

Original Research Article

A Study on Clinical and Hematological Profile of Dengue Fever in a Tertiary Care Hospital

Shamsunder Khatroth*

Assistant Professor, Department of General Medicine, MNR Medical College, Sangareddy, Telangana, India

*Corresponding author email: shamsunder_md@yahoo.in

	International Archives of Integrated Medicine, Vol. 4, Issue 8, August, 2017. Copy right © 2017, IAIM, All Rights Reserved. Available online at http://iaimjournal.com/	
	ISSN: 2394-0026 (P)	ISSN: 2394-0034 (O)
	Received on: 22-07-2017	Accepted on: 28-07-2017
	Source of support: Nil	Conflict of interest: None declared.
How to cite this article: Shamsunder Khatroth. A Study on Clinical and Hematological Profile of Dengue Fever in a Tertiary Care Hospital. IAIM, 2017; 4(8): 96-102.		

Abstract

Introduction: Dengue is one of the most important viral diseases especially in the tropical regions. This disease increases in incidence in the immediate post monsoon period coinciding with the breeding of mosquitos in the stagnant water. It has varied clinical presentation and more or less consistent abnormal laboratory values on complete blood count test.

Aim of the study: The aim of the study was to determine the clinical and hematological profile in patients with Dengue fever.

Materials and methods: This was a prospective study done in the department of General Medicine at Dr. Pinnamaneni Siddhartha Institute of Medical sciences and Research Foundation, Andhra Pradesh, over duration of 7 months. The study included 60 patients admitted in the hospital and all the cases were IgM dengue positive.

Results: There were 40 (66.6%) male and 20 (33.3%) female patients. Out of 60 patients, 30 (50%) were in age group of 20 to 30 years. Most of the cases were found in post monsoon period in September and October. In our study out of 60 cases of dengue fever, raised hematocrit (>47%) was noted in 10 (16.6%) of patients at presentation and 50 (83.3 %) cases had thrombocytopenia, in which 8 (13.3%) cases had < 20,000/cumm with bleeding manifestations.

Conclusion: Most common clinical presentation of Dengue fever is of fever with or without myalgia and presence of hepatosplenomegaly. Young adult males are more commonly affected. The most common laboratory abnormalities are of an increase in hematocrit, low total leucocyte count and low platelet count.

Key words

Dengue fever, Platelet count, Leucopenia, Dengue serology.

Introduction

The word dengue is believed to have originated from Swahili language “ki denga pepo”, which describes sudden cramp like seizure. The clinical symptoms suggestive of dengue virus infection were described as early as 265-420 AD in China. At that time the disease was associated with water and insects [1].

Dengue is one of the most important viral diseases especially in the tropical regions. According to the WHO almost 50 million people get dengue infection annually and WHO estimates almost half of the world’s population lives in countries having endemicity for dengue infection [2].

There are four serotypes of the dengue virus (DEN-1, DEN-2, DEN-3, DEN-4) that can cause the disease. It is a type of arbovirus (arthropod-borne viruses) that belongs to the genus flavivirus of the family flaviviridae [2, 3].

It is a well-known fact that this disease is transmitted by mosquitoes of the genus *Aedes aegypti*. Dengue has a variety of clinical presentations, where the patients can be completely asymptomatic to mild clinical features to high grade fever with viral syndrome or in the severest forms as dengue hemorrhagic fever (DHF) which can even be fatal [4]. Dengue virus infection has existed in India since a long time [5].

Most common clinical presentation of Dengue fever (DF) is of an acute febrile viral disease with headaches, bone, joint and muscular pains, rash and leucopenia. It is also known as break bone fever due to the severe bone pains [6].

Dengue hemorrhagic fever (DHF) is characterized by four major clinical manifestations: high grade fever, hemorrhagic phenomena, often with hepatomegaly and, in

severe cases, signs of circulatory failure. Severe plasma leakage in these patients can lead to hypovolemic shock and circulatory failure. This is called dengue shock syndrome (DSS) and can lead to death [7].

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 [8, 9].

Aim of the study

The aim of the study was to determine the clinical and hematological profile in patients suffering from Dengue fever.

Materials and methods

Ethical institutional permission was taken. This was a descriptive study with analysis of patients who were admitted for Dengue fever in the department of General Medicine at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, Krishna district, Andhra Pradesh for duration of 7 months. This study was conducted on 60 indoor patients admitted from beginning of September 2015 to end of March 2016.

Inclusion criteria

- Patients with serologically confirmed IgM positive dengue fever with or without purpuric rash admitted to Medicine ward.
- Both genders

Exclusion criteria

- Preexisting chronic diseases

- Pediatric age group was excluded
- Patients who were having mixed infections like Dengue fever and Malaria and where diagnosis was not confirmed were excluded from the study.

Methodology

A thorough clinical examination was done including complete clinical history, local and systemic examination in all cases included in the study.

All the routine investigations like complete blood count (hematology auto-analyser, sysmax xs-800i), peripheral blood film for cell morphology, thick and thin blood smear for malaria parasite, specific malarial antigen card test, random blood sugar, complete urine examination, were done. Dengue IgM and IgG by ELISA was done in all the cases. In a few cases chest X-ray PA view, liver function tests, renal function tests and ultrasonography of abdomen were also done.

For routine investigations venous blood was collected from cubital vein from all patients admitted with symptoms suggestive of dengue fever.

Evaluation of hematological parameters was done by collecting 2 ml samples in EDTA containers which were examined for Haemoglobin count, Haematocrit, Platelet count, Total leucocyte count, Differential leucocyte count. The analysis was done by the automated analyzer SYSMEX XT 1800i (3-part differential).

Activated partial thromboplastin time and prothrombin time (APTT/PT) was done by collecting 2 ml blood in sodium citrate anticoagulant containers. The analysis was done by ACL-7000 coagulation meter. Dengue was diagnosed by serology for IgM and IgG Enzyme Linked Immunosorbent Assay (ELISA) and by NS1-Ag (Nonstructural protein-1 antigen) positivity.

Dengue Day1 test kit was used to detect NS1 antigen and IgM and IgG antibodies. The test results were expressed as positives/negatives for antigen and both antibodies.

All the relevant clinical details such as presenting complaints, duration of symptoms, length of hospital stay, presence or absence of purpuric rash, leucopenia, thrombocytopenia, and hematocrit were analyzed with the help of STAT A software version 2.0.

Results

Most of the cases (50%) were seen in the 20-30 year age group (**Table – 1**).

Table – 1: Age distribution.

Age (Years)	No. of cases	%
20-30	30	50%
31-40	10	16.6%
41-50	13	21.6%
51-60	05	8.33%
>61	02	3.33%
Total	60	100%

Table – 2: Distribution of Clinical features.

Clinical features	No. of cases	%
Fever	27	45%
Myalgia	08	13.3%
Fever + Myalgia	10	16.6%
Headache	02	3.3%
Nausea and vomiting	03	5.0%
Fever + Skin rashes	04	6.6%
Petechiae	05	8.3%
Fever + Itching	01	1.6%
Total	60	100%

Gender distribution

Majority of the patients were males 40 (66.6%) compared to females, 20 (33.3%) and the male to female ratio was 2:1.

Fever was the most common presentation and was seen in 27 cases (45%) cases (**Table – 2**).

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

Hemoglobin level			Hematocrit		
Hb (gm/dl)	No. of cases	%	Hct (%)	No. of cases	%
6-8.9	05	8.3	20-26	-	-
9-11.9	25	41.6	27-36	30	50
12-14.9	20	33.3	37-46	20	33.3
15-17.9	10	16.6	47-56	10	16.6
Total	60	100%	Total	60	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	08	13.3
1500-4,000	12	20	20,000-50,000	32	53.3
4000-11,000	38	63.3	50,000-1.4 lakh	10	16.6
>11,000	10	16.6	>1 .5 lakhs	10	16.6
Total	60	100%	Total	60	100%

Seasonal Variation

Most of the cases 25 (41.6 %) and 17 (28.3 %) were found in post monsoon period in September and October month respectively. November, December 2015 and first three months of 2016 showed all together the remaining 18 (30%) cases.

Hematological parameters

Present study showed hemoglobin range of 6 gm% to 17 gm% (**Table – 3**).

Raised hematocrit (>47%) was noted in 10 (16.6%) of patients at presentation and the hematocrit ranged from 20- 51%.

The total leukocyte count ranged from 1500 cells/cumm to >11000 cells/cumm. Leucopenia with less than 4000 cells/cumm was present in 12 (20 %) cases (**Table – 4**).

In the present study out of 60 cases of dengue fever, 50 (83.3 %) cases had thrombocytopenia and 13.3% cases had severe thrombocytopenia (< 20,000/cumm) with bleeding manifestations.

Distribution of patients according to activated partial thromboplastin time

This test showed normal values in 40 (66.6%) cases and it was elevated in 20 (33.3%) cases.

Elevated liver enzymes

Serum AST and ALT were elevated in 40 (66.6%) cases and were normal in 20 (33.3%) cases.

In the present study, hepatomegaly was noted in 20 (33.3 %) and splenomegaly was seen in 10 (16.6%) of cases.

Discussion

Age and gender wise distribution

In the present study out of 60 patients, 30 (50%) were in age group of 20 to 30 years followed by 13 (21.6%) cases in the age group of 41 to 50 years, 10 (16.6%) cases in the age group of 31 to 40 years and 05 (8.3 %) cases with age 51 to 60 years, 02 (3.3 %) cases were in the age group of > 61 years (**Table - 1**).

Deshwal, et al. [10] 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. [11] 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. [12] (12 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. [13] (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.

In our study majority of the patients were males 40 (66.6%) compared to females 20 (33.3%) and the male to female ratio was 2:1. Deshwal, et al. [10] and Vibha, et al. [11] 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. [11] study. In the study by Ahmed, et al. [13] 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. [12] (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.

Clinical presentation

In the present study, fever was the most common presentation and was seen in 27 cases (45%) followed by fever and myalgia in 10 (6.6%) cases, 04 (6.65) respectively (**Table – 2**). In the study by Deshwal, et al. [10] 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. [11] 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.

Hematological parameters

Present study showed hemoglobin (Hb) ranging from 6 gm% to >15 gm% , 25 (41.6%) cases showed Hb of 9-11.9 gm % , followed by 20 (33.3%) cases showed Hb of 12-14.9 gm % , 05 (8.3%) had Hb of 6-8.9 gm % and 10 (16.6 %) had Hb of 15-17.9 gm% (**Table – 3**). In the study by Meena, et al. [12] 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. [14] observed hemoglobin level from 3.6 gm/dl to 16.7gm/dl with a mean of 11.9 gm/dl. In the present study, 30(50 %) cases showed hematocrit of 27-36% and 20 (33.3 %) showed hematocrit of 37-46%. Raised hematocrit (>47%) was noted in 10(16.6%) of patients at presentation. Deshwal, et al. [10] observed raised hematocrit of >47% in 20.7% of patients at presentation. Vibha, et al. [11] observed > 40% hematocrit in 28 (28%) cases. In present study, hematocrit ranged from 20% to 51%. The mean hematocrit value of dengue positive cases in our study was 39.08%. In DHF and DSS, an increase in hematocrit levels was noted and was above 45%. Dongre, et al. [14] observed an increased hematocrit of > 40% in only 16 patients.

In the present study, total leukocyte count ranged from 1500 to >11000 cells/mm³. A total leukocyte count of less than 4,000 cell/mm³ was present in 12 (20 %) cases, count of 4000-11000 cells/cu mm seen in 38(63.3%) cases and >11000/ cumm was seen in 10 cases (16.6 %) as per **Table - 4**. In Deshwal, et al. [10] study leucopenia was noticed in around 20.19% of cases. In Meena, et al. [12] study total leukocyte count ranged from 1310 to 16700 cell/mm³, 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. Almost 45% patients had total leukocyte counts between the normal range. Dongre, et al. [14] observed leucopenia (total leukocyte counts <4000/cumm) in 81cases and normal count (count between 4000 to 11000/cumm) in 111

cases. Leucopenia with lymphocytosis was seen in 40 patients.

In the present study out of 60 cases of dengue fever, 50 (83.3 %) cases had thrombocytopenia, in which 32 (53.3%) patients had platelet count between 20,000-50,000/cumm, 10 cases (16.6%) had platelet count of 50000- 1.4 lakhs cumm and 8 (13.3%) cases had < 20,000/cumm with bleeding manifestations. Deshwal, et al. [10] 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. [12] 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. [14] 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.

Raised liver serum transaminases were noted in 40 (66.6 %) of patients in the present study. Deshwal, et al. [10] noted raised liver serum transaminases in 88.54% of their patients.

In the present study most of the cases were found in post monsoon period in September 25 (41.6 %) and October 17 (28.3%) Dongre, et al. [14] and Deshwal, et al. [10] observed most of the cases in post monsoon period in September and October and this coincided with the rainy season, showing the increased breeding of mosquitoes during the monsoon season. Our observation is similar to that of the above authors.

In the present study hepatomegaly was noted in 20 (33.3 %) and splenomegaly in 10 (16.6%) of all cases. Deshwal, et al. [10] too reported hepatomegaly in 14.75% and splenomegaly in 13.20% of their cases.

Conclusion

Most common clinical presentation of Dengue fever is of fever with or without myalgia and presence of hepatosplenomegaly. It is more common in immediate post-monsoon months and affects young adult males more commonly. The most common laboratory abnormalities are of an increase in hematocrit, low total leucocyte count and low platelet count.

References

1. Khan E, Hasan R, Mehraj J, Mahmood S. Genetic Diversity of Dengue Virus and Associated Clinical Severity During Periodic Epidemics in South East Asia. Karachi, Pakiatan. Current Topics in Tropical Medicine, 2006; 91-105.
2. World Health Organisation, 2009. Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control, New Edition, World Health Organization and TDR for research on diseases of poverty.
3. Azin FRFG, Goncalves RP, Pitombeira MHS, Lima DM, Branco IC. Dengue: profile of hematological and biochemical dynamics. Rev Bras Hematol Hemoter., 2012; 34(1): 36-41.
4. Brasil Ministerio da Saude. Secretaria de Vigilancia em Saude. Dengue: diagnostico e manejo clinic, 2nd edition, Brasilia, DF; 2005.
5. Gomber S, Ramchandran VG, Satish Kumar, Agarwal KN, Gupta P, Dewan DK. Hematological observations as diagnostics markers in dengue hemorrhagic fever-a reappraisal. Indian Pediatrics, 2001; 38: 477-481.
6. Hales S, De Wet N, Maindonald J, Woodward A. Potential effect of population and climate changes on global distribution of dengue fever: an empirical model. The Lancet, 2002; 360(9336): 830-34.
7. Siqueira JB, Martelli SMT, Coelho GE, Simplício ACR, Hatch DL. Dengue and dengue hemorrhagic fever, Brazil, 1981–

2002. Emerging infectious diseases, 2005; 11(1): 48-53.
8. Oishi K, Saito M, Mapua CA, Natividad FF. Dengue illness: clinical features and pathogenesis. *J Infect Chemother.*, 2007; 13(3): 125-33.
 9. Lin CF, Wan SW, Cheng H J, Lei HY, Lin YS. Autoimmune pathogenesis in dengue virus infection. *Viral Immunol.*, 2006; 19(2): 127-32.
 10. Deshwal R, Qureshi MI, Singh R. Clinical and Laboratory Profile of Dengue Fever. *Journal of The Association of Physicians of India*, 2015; 63.
 11. Gajera VV, Sahu S, Dhar R. Study of Haematological Profile of Dengue Fever and its Clinical Implication. *Annals of Applied Bio-Sciences*, 2016; 3(3): 2455-0396.
 12. Meena KC, Jelia S, Meena S, Arif M, Ajmera D, Jatav VS. A study of hematological profile in dengue fever at a tertiary care center, Kota Rajasthan. *Int J Adv Med.*, 2016; 3(3): 621-624.
 13. Ahmed F, Hussain Z, Ali Z. Clinical and hematological profile of patients with dengue fever. *J. Med. Sci. (Peshawar, Print)*, 2014; 22(1): 17-20
 14. Dongre T, Karmarkar P. Hematological Parameters and Its Utility in Dengue-A Prospective Study. *IOSR Journal of Dental and Medical Sciences*, 2015; 14(2): 31-34.