

CLINICAL AND HEMATOLOGICAL PROFILE OF PATIENTS WITH DENGUE FEVER AT A TERTIARY CARE HOSPITAL: AN OBSERVATIONAL STUDY

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ABSTRACT

Objectives: The objective of this study was to analyze the clinical and hematological profile and studying outcome of patients having dengue fever (DF).

Methods: This was an observational study conducted in the Department of General Medicine, Basveshwar Teaching and General Hospital, Kalaburagi, India. One hundred patients with DF were included in this study. Demographic details were obtained, detailed history was taken, and clinical examination was done. The cases were classified into dengue without warning signs, dengue with warning signs, and severe dengue as per world health organization classification of dengue. Clinical features, hematological profile, and outcome were assessed in studied cases. SSPE 21 software was used for statistical analysis. P value less than 0.05 was taken as statistically significant.

Results: Out of these 100 cases, there were 62 (62.00 %) males and 38 (38 %) females with a M: F ratio of 1: 0.61. The mean age of male and female patients was found to be comparable with no statistically significant difference in the age group ($p=0.391$). Out of 100 studied cases, non-severe dengue was seen in 56 (56%) patients whereas 31 (31.00%) patients had non-severe dengue with warning signs and remaining 13 (13.00%) patients had severe dengue. The most common presenting complaint was fever which was present in all patients (100%). The other complaints included headache (82%) nausea and vomiting (74%). Positive tourniquet test was seen in 7 (7%) patients and hypotension, decreased pulse pressure, and altered sensorium were seen in 5 (5%) patients each. In cases of dengue with warning signs or severe dengue out of 44 patients, 21 (21%) patients required blood component therapy and 5 (5%) patients landed up in shock despite fluid therapy. Two (2%) succumbed to complications of severe dengue.

Conclusion: Comprehensive understanding of clinical features, hematological profile, and warning signs in DF is essential for timely diagnosis and effective management. With early diagnosis and proper management, the outcome of patients is usually good.

Keywords: Dengue fever, Clinical picture, Hematological profile, Outcome.

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INTRODUCTION

Dengue fever (DF) continues to pose a significant public health challenge globally. The resurgence of DF has become a pressing concern for healthcare systems worldwide. Its timely diagnosis and appropriate management, particularly in cases of dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), is important to prevent serious complications. The World Health Organization (WHO) estimates that around 390 million dengue infections occur every year, with almost half of the world's population at risk [1]. Despite substantial efforts to control its spread, the incidence of dengue has been steadily rising. Its increasing incidence necessitates an in-depth understanding of its clinical and hematological manifestations for effective management.

Dengue virus is the causative agent for dengue which is primarily transmitted by the *Aedes aegypti* mosquito. The virus exists in four distinct serotypes namely DENV-1 to DENV-4. Each one of these serotypes is capable of causing full spectrum of the disease. The immune response to dengue virus triggers a release of inflammatory cytokines and activation of complement pathways. Continue viral replication and immune response contributes to the characteristic clinical manifestations of DF [2].

DF is classified into three categories, namely, DF, DHF, and DSS. DF is the mildest form of the spectrum of the disease and is generally characterized by fever, headache, pain, and rash. All these symptoms are self-limiting [3]. While DF is often a self-limiting illness, severe cases can lead to life-threatening complications. DHF and DSS are associated with increased vascular permeability that leads to plasma leakage and shock. Bleeding manifestations which may be seen in DHF include

gastrointestinal bleeding and epistaxis and, in severe cases, patients may develop life-threatening complications including disseminated intravascular coagulation [4]. Multi-organ involvement, such as liver dysfunction and acute kidney injury, may further complicate the clinical course. Identifying these complications early in the disease process is vital for initiating appropriate interventions and improving patient outcomes [5].

Prompt DF is crucial for timely intervention. Although the diagnosis of dengue is usually suspected on the basis of clinical findings in endemic areas, laboratory investigations play a pivotal role in confirming the diagnosis and assessing disease severity [6]. Common tests for the confirmation of diagnosis include the detection of viral RNA through polymerase chain reaction and serological tests such as enzyme-linked immunosorbent assay (ELISA) [7]. Although not required for the diagnosis, a complete blood count (CBC) to monitor changes in hematological parameters such as rise in hematocrit and decrease in platelet count is necessary to monitor the patients. Thrombocytopenia is a hallmark finding in DF and serves as a key indicator of disease severity [8].

The management of DF is usually symptomatic since there is no specific antiviral therapy available [9]. Management is usually supportive and may consist of paracetamol for fever, non-steroidal anti-inflammatory drugs for severe pain and arthralgia, and maintaining adequate hydration. In cases of DHF and DSS, proper monitoring and replacement of interstitial fluid loss and management of hypovolemic shock is crucial. If properly managed cases with DHF and DSS also have favorable outcome in majority of the cases [10].

We undertook this study to analyze the clinical profile and hematological findings of the patients having DF.

METHODS

This was an observational study conducted in the Department of General Medicine, Basveshwar Teaching and General Hospital, Kalaburagi, India. One hundred patients with DF were included in this study. Duration of study was 1 year. Informed and written consent to be part of the study was taken from all the patients. OPENEPI software was used to calculate the sample size on the basis of a preliminary pilot study done on the subject of clinical features of DF with the aim of achieving 90% statistical power and a 95% confidence level. A sample size exceeding 80 was considered sufficient. Hence, we included 100 patients in our study.

Demographic details such as age as well as gender and occupation were noted. The cases were classified as per WHO classification of dengue (Table 1) [11].

A detailed history was obtained with respect to duration of illness and presence of any warning symptoms such as severe abdominal pain or restlessness. A thorough clinical examination was done in all the cases. Pulse rate, respiratory rate, and blood pressure were recorded. Laboratory investigations such as serological markers (IgG, IgM, and NS1), serum electrolytes, CBC, hepatic and renal functions, as well as coagulation profile were done in all the cases. An abdominal ultrasound was ordered in all the cases. The particular identification of gallbladder wall thickening, collection of fluid in gallbladder fossa, presence of pleural effusion, and ascites was requested from radiologist.

The statistical analysis was done with the help of SPSS 21.0 software. Chi-square tests were utilized for categorical data. For repeated observations, paired t-tests or repeated measures ANOVA were applied, depending on the suitability of the method. Microsoft office was used for preparation of charts and graphs. p<0.05 was taken as statistical significance.

Inclusion criteria

The following criteria were included in the study:

1. Patients diagnosed to be having DF on the basis of serological tests such as dengue IgG, IgM, and NS1 antigen.
2. Those who gave written informed consent to be part of study.
3. Age above 18 years.

Exclusion criteria

The following criteria were excluded from the study:

1. Those who refused consent.
2. Age <18 years.
3. Patients having clinical features similar to dengue but negative having serology for dengue.
4. Patients having conditions likely to give rise to interstitial fluid loss such as liver diseases, nephrotic syndrome, and hypoalbuminemia.
5. Pregnant women.

RESULTS

One hundred patients with DF were included in this study. Out of these 100 cases, there were 62 (62.00 %) males and 38 (38%) females with a M: F ratio of 1: 0.61 (Fig. 1).

The gender-wise age distribution of the patients showed that the most common affected age group was between 31 and 40 years (30.00%), followed by 21–30 years (24.00%) and 51–60 years (16.00%). Only 6 (6%) patients were below age of 20 years. The mean age of male and female patients was found to be 49.78±14.02 years and 46.42±11.21 years, respectively. The mean age of male and female patients was found to be comparable (Table 2).

Out of 100 studied cases, non-severe dengue was seen in 56 (56%) patients whereas 31 (31.00%) patients had non-severe dengue with

warning signs and remaining 13 (13.00%) patients had severe dengue (Table 3).

Table 1: Classification of dengue cases on the basis of the WHO classification

Category	Criteria
Dengue Without Warning Signs (D-W)	Fever and two of the following: Nausea, vomiting, rash, aches and pains, leukopenia, positive tourniquet test, and laboratory confirmed dengue.
Dengue With Warning Signs (D+W)	With the ability to tolerate adequate volumes of oral fluid replacement and pass urine at least once every 6 h. Patients with any of the following features: At least one of the following warning signs: Abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation, mucosal bleed, lethargy/restlessness, liver enlargement >2 cm, and increased HTC with concurrent decrease in platelet count ($\leq 100,000$ platelets/mm ³). OR At least one comorbid condition such as pregnancy, infancy, old age, diabetes mellitus, and renal failure. OR Social circumstances such as living alone and living far from hospital.
Severe dengue fever	Patients with any of the following features: Severe plasma leakage leading to shock or fluid accumulation leading to respiratory distress. Severe bleeding as evaluated by clinician. Severe organ involvement: Liver – AST or ALT ≥ 1000 IU/L, CNS – impaired consciousness. Involvement of heart and other organs.

Table 2: Age distribution of the affected cases

Age (In years)	Males		Females	
	No of cases	Percentage	No of cases	Percentage
<20 years	5	5.00%	1	1.00%
21–30 years	15	15.00%	9	9.00%
31–40 years	17	17.00%	13	13.00%
41–50 years	9	9.00%	2	2.00%
51–60 years	7	7.00%	9	9.00%
>60 years	9	9.00%	4	4.00%
Total	62	62.00%	38	38.00%
Mean Age	49.78±14.02 years		46.42±11.21 years	

p=0.2137 (Not significant)

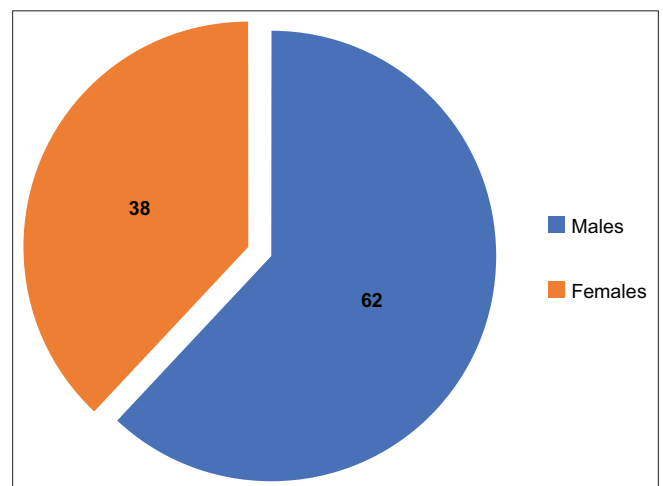


Fig. 1: Gender distribution of cases

Table 3: Severity of dengue fever in studied cases

Dengue type	Males		Females		Total	
	No Of Patients	Percentage	No Of Patients	Percentage	Numbers	Percentage
Non-severe dengue	35	35	21	21	56	56
Dengue with warning signs	19	19	12	12	31	31
Sever dengue	8	8	5	5	13	13
Total	62	62.00	38	38.00	100	100

The analysis of the cases on the presenting complaints showed that the most common presenting complaint was fever which was present in all patients (100%). The other complaints included headache (82%) nausea and vomiting (74%), skin rash (68%), and conjunctival injection (42%). Abdominal pain (31%), persistent vomiting (17%), and lethargy (12%) were other features (Table 4).

The analysis of patients for presence of warning signs showed that out of 100 patients, 16 (16%) patients had some or the other bleeding manifestations including mucosal bleeding, whereas restless and icterus were seen in 12 (12%) and 11 (11%) patients. Positive tourniquet test was seen in 7 (7%) patients and hypotension, decreased pulse pressure, and altered sensorium were seen in 5 (5%) patients each (Table 5).

The analysis of the patients on the basis of hematological parameters showed that the majority of the patients, there was some or the other form of hematological derangement. Most striking finding was thrombocytopenia. Mean platelet count of the studied cases was found to be 58.75 ($\times 1,000$)/ μL with minimum count being 15/($\times 1,000$)/ μL (Table 6).

The analysis of the patients on the basis of outcome showed that out of 56 (56%) patients with non-severe dengue, no patient landed up in complications such as shock and no patient required blood component therapy. All patients could be managed successfully by supportive measures. However, in cases of dengue with warning signs or severe dengue out of 44 patients, 21 (21%) patients required blood component therapy and 5 (5%) patients landed up in shock despite fluid therapy. Two (2%) succumbed to complications of severe dengue.

DISCUSSION

We undertook this observational study of 100 patients with dengue to analyze the clinical and hematological profile as well as outcome of patients. In our study out of 100 cases, there were 62 (62.00%) males and 38 (38%) females with a M: F ratio of 1: 0.61. The mean age of male and female patients was found to be comparable with no statistically significant difference in the age group ($p=0.391$). Chhotala and Suva conducted a study to analyze clinical manifestations of dengue cases admitted in the hospital [12]. The demographic details and gender distribution of patients were analysed. In this research, the predominant age range was 20–29 years, and the average age was 28.6 years, with a male-to-female ratio of 1.94:1. Fever was the most prevalent clinical manifestation, noted in all participants (100%), followed by headache (98%) and myalgia (97%). Vomiting was observed in 49% of the cases. Warning signs were identified in 28 out of 100 patients. The findings of the study suggest a higher susceptibility of males to symptomatic dengue compared to females. Similar male preponderance among cases of dengue was also reported by the authors such as Kumar *et al.* [13] and Anker and Arima [14].

Out of 100 studied cases, non-severe dengue was seen in 56 (56%) patients whereas 31 (31.00%) patients had non-severe dengue with warning signs and remaining 13 (13.00%) patients had severe dengue. The analysis of the cases on the presenting complaints showed that the most common presenting complaint was fever which was present in all patients (100%). The other complaints included headache (82%) nausea and vomiting (74%), skin rash (68%), and conjunctival

Table 4: Signs and symptoms in studied cases

Presenting complaints	Number of patients	Percentage of patients
Fever	100	100
Headache	82	82
Myalgia	79	79
Nausea and vomiting	74	74
Conjunctival injection	42	42
Skin rash	37	37
Abdominal pain	31	31
Arthralgia/arthritis	21	21
Persistent vomiting	17	17
Hepatomegaly	17	17
Mucosal bleed/petechia/purpura	16	16
Lethargy	12	12

Table 5: Presenting complaints in studied cases

Presenting Complaints	Number of patients	Percentage of patients
Bleeding manifestations	16	16
Restlessness	12	12
Icterus	11	11
Positive tourniquet test	7	7
Hypotension	5	5
Decreased pulse pressure	5	5
Altered sensorium	5	5

Table 6: Hematological profile of patients with dengue

Parameter	Mean (SD)	Minimum	Maximum
RBC (millions/cumm)	4.30 (0.75)	2.00	8.50
Hemoglobin (mg/dL)	13.80 (2.00)	1.80	8.00
Hematocrit (%)	43.2 (6.00)	27.00	10.00
Total leukocytes count ($\times 1,000$)	5.75 (2.25)	0.50	14.50
Platelets count ($\times 1,000$)/ μL	58.75 (3.00)	15.00	190.00
Serum urea (grams)	23.5 (15.50)	11.00	105.00
Serum creatinine (mg/dL)	0.80 (0.40)	0.20	4.50
Serum bilirubin (mg/dL)	0.90 (0.70)	0.20	5.20
SGOT (IU/L)	190.0 (150.0)	30.0	920.0
SGPT (IU/L)	145.0 (130.0)	20.0	720.0
ALP (IU/L)	125.0 (75.0)	50.0	410.0
Total protein (gm/dL)	6.2 (0.80)	3.80	8.20
Serum albumin	3.2	2.1	4.8

injection (42%). Abdominal pain (31%), persistent vomiting (17%), and lethargy (12%) were other features. Deshkar *et al.* conducted a study to determine seropositivity, and clinical picture of patients with dengue [15]. Blood samples were obtained from 15,606 individuals exhibiting symptoms resembling dengue, and serum was subsequently separated. All collected samples underwent detection of IgM antibodies using dengue MAC ELISA. The prevalence of dengue among suspected cases was determined to be 24.49% (3822 out of 15,606). The highest number of positive cases, totaling 1548 (40.50%), belonged to the age group of 0–10 years. Males (60.83%) were more affected than females (39.17%).

The peak incidence occurred during the months of August, September, October, and November. The predominant clinical features included fever, followed by myalgia, arthralgia, headache, and bleeding manifestations. Patients with DSS and dengue hemorrhagic fever exhibited a significant decrease in platelet count. Similar clinical features were also reported by the authors such as Saini *et al.* [16] and Karoli *et al.* [17].

In our study, positive tourniquet test was seen in 7 (7%) patients and hypotension, decreased pulse pressure and altered sensorium were seen in 5 (5%) patients each. Most striking hematological finding in our study was thrombocytopenia. Mean platelet count of the studied cases was found to be 58.75 ($\times 1,000$)/ μL with minimum count being 15/($\times 1,000$)/ μL . All patients could be managed successfully by supportive measures. However, in cases of dengue with warning signs or severe dengue out of 44 patients, 21 (21%) patients required blood component therapy and 5 (5%) patients landed up in shock despite fluid therapy. Two (2%) succumbed to complications of severe dengue. Singh *et al.* conducted a study to find out the clinical features and outcome of patients suffering from dengue [18]. The study included individuals aged 12 years and older who tested positive for dengue antigen or antibodies. All admitted patients in this category underwent thorough clinical examinations and investigations. Among them, 140 patients were identified with dengue infection. Thrombocytopenia emerged as the most frequent hematological abnormality, and common clinical findings included splenomegaly, hepatomegaly, and hepatosplenomegaly. Instances of renal, hepatic, and cerebral dysfunctions were observed. The study reported a mortality rate of 3.6%, with fatalities occurring in five patients. High mortality and unfavorable outcomes were associated with conditions such as encephalitis, shock, and acute respiratory distress syndrome. The mortality rate in this investigation was comparable to the findings of our study. Similar outcome of patients with DF is also reported by the authors such as Hasan *et al.* [19] and Kulkarni *et al.* [20]

CONCLUSION

A thorough knowledge of clinical and hematological features as well as warning signs in cases of DF is important for timely diagnosis and management. Identifying early symptoms and monitoring hematological profile will help in implementing appropriate interventions which can significantly impact patient outcomes, reducing the risk of severe complications.

CONFLICTS OF INTEREST

None.

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