 million dengue

infections occur worldwide annually and approximately 2.5 billion people, i.e., two-fifth of world's population in tropical and subtropical countries are at risk. The reported case fatality rate in India is 3–5%.[5,6] Most developing countries have epidemics of febrile illnesses including typhoid, measles, leptospirosis, and severe acute respiratory distress syndrome that can be confused with dengue due to similar clinical features.[7] Of biochemical variables, the most frequent changes occur in liver function tests such as in serum aspartate aminotransferase (AST), serum alanine aminotransferase (ALT), Gamma-glutamyl transpeptidase and alkaline phosphatase levels, and serum albumin concentrations.[8,10] 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 Aedes mosquito bites an individual in the viremia phase, viral replication (extrinsic incubation) begins in the vector from eighth to twelve days. In humans, the incubation period ranges from 3 to 15 days (intrinsic incubation) with an average of 5 days.[11]

### Materials and Methods

A prospective study was conducted in the Department of General medicine, Seikh Bhikhari Medical College, Hazaribagh, Jharkhand, India for 1 year.

### Methodology

Total 100 patients 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. 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. Febrile patients with positive NS1 antigen or IgM or both on rapid card tests. IgG may be positive or negative were include in this

study. 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 > 20% of normal was considered as hemoconcentration. Leukopenia was taken as total leucocyte count <4,000/mm<sup>3</sup>. Thrombocytopenia was taken as platelets count <1,00,000/mm<sup>3</sup>. Biochemical parameters included serum Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), were done on Cobas c 311 from Roche (Hitachi) biochemistry machine.

### Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (microsoft excel 2009) and then exported to data editor page of SPSS version 24.0 (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 (44%) were seen in the 20-30 year age group followed by 40-50 years 21%, 30-40 years 14%. Majority of the patients were males 64 (64%) compared to females, 36 (36%). (Table 1). Fever was the most common presentation and was seen in 50 cases (50%) cases and followed by Fever and Myalgia 12%, Myalgia 10%, Petechiae 9%, Fever and Skin rashes, Nausea and vomiting and Fever and Itching.(Table 2). Present study showed hemoglobin range of 6.5 gm% to 16.5 gm%. 46 (46%) cases showed Hb of 9-12 gm %, followed by 31(31%) cases showed Hb of 12-15 gm %, 8(8%) had Hb of below 9 gm % and 15 (15 %) had Hb of above 15 gm% (Table – 3). In the present study, 55(55 %) cases showed hematocrit of 25-35% and 27 (27 %) showed hematocrit of 35-45%. Raised hematocrit (>45%) was noted in 18(18%) of patients at presentation. The total leukocyte count ranged from 1500 cells/cumm to >11000 cells/cumm. Leukopenia with less than 4000 cells/cumm was present in 20 (20%) cases , count of 4000- 11000 cells/cu mm seen in 62(62%) cases and >11000/cumm was seen in 18 cases (18%) as per Table 4. In the present study out of 100 cases of dengue fever, 87% cases had thrombocytopenia and 13% cases had severe thrombocytopenia (< 20,000/cumm) with bleeding manifestations. Serum AST and ALT were elevated in 68 (68%) cases and were normal in 32(32%) cases. In the present study, hepatomegaly was noted in 33 (33 %) and splenomegaly was seen in 13(13%) of cases.

**Table 1: Demographic Profile of Patients**

Gender	No. of patients =100	%
Male	64	64
Female	36	36
Age (Years)		
Below 20	9	9
20-30	44	44
30-40	14	14
40-50	21	21

50-60	9	9
Above 60	3	3
Total	100	100%

**Table 2: Distribution of Clinical features**

Clinical features	No. of cases	%
Fever	50	50
Myalgia	10	10
Fever and Myalgia	12	12
Headache	3	3
Nausea and vomiting	6	6
Fever and Skin rashes	8	8
Petechiae	9	9
Fever and Itching	2	2
Total	100	100%

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

Hemoglobin level			Hematocrit		
Hb (gm/dl)	No. of cases	%	Hct (%)	No. of cases	%
Below 9	8	8	Below 25	-	-
9-12	46	46	25-35	55	55
12-15	31	31	35-45	27	27
Above 15	15	15	45-55	18	18
Total	100	100%	Total	100	100%

**Table 4 : Distribution of cases according to total leukocyte count and platelet count**

Total leukocyte count			Platelet count		
TLC (cells/cumm)	No. of cases	%	Platelet (cells/cumm)	No. of cases	%
< 1500	-	-	<20,000	13	13
1500-4,000	20	20	20,000-50,000	53	53
4000-11,000	62	62	50,000-1.4 lakh	19	19
>11,000	18	18	>1 .5 lakhs	15	15
Total	100	100%	Total	100	100%

## Discussion

The incidence and geographical distribution of dengue have increased due to increase in global temperature and increased population, unplanned urbanization, inefficient mosquito control, and lack of health care facilities.

In our study Most of the cases (44%) were seen in the 20-30 year age group followed by 40-50 years 21%, 30-40 years 14%. Deshwal, et al.[12] studied a total of 515

patients of Dengue. In their study too maximum patients were in 21-40 year age group (62.91%). Vibha, et al.[13] studied 100 patients, and observed 49 (49%) to be in the 15 to 25 year age group followed by 33 (33%) cases in the 26 to 35 years age group. Meena, et al.[14] did a randomized study of 100 patients with Dengue fever. According to age, maximum cases (29%) were in 21-30 years and rest (27%) were in 15-20 years, (21%) were in 31-40 years, (16%) were in 41-50 years and (7%) in 51-

60 years. Ahmed, et al.[15] (n=205) observed the age range for dengue as 10-65 years and the mean age was 31.29 years (SD±13.65). Our findings compare well with the observations of the above authors.

Majority of the patients were males 64 (64%) compared to females, 36 (36%). Deshwal, et al.[12] and Vibha, et al.[13] too observed a male predominance in their studies with 72.8% and 70% male patients respectively. The male to female ratio was 1.7:1 in Vibha, et al.[13] study. In the study by Ahmed, et al.[15] the number of males was 193 (94.15%), while females were 12 (5.85%) with male to female ratio of 9:1 approximately. Meena, et al.[14] (n=100) also observed a male predominance with 63 cases (63%) and 37 (37%) female patients. Our findings correlate well with the above authors. The male predominance can be explained by the fact that usually it's the male population that has excess outdoor activity and the likelihood of being exposed to the vector mosquito bites.

Fever was the most common presentation and was seen in 50 cases (50%) cases and followed by Fever and Myalgia 12%, Myalgia 10%, Petechiae 9%, Fever and Skin rashes, Nausea and vomiting and Fever and Itching. In the study by Deshwal, et al.[12] fever was universal followed by headache (94.75%), myalgia (90.67%), conjunctival injection (39.41%), morbilliform skin rash (37.86%), abdominal pain (24.46%), retro-orbital pain (18.25%), itching predominantly localized to palmar and plantar aspects of hands and feet (13.39%). In the study by Vibha, et al.[13] 95 (95%) of the patients had fever as presenting symptom. Other symptoms were myalgia in 70 (70%) cases, arthralgia in 60(60%) cases and headache in 50 (50%) cases.

Present study showed hemoglobin range of 6.5 gm% to 16.5 gm%. 46 (46%) cases showed Hb of 9-12 gm %, followed by 31(31%) cases showed Hb of 12-15 gm %, 8(8%) had Hb of below 9 gm % and 15 (15

% ) had Hb of above 15 gm%. In the study by Meena, et al.[14] hemoglobin ranged from 7.5-17.5 g/dl, mean hemoglobin value was 12.6 g/dl. Hemoglobin level more than 15gm% was seen in 6% cases. Dongre, et al.[16] observed hemoglobin level from 3.6 gm/dl to 16.7gm/dl with a mean of 11.9 gm/dl.

In the present study, 55(55 %) cases showed hematocrit of 25-35% and 27 (27 %) showed hematocrit of 35-45%. Raised hematocrit (>45%) was noted in 18(18%) of patients at presentation. Deshwal, et al.[12] observed raised hematocrit of >47% in 20.7% of patients at presentation. Vibha, et al.[13] observed > 40% hematocrit in 28 (28%) cases. The mean hematocrit value of dengue positive cases in our study was 40%. In DHF and DSS, an increase in hematocrit levels was noted and was above 45%. Dongre, et al.[16] observed an increased hematocrit of > 40% in only 16 patients.

The total leukocyte count ranged from 1500 cells/cumm to >11000 cells/cumm. Leucopenia with less than 4000 cells/cumm was present in 20 (20%) cases, count of 4000- 11000 cells/cu mm seen in 62(62%) cases and >11000/ cumm was seen in 18 cases (18%).

In Deshwal, et al.[12] study leucopenia was noticed in around 20.19% of cases. In Meena, et al.[14] study total leukocyte count ranged from 1310 to 16700 cell/mm<sup>3</sup>, with mean total leukocyte count of 4701 cells/cumm. A total leukocyte count of less than 4,000 cell/cumm was present in 51 (51%) patients whereas, a total leukocyte count of more than 11,000 cell/cumm was present in 4 (4%) patients. Dongre, et al.[16] observed leucopenia (total leucocyte counts <4000/cumm) in 81 cases and normal count (count between 4000 to 11000/cumm) in 111 cases. Leucopenia with lymphocytosis was seen in 45 patients.

In the present study out of 100 cases of dengue fever, 87% cases had thrombocytopenia and 13% cases had

severe thrombocytopenia (< 20,000/cumm) with bleeding manifestations. Deshwal, et al.[12] observed a platelet count of 50,000/cumm at presentation in 69.5% of cases, though it kept on falling further during hospitalization under observation. In their study minimum platelet count noted was 8,000/cumm. In Meena, et al.[14] study, (n=100), 90 (90%) cases had thrombocytopenia, in which 61 patients had platelet count between 20,000-60,000. Out of these 61 patients, seven patients (11.47%) had bleeding manifestation. Dongre, et al.[16] observed thrombocytopenia, platelet count <10,000 in 112 patients. Six cases had counts less than 20000/cumm, 32 cases had counts between 20,000- 50,000/cumm, 42 cases had counts between 50,000-75000/cumm and 129 cases had counts more than 75000/cumm. Serum AST and ALT were elevated in 68 (68%) cases and were normal in 32(32%) cases. Deshwal, et al.[12] noted raised liver serum transaminases in 88.54% of their patients. In the present study, hepatomegaly was noted in 33 (33 %) and splenomegaly was seen in 13(13%) of cases. Deshwal, et al.[12] too reported hepatomegaly in 14.75% and splenomegaly in 13.20% of their cases.

### 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. This facilitates early treatment and aggressive fluid replacement therapy with good nursing care so that fatality rates can be reduced.

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