ORIGINAL ARTICLE　　　　　　　　　**GENERAL MEDICINE**

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

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Abstract

Aim: Dengue is a major health problem in many parts of India and South India is one of the endemic areas for dengue. Several factors have been attributed to increased morbidity and mortality in dengue with altered hematological and coagulation parameters playing an important role. ***Methods:*** *Detailed clinical examination was done at the time of admission followed by serial monitoring to assess the progression of the disease. They were classified as dengue with no warning signs, dengue with warning signs, and severe dengue. Dengue with no warning signs was defined as laboratory-confirmed dengue cases with no signs of plasma leakage.* ***Results:*** *Fever was the clinical manifestation that was present in all n=75 (100%) patients. Maculopapular rashes were present in n=18 (25.33%) cases, myalgia in n=70 (93.33%), Retro-orbital pain in n=20(26.67%) cases, severe headache in n=27 (36.0%) and other common clinical signs/symptoms. Relative bradycardia was observed in n=21 (28%) cases, and most of the patients with relative bradycardia were diagnosed to have dengue with warning signs.* ***Conclusion:*** *Dengue fever commonly affects the young male population with predominant presenting symptoms of fever, myalgia, arthralgia, and abdominal symptoms. The hematological profile of thrombocytopenia, leucocytosis and increased hematocrit are important signs. Sometimes the symptoms may remain atypical even in the same region within a given period.*

Keywords: Dengue fever, Dengue hemorrhagic fever; Dengue shock syndrome, Thrombocytopenia, IgM Dengue.

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Introduction

Dengue infections are common in tropical countries such as India. Globally the incidence of dengue has shown increasing trends in recent years. The World Health Organization (WHO) estimates an annual incidence of 50–100 million infections worldwide and the real numbers may be more than 390 million. [1] The peak incidence of dengue cases occurs from July to November. [2] The full global burden of the disease is unclear, but the patterns are alarming for human health and the economy. Yearly hundreds of thousands of severe cases arise of which 20000 lead to death. The loss of economy is 264 disability-adjusted life years (DALYs) per million population per year. [3, 4] The clinical picture of dengue viral infections ranges from asymptomatic/mild self-limiting to acute febrile illness, dengue fever, and in more severe forms of dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). The female mosquito Aedes aegypti and some of their related species are responsible. The virus which causes dengue is classified into 4 different types DENV-1, 2, 3 & 4. Dengue type I is more prevalent in Asia and African subcontinents. [5] The incubation period is 4-7 days but ranges from 3 to 14 days. DHF is characterized by increased vascular permeability, hypovolaemia, and abnormal

blood clotting mechanisms. One of the predominant features of dengue is thrombocytopenia. Destruction of platelets appears to occur because of complement activation presumably because platelets bind virus antigens and because of peripheral sequestration. [6, 7] Because the dengue virus has been shown to suppress the marrow production of platelets, both decreased production and increased utilization of platelets may contribute to bleeding tendency early in infection. Bone marrow studies in patients with DHF have shown marked depression of all marrow elements and downregulation of hemorrhage may be a consequence of the thrombocytopenia and associated platelet dysfunction or disseminated intravascular coagulation. During severe dengue, driven by a high early viral burden, leading to dysfunction of vascular endothelial cells, derangement of the hemocoagulation system than to plasma leakage, shock, and bleeding. [8] Early recognition and prompt initiation of treatment are vital if disease-related morbidity and mortality are to be limited. With this background, we in the current study tried to study the various clinical and hematological parameters of patients with dengue fever reporting to our tertiary care hospital.

Materials and Methods

This cross-sectional study was conducted in the Department of General Medicine, Chalmeda Anand Rao Institute of Medical Sciences, Bommakal, Karimnagar. Institutional Ethical Permission was obtained for the study. Written consent was obtained from all the participants of the study.

Inclusion criteria
1. Those admitted to our Hospital with clinical suspicion of Dengue
2. Those confirmed with IgM dengue positive

Exclusion criteria
1. Age less than 15 years or more than 60 years
2. Preexisting comorbid conditions such as liver, kidney, or heart disease
3. Patients with a history of hematological disorders.

Clinical and demographic details of every case were recorded in a case record form including symptoms, signs, laboratory, and radiological investigations. Detailed clinical examination was done at the time of admission followed by serial monitoring to assess the progression of the disease. They were classified as dengue with no warning signs, dengue with warning signs, and severe dengue. Dengue with no warning signs was defined as laboratory-confirmed dengue cases with no signs of plasma leakage. Warning signs included intense abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation, mucosal bleed, lethargy, restlessness, liver enlargement, an increase in hematocrit with a rapid decrease in platelets. Severe dengue includes signs of plasma leakage with rising hematocrit leading to shock/fluid. Blood pressure was measured by using an appropriate age-matched cuff in the left arm, with the patient in a supine position, twice daily, and the mean of measurements was taken. A tourniquet test was done in those who did not have obvious bleeding manifestations. Complete blood count including differential blood count, packed cell volume (PCV), and Total platelet count (TPC) was done by using the coulter analysis method. PCV and TPC were monitored serially once a day for all subjects. All the available data was uploaded on an MS Excel spreadsheet and analyzed by SPSS version 19.0 on Windows format. For continuous variables mean and standard deviations were used and for categorical variables were represented as percentages and a p-value of <0.05 was considered significant.

Results

A total of N=75 patients admitted to our hospital with fever (>101°F) and IgM dengue positive was studied. In our study 60% of cases were males and 40% of cases were females the male to female ratio was 3:2. The commonest age group affected was 21 – 30 years the mean age of male cases in the study was 27.5 ± 3.5 years and for females, it was 24.6 ± 2.41 years. The overall mean age of the cases of the study was 26.5 ± 5.4 years. The detailed distribution of the case based on age and sex has been depicted in table 1.

Table 1: Age-wise and sex-wise distribution of cases

Age group in years	Male N (%)	Female N (%)	Total N (%)
15 – 20	03 (4.0)	05 (6.67)	08 (10.67)
21 – 30	22 (29.33)	13 (17.33)	35 (46.67)
31 – 40	11 (14.67)	08 (10.67)	19 (25.33)
41 – 50	05 (6.67)	03 (4.0)	08 (10.67)
51 – 60	04 (5.33)	01 (1.33)	05 (6.67)
Total	45 (60.0)	30 (40.0)	75 (100)

The patients were diagnosed to have Dengue Fever (DF) 72% of cases, Dengue hemorrhagic fever (DHF) in 22.67% and Dengue Shock Syndrome (DSS) 5.33% were diagnosed based on WHO criteria [9] given in table 2.

Table 2: Clinical Spectrum of Dengue Cases

| Diagnosis	Frequency	Percentage
Dengue Fever	54	72.00
Dengue hemorrhagic fever	17	22.67
Dengue shock syndrome	04	05.33
Total	75	100.0

Fever was the clinical manifestation that was present in all n=75 (100%) patients. Morbiliform/maculopapular rashes were present in n=18 (25.33%) cases, myalgia in n=70 (93.33%), Retro-orbital pain in n=20(26.67%) cases, severe headache in n=27 (36.0%) and other common clinical signs/symptoms have been depicted in table 3. Relative bradycardia was observed in n=21 (28%) cases, and most of the patients with relative bradycardia were diagnosed to have dengue with warning signs.

Table 3: Analysis of Various Symptoms and Signs.

Symptoms/signs	Male	Female	Total N (%)
Fever	45	30	75 (100.0)
Myalgia	42	28	70 (93.33)
Joint pain	32	27	59 (78.67)
Vomiting	23	11	34 (45.33)
Pain ABD	20	14	34 (45.33)
Retro-orbital pain	12	08	20(26.67)
Rash	11	07	18 (25.33)
Bleeding	08	03	11 (14.67)
Headache	13	14	27 (36.0)
Hepatomegaly	10	08	28 (37.33)
Shock	03	01	04 (5.33)

Ultrasonography of the abdomen found organomegaly was noted in 34 (45.33%) out of which n=28(37.33%) cases had hepatomegaly and n=6(8.0%) had hepatosplenomegaly. N=11 cases were found with ascites, n=13 cases were diagnosed with pleural effusion given in figure 1.

Figure 1: Showing the evidence of plasma leakage in the patients
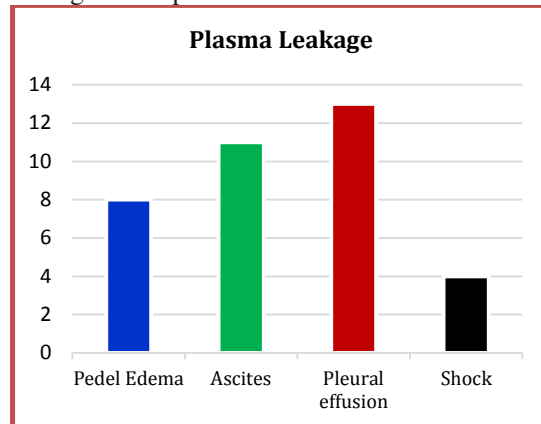
Severe thrombocytopenia was found in 13.33% cases out of which n=4 cases were platelet counts < 20,000 they were administered with 4 units of platelet transfusion each. Their platelet counts reached normal levels within 5 days of treatment. The hematological profile of the patients of the study is given in table 4. One patient with dengue fever was associated with acute kidney injury, with hypertension. Fever was treated with paracetamol; the fluid balance was maintained by using normal saline and there was no case of mortality in this study.

Table 4: Values of hematological parameters recorded in cases

Hematological Parameter	Frequency	Percentage
Platelet counts (*per mm³*)		
<50,000 (severe Thrombocytopenia)	10	13.33
50,000 – 100,000 (moderate Thrombocytopenia)	57	76.00
>100,000 (mild Thrombocytopenia)	08	10.67
Total leucocyte count (*per mm³*)		
< 4000	34	45.33
4000 - 11000	8	10.67
>11,000	33	44.00
Hematocrit (%)		
< 40	37	49.33
40 - 45	12	16.00
> 45	26	34.67

Discussion

Dengue fever is one of the most important Arboviral infections. It has recently become a major global public health problem. In India, epidemics are becoming more frequent. Classical dengue fever is an acute febrile illness

but in a small percentage of dengue infection, a more severe form of the disease known as DHF occurs. Early recognition and meticulous management are very important to save precious lives from this killer disease. The present study was conducted on n=75 confirmed cases of dengue admitted to our tertiary care hospital. The overall mean age of the cases of the study was 26.5 ± 5.4 years this is following the other studies conducted on this topic where they found the common age group affected is 21 – 30 years. [10, 11] The male to female ratio was 3:2. Neerja M et al., [12] in a similar study in Hyderabad found the male to female ratio was 2:1. The main reason for male predominance might be because most of them go out of the home for works and hence to exposed to mosquito bites more frequently as compared to females. In our study DF was in 72% of cases, DSS was in 5.33%, and DHF 22.67% cases. In a study done by Neerja M et al., [12] the prevalence of DF, DHF, DSS was 85%, 5%, 10% respectively. In a study done by Pancharoen et al., [13] there was a high incidence of DHF 60.4% of cases. The observations show that the clinical spectrum varies with geographical areas. Our region where this study is conducted is endemic for dengue fever hence the incidence varies with other studies. Fever was the important presenting symptom found in all 100% of the cases of the study followed by myalgia 96.33%, arthralgia in 78.67%, vomiting, and abdominal pain in 45.33% of cases. Several studies conducted on this topic also revealed that fever is the commonest complaint in the cases. [12, 14, 15] A study in Northeast India has also shown that fever was observed in 96.8% of cases followed by myalgia. [16] Itoda I et al., [17] in Japan observed that headache was observed in 90% of cases of dengue. Rash was the symptom seen in 25.33% of cases. In similar studies by Dash PK et al., [18] Neerja et al., [12] and Khan et al., [16] rash was found to be present in 56%, 41%, and 37.8% respectively. In the present study, mild thrombocytopenia was found in 10.67% of cases, moderate thrombocytopenia in 76% of cases, and 13.33% had severe thrombocytopenia. The association of thrombocytopenia with the dengue virus is significant (p<0.05). Cherian T et al., [19], and Singh NP et al., [20] have shown the incidence of

thrombocytopenia to be 94.7%, and 61.39% respectively. The current shock was in 5.33% of cases. Nimmanitya et al., [21] showed the incidence of shock in 35% of cases of dengue. In this study, Severe thrombocytopenia was found in 13.33% of cases out of which n=4 cases were platelet counts < 20,000 they were administered with 4 units of platelet transfusion each. The hematocrit ranged from 32 - 60%. The mean hematocrit value of dengue positive cases in my study was 42.5%. In DHF and DSS, an increase in hematocrit levels was noted. The overall patient care in this study was excellent with 100% of cases recovering completely. The low mortality in this study was due to early recognition of warning symptoms and time management to prevent complications with intense monitoring and optimal supportive care.

Conclusion

Within the limitations of the current study, it can be concluded that Dengue fever commonly affects the young male population with predominant presenting symptoms of fever, myalgia, arthralgia, and abdominal symptoms. The hematological profile of thrombocytopenia, leucocytosis and increased hematocrit are important signs. Sometimes the symptoms may remain atypical even in the same region within a given period. Therefore, clinicians in the endemic areas should be aware of the clinical profile of dengue infection presentation, and early recognition and timely management could prevent mortality in the population.

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References

1. Bhatt, S., Gething, P., Brady, O. et al. The global distribution and burden of dengue. Nature 496, 504–507.
2. Guidelines for Clinical Management of Dengue Fever, Dengue Hemorrhagic Fever, and Dengue Shock Syndrome. Government of India; 2008. Available at: https://nvbdcp.gov.in/WriteReadData/l892s/Clinical%20Guidelines.pdf [Accessed on 06/06/2021].

3. World Health Organization. Global strategy for dengue prevention and control -2012-2020. Geneva: World Health Organization. 2012.

4. Suaya JA, Shepard DS, Siqueira JB, Martelli CT, Lum LCS, Tan LH, et al. Cost of dengue cases in eight countries in the Americas and Asia: a prospective study. Am J Tropical Med and Hygiene. 2009; 80:846-55.

5. Dengue diagnostics: proceedings of a joint TDR/WHO and PDVI workshop: 4-6 October 2004, Geneva, Switzerland Available at: https://apps.who.int/iris/bitstream/handle/10665/69118/TDR_IRM_DIAG_DEN_05.1.pdf?sequence=1&isAllowed=y [Accessed on 15/06/2021]

6. Malasit P, Mongkolsapaya J, Kalayanarooj S, Nimmannitya S.1990. Surface associated complement fragments (C3a) on platelets from patients with dengue infection. Southeast Asian J Trop Med Public Health 1990; 21: 705.

7. Wang S, He R, Patarapotikul J, Innis BL, Anderson R. Antibody enhanced binding of dengue- virus to human platelets. J Viro S 1995.20; 213;1: 254–57.

8. Gubler DJ. Dengue and dengue hemorrhagic fever. Clin Microbiol Rev. 1998; 11(3):480-96.

9. Dengue. Guidelines for diagnosis, treatment, prevention, and control, 2nd Edition, World Health Organization, Geneva 2009; 1-144.

10. Dutta AK, Biswas A, Baruah K, Dhariwal AC. National guidelines for diagnosis and management of dengue fever/dengue hemorrhagic fever and dengue shock syndrome. J Ind Med Assn. 2011;109(1):30-35.

11. Gupta E, Dar L, Kapoor G, Broor S. The changing epidemiology of dengue in Delhi, India. Virology Journal. 2006; 3;92.

12. Neeraja .M, Lakshmi. V, Teja V.D, Umabala P and Subbalakshmi M.V. Serodiagnosis of dengue virus infection in patients presenting to a tertiary care hospital. Indian J Med Microbiol 2006; 24; 4: 280-82.

13. Panchareon C and Thisyakora U. Neurological manifestations in dengue patients. Southeast Asian J Trop Med Public Health 2001; 32;2: 341-45.

14. Aggarwal A, Chandra J, Aneya S, Patwari AK, and Dutta AK. An epidemic of dengue hemorrhagic fever and shock syndrome in children in Delhi. Indian Pediatr 1998; 35: 727-32.

15. 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, Pakistan. Current Topics in Tropical Medicine 2006; 91-105.

16. Khan SA, Dutta P, Topno R, Soni M, Mahanta J Dengue Outbreak in a Hilly State of Arunachal Pradesh in Northeast India. The Scientific World J. 2014; Article ID 584093.

17. Itoda I, Masuda G, Suganuma A, Imamura A, Ajisawa A, Yamada K. Clinical features of 62 imported cases of dengue fever in Japan. Am J Trop Med Hyg. 2006;75(3):470-74.

18. Dash PK, Saxena P, Abhavankar A, Bhargava R, and Jana AM. The emergence of dengue virus types 3 in Northern India. Southeast Asian J Trop Med Public Health 2005; 36;2: 370-77.

19. Cherian T, Ponnuraj E, Kuruvilla T, Chellam K, John TJ, and Raghupathy P. An epidemic of dengue hemorrhagic fever and dengue shock syndrome in and around Vellore. Indian J Med Res 1994; 100: 51-56.

20. Sing NP, Jhamb R, Agarwal SK, Gaiha M, Dewan R, Daga MK. 2003 the outbreak of dengue fever in Delhi, India. Southeast Asian J Trop Med Public Health 2005; 36; 5: 1174-78.

21. Nimmannitya S. Dengue and dengue hemorrhagic fever. In: Cook G C, Zulma AI. Manson's tropical diseases. London. M/s WB Saunders 2009; 22:753-60.