Original Research Article

Prospective study on the clinico-hematological profile of dengue fever patients in Navi Mumbai

Prachi Sankhe, Priyanka Jadhav*, Praveen Meduri

Department of General Medicine, D. Y. Patil Hospital and Medical College, Navi Mumbai, Maharashtra, India

*Correspondence:
Dr. Priyanka Jadhav,
E-mail: priyanka.jadhav@dypatil.edu

ABSTRACT

Background: It has been seen that epidemiology and clinical presentation of dengue infection differs significantly across geographical areas. The present study was done to study clinico-hematological profile of patients with dengue fever in Navi Mumbai, Maharashtra.

Methods: This prospective observational study was conducted at a tertiary level teaching hospital in Navi Mumbai. All patients were observed over their entire duration of their hospital stay (up to 7 days). We included adult patients of both gender (males or females) who were admitted with clinically and serological diagnosed dengue fever, consenting to participate in the study. The clinical, laboratory and radiological findings of the patients were noted.

Results: All 80 patients presented with fever while 71.25% had myalgia. Retro-orbital pain, rash and vomiting was observed in 38%, 26% and 26% respectively, whereas 23.75% patients were having cough and bleeding from any site. Three fourths of the patients were diagnosed with dengue, 18.75% and 6.25% were diagnosed with DHF and DSS. respectively. Hepatosplenomegaly was increasing from day 1 (9%) to 6th (60%) and 7th (60%) day. Mean haemoglobin levels and haematocrit started increasing from second day onwards, while WBC count and platelet count increased gradually from first day onwards. Splenomegaly was diagnosed in 3.75% of patients while hepatosplenomegaly and fatty liver was observed in 8.75% and 2.5% respectively. There were two deaths, both were cases of DSS.

Conclusions: Almost all the patients included in our study showed both haematological and biochemical abnormalities.

Keywords: Dengue, Hematological, Outcome, Mortality

INTRODUCTION

Dengue is currently regarded globally as the most important mosquito borne viral diseases presenting with varied symptomatology.[1] Dengue virus causes a spectrum of illness ranging from in apparent, self-limiting classical dengue fever (DF) to life threatening dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Recently, it has 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.[2] 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. Doke et al mentioned that epidemiology and clinical presentation of dengue infection differs significantly across geographical areas in India and there is a need to systematically collect data from various regions and study the nature and course of dengue infections.[3] This present study was done at a tertiary care hospital in Navi Mumbai, Maharashtra, to study clinico-hematological profile of patients with dengue fever.

METHODS

Study design and sampling

This prospective observational study was conducted at DY Patil Hospital and Medical College, Navi Mumbai. The study was initiated after obtaining the permission from the Institutional Ethics Committee. The study was conducted for a period of one year (January 2019 to December 2019) from the date of obtaining the permission from the Institutional Ethics Committee. All patients were observed over their entire duration of their hospital stay (up to 7 days). We included adult patients of both gender (males or females) who were admitted with clinically and serological diagnosed dengue fever, consenting to participate in the study. Patients with other concomitant febrile illnesses including malaria, enteric fever, chikungunya fever, etc were excluded from the study. We also excluded patients with a known history of haematological disorders or drugs modifying haematological parameter and those with comorbid severe systemic disease or any other terminal illness.

Data collection and data analysis

Once identified as a study participant, based on the inclusion and exclusion criteria, a detailed history of every patient was taken after obtaining a written consent. They were then subjected to a detailed clinical examination and the observations were carefully noted. Patient's data was collected in the Case Record/Report Form (CRF) over a period of 7 days considering the fact that most of patients recovered in a week. For serological investigations, 2 ml patient blood was collected in red colored vacuatainer for IgM and IgG testing by Enzyme Linked Immunosorbent Assay (ELISA) method and for NS1-Ag (non-structural protein-1 antigen) test. For routine investigations, 2 ml venous blood sample was collected in EDTA tubes from the cubital vein from all the patients. Laboratory investigations like haemoglobin (Hb), total and differential leucocyte counts (TLC and DLC), platelet count, haematocrit (HCT) and liver function tests (LFT) were sent for all patients. Ultrasonography of abdomen was done for all patients.

Descriptive analysis was performed in open-source Epi-Info software.[4] Qualitative data were presented as frequency and percentage and quantitative data were described as mean and standard deviation.

RESULTS

A total of 80 dengue patients from 18-65 years of age were observed during the study, with a mean age of study population was 33±12 years, 66% being male patients (Table 1). All patients presented with fever while 71.25% had myalgia. Retro-orbital pain, rash and vomiting was observed in 38%, 26% and 26% respectively, whereas 23.75% patients were having cough and bleeding from any

site. Abdominal pain, joint pain, breathlessness and loose stools were associated with 20%, 6.25%, 5% and 3.75% of the patients respectively. Three fourths of the patients were diagnosed with dengue, 18.75% and 6.25% were diagnosed with DHF and DSS. respectively. Figure 1 describes the vitals of the patients as observed over first seven days of admission. On day 1, mean temperature was 37.55±0.61°C which reduced to 37°C at day 6 and was steady on day 7. Mean respiratory rate declined from day 1 to day 7. Pulse rate gradually decreased from day 1 (84.31±9.57 bpm) to 5th day (82.00±5.44 bpm). A raise in pulse was observed on 6th day (85.20±8.20 bpm) which reduced to 79.60±3.85 bpm on day 7. The blood pressure steadily increased over these seven days.

**Table 1: Baseline characteristics of the patients included in the study.**

Variables	N	Percentage
Age groups		
Less than 20	12	15
21 to 40	34	43
41 to 60	26	33
More than 60	8	10
Gender		
Male	53	66
Female	27	34
Symptoms		
Fever	80	100
Myalgia	57	71
Retro-orbital pain	30	38
Rash	21	26
Vomiting	21	26
Bleeding from any site	19	24
Cough	19	24
Abdominal pain	16	20
Joint pain	5	6
Breathlessness	4	5
Loose stools	3	4
Diagnosis		
Dengue	60	75
Dengue hemorrhagic fever	15	19
Dengue shock syndrome	5	6

As shown in table 2, highest incidence of hepatomegaly was 55% in patients on day 5. Hepatosplenomegaly was increasing from day 1(9%) to 6th (60%) and 7th (60%) day. Crepitations were decreasing during the observational period. First day, 23% cases showed crepitation's while from 5th day onwards no crepitations were observed. Figure 2 describes the haematological parameters of the patients. Mean haemoglobin levels and haematocrit started increasing from second day onwards, while WBC count and platelet count increased gradually from first day onwards. SGPT levels increased on day 7 to 68 IU from 59.21 IU of day 1 while rise in SGOT levels was observed on 7th day (135 IU) as compared to day 1 (90.75 IU).

Table 2: Serial follow-up of the clinical manifestations and systemic examination.

Day	Hepatomegaly N (%)	Splenomegaly N (%)	Hepatosplenomegaly N (%)	Crepitations N (%)	Drowsiness N (%)	Disoriented N (%)	No abnormality detected N (%)
1 (n=80)	16 (20)	03 (4)	07 (9)	18 (23)	2 (2.5)	0 (0)	48 (60)
2 (n=74)	16 (22)	02 (3)	06 (8)	18 (24)	0 (0)	2 (2.5)	42 (57)
3 (n=52)	15 (29)	02 (4)	06 (12)	09 (17)	0 (0)	0 (0)	28 (54)
4 (n=29)	10 (34)	01 (3)	05 (12)	02 (7)	0 (0)	0 (0)	11 (38)
5 (n=11)	06 (55)	0 (0)	03 (27)	0 (0)	0 (0)	0 (0)	02 (18)
6 (n=5)	01 (20)	0 (0)	03 (60)	0 (0)	0 (0)	0 (0)	01 (20)
7 (n=5)	01 (20)	0 (0)	03 (60)	0 (0)	0 (0)	0 (0)	01 (20)
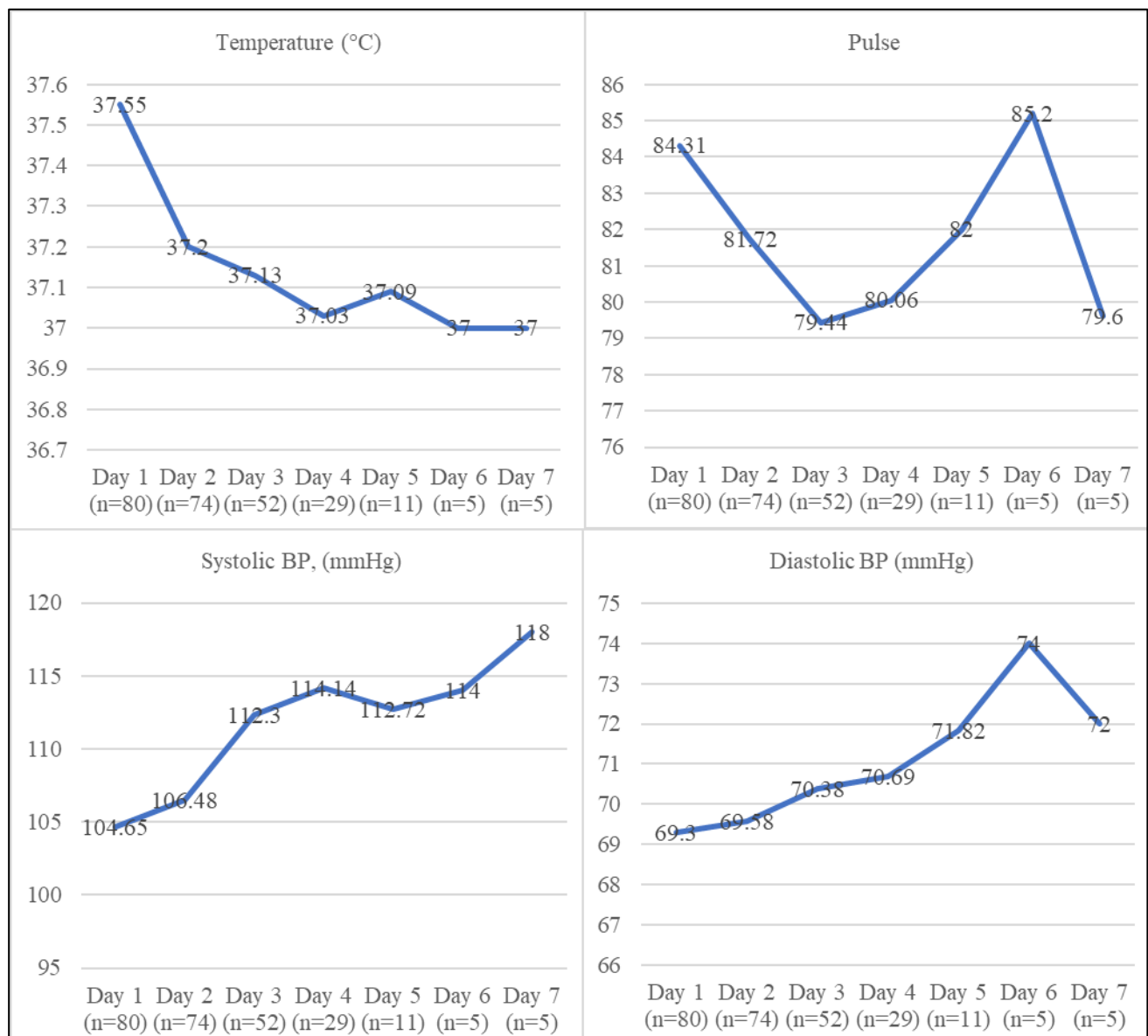
Figure 1: Serial measurements of vitals.
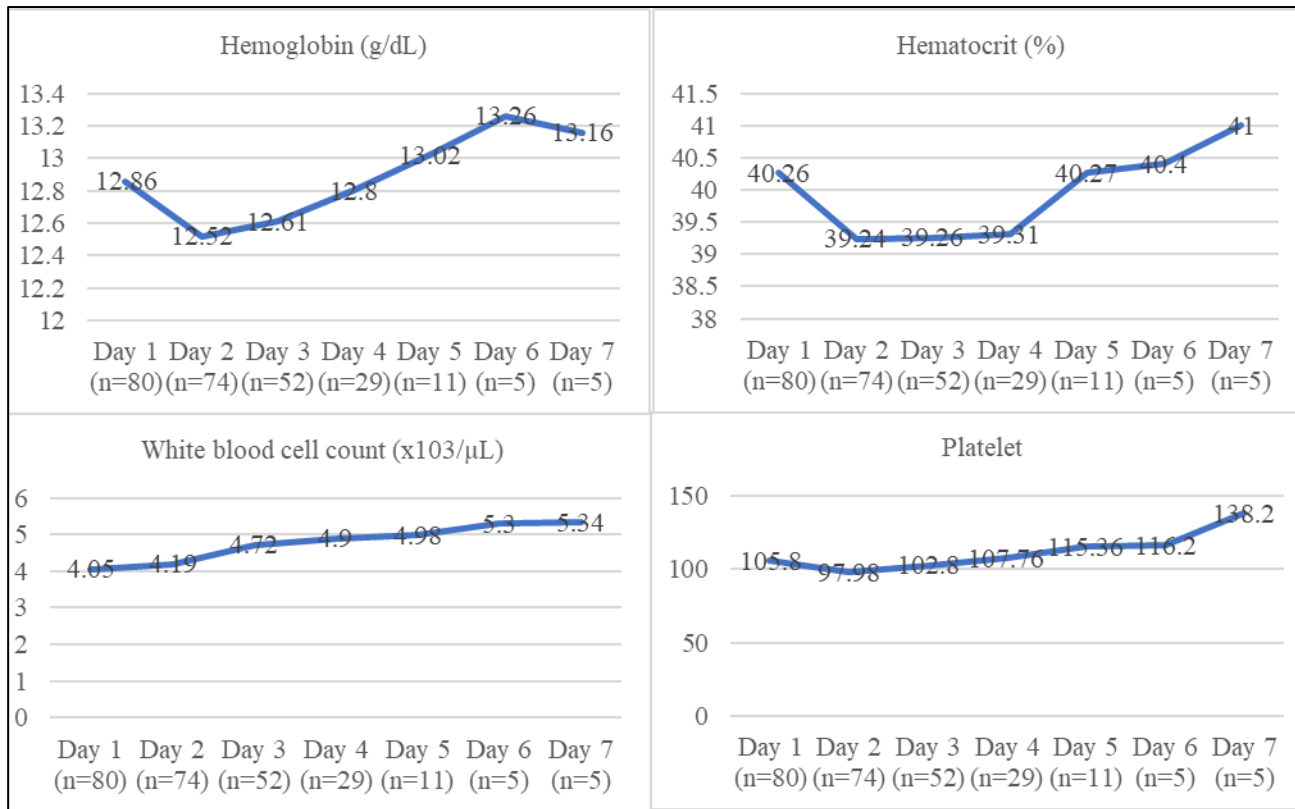
Figure 2: Serial measurements of the haematological profile of the patients.

On day 7, rise in urea (28mg/dL) and serum creatinine (1.17 mg/dL) levels was detected. Initially urea and creatinine levels were 21.51 mg/dL and 1.09 mg/dL respectively. Chest X-ray did not show any pathological changes in 76% of the patients. Ultrasound abdomen on day 1 found 18.75% and 17.5% patients with ascites and hepatomegaly respectively (Table 3). Splenomegaly was diagnosed in 3.75% of patients while hepatosplenomegaly and fatty liver was observed in 8.75% and 2.5% respectively. Simple renal cyst was seen in one case. There were two deaths, both were cases of DSS.

Table 3: Ultrasound abdomen examination findings on day 1.

USG finding	N	Percentage
Normal	47	59
Ascites	15	19
Hepatomegaly	14	18
Splenomegaly	3	4
Hepatosplenomegaly	7	9
Fatty liver	2	3
Hematoma of liver	2	3
Simple renal cyst	1	1

DISCUSSION

A rising incidence of dengue fever outbreaks has been reported over the past few years from various states of India which constantly threatens the health care system with respect to associated morbidity and mortality, loss of work and out of pocket expenditure. Dengue is endemic in India and we conducted this study to investigate the clinical and haematological profile of patients presenting to our hospital. We observed that 21 to 40 years was the most common age group and the mean age of the patients was 33 years. Males comprised 66% of the study population. Oza et al reported the mean age of dengue patients to be 24 years with 62% being males.[5] Prasad and Kumari found 61% of their patients to be between the age of 18 and 30 years and 76% were males.[6] Very few studies from India have reported a higher proportion of female dengue patients. Nair et al reported 53% of their study population of dengue patients to be females.[7]

Most frequent symptoms in the present study were fever (100%) and myalgia (71%). Loose stools are an uncommon symptom in dengue fever and was observed in 4% of the patients. Among systemic manifestations, we observed that hepatomegaly was the commonest on day 1 of admission. This continued till day 5, after which hepatosplenomegaly became the most common systemic finding. Nair et al also reported fever and body ache to be the most common symptoms. They authors reported symptoms of diarrhoea in 10% of the patients. Similar to our findings, Oza and colleagues reported fever and myalgia to be the most common presenting symptoms. A high incidence of gastrointestinal symptoms like nausea and vomiting were reported in a study from Kerala also and is attributed to hepatomegaly and serosal inflammation.[8] In our study, USG abdomen revealed

ascites in 19% of our patients and hepatomegaly in 18%. Based on USG abdomen Prasad and Kumari reported pleural effusion in 50% of the patients, hepatomegaly in 50% as well and splenomegaly in 66%% of the patients.

In the present study, the final diagnosis of dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS) was made in 19% and 6% respectively. Oza et al reported 9.6% of the patients to be diagnosed as DHF and none had DSS. Prasad and Kumari reported that out of 120 patients, 74 (61.6%) patients were diagnosed to have DF, 46 (38.3%) patients were diagnosed to have DHF. In Meena et al study, out of 100 patients, 84 (84%) patients were diagnosed to have DF, 14 (14%) patients were diagnosed to have DHF and 2 (2%) patients were diagnosed to have the more severe dengue shock syndrome (DSS) based on WHO criteria.[9]

We observed that mean haemoglobin levels and haematocrit started increasing from second day onwards, while WBC count and platelet count increased gradually from first day onwards. None of the patients had haemoconcentration. Prasad and Kumari observed haemoconcentration in 50/120 (41.6%%) of patients with DHF. Khatroth et al observed raised haematocrit in 16.6% of patients at presentation.[10] Dengue fever and DHF are associated with the capillary leak syndrome that results in haemoconcentration.

CONCLUSION

Dengue continues to pose a serious challenge to the clinicians, microbiologists and health care workers. Almost all the patients included in our study showed both haematological and biochemical abnormalities. This study has revealed a varied clinical profile of dengue fever along with the typical symptoms and some atypical symptoms have also been observed.

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