

Original Research Article

Clinical features, laboratory profile and outcomes among dengue patients admitted in a tertiary care hospital, Delhi NCR

Mohit Tiwari¹, Abhishek Tibrewal^{2*}, Varun S. Pichika¹

¹Department of Medicine, Max Super Speciality Hospital, Ghaziabad, Uttar Pradesh, India

²Department of Epidemiology and Biostatistics, New Delhi, India

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*Correspondence:

Dr. Abhishek Tibrewal,

E-mail: dr.abhishek08@hotmail.com

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ABSTRACT

Background: Globally, dengue, a mosquito-borne viral infection, is the most rapidly spreading vector-borne disease. Dengue fever is endemic in >100 countries including India. Dengue has a variety of clinical presentations. The objective of the study was to understand the clinical features, laboratory profile and outcomes of dengue fever among patients admitted in a tertiary care hospital in Delhi, National Capital Region.

Methods: This was a cross-sectional study among 75 dengue confirmed (NS-1 antigen and/or IgM antibody positive) patients with fever <1 week. The variables included were socio-demographic; clinical features; laboratory and radiological profile and outcomes. Descriptive analysis was used.

Results: The majority of the patients were aged between 18-40 years 72% and predominantly males 68%. A total of 18.7% patients (malaria: 13.3% and chikungunya: 5.3%) had co-infection. Fever was present in all the patients, followed by myalgia (74.7% patients), retro-orbital pain/headache 69.3%, and vomiting 45.3%. The mean hemoglobin was 13.9 gm/dl, leukopenia 46.7% patients, thrombocytopenia 96.0% and elevated liver enzymes 69.3%. Radiological examination showed pleural effusion 6.7%, gallbladder wall thickening 6.7%, splenomegaly 4.0%, and hepatomegaly 2.7%. The outcomes included ICU care 17.3%, ventilator support 13.3%, blood transfusion 14.7%, and mortality 1.3% during the hospital stay.

Conclusions: Dengue has become a major public health problem in India. The most common clinical features are fever, myalgia, headache and vomiting; laboratory abnormalities are leukopenia, thrombocytopenia and deranged liver enzymes. No specific treatment exists, but early detection and proper medical care lowers fatality rates.

Keywords: Dengue, Clinical features, Laboratory, Outcomes, Delhi

INTRODUCTION

Globally, dengue, a mosquito-borne viral infection, is the most rapidly spreading vector-borne disease.¹ Dengue, caused by a dengue virus (DENV), is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas. World Health Organization (WHO) has considered it a major global health problem, due to its impact on the healthcare system worldwide.² Globally, dengue fever (DF) is endemic in >100 countries including India.³ In India, the burden of dengue infection is heterogeneous, with high transmission in northern,

western, and southern regions.⁴ During 2019, the National Vector borne Disease Control Program (NVBDCP) reported ~135,000 laboratory confirmed cases of dengue in India, suggesting that the disease is grossly under-reported.⁵

Dengue has a variety of clinical presentations, ranging from 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.^{2,6} The most common clinical presentation of DF is of an acute febrile viral disease with headaches,

bone, joint and muscular pains, rash and leucopenia.⁶ The clinical presentation of dengue infection is observed to vary across different geographical regions (North, East, West, and South) in India.⁷⁻¹⁰ For early diagnosis and better management of disease, collection of data from various regions is very important to understand the nature and course of dengue infections.¹¹ Therefore, the objective of the study was to understand the clinical features, laboratory profile and outcomes of DF among patients presenting at a tertiary care hospital in Delhi National Capital Region (NCR).

METHODS

The cross-sectional study was carried out over 15 months (1st August 2017 to 31st October 2018) in Max Super Speciality, a tertiary care hospital in Vaishali, Delhi NCR, India. All the prerequisite approval was obtained from the ethics committee and institutional review board of the hospital. The study population included dengue confirmed patients admitted in the inpatient department of the hospital after obtaining their informed consent. The inclusion criteria were patients aged ≥ 18 years having fever < 1 -week duration with proven cases of DF previously diagnosed or diagnosed with serology non-structural protein 1 (NS1) antigen or immunoglobulin M (IgM) antibody by enzyme-linked immunosorbent assay (ELISA) during hospitalisation. The exclusion criteria were patients aged < 18 years, those without a recent evidence of dengue infection immunoglobulin G (IgG) positive but IgM negative) and those not giving the consent.

For this study, every alternate dengue patients admitted in the inpatient department was considered. For each of the included patients, the following information was captured using a predefined study pro-forma. Age (in years); gender (male/female); clinical features; existing co-morbidities; laboratory tests complete blood count, liver function test, malaria antigen and peripheral smear for malaria parasite, chikungunya polymerase chain reaction (PCR) and/or serology, radiological procedures chest X-ray (CXR), ultrasound whole-abdomen. The outcomes of DF are reported as requirement of intensive care unit (ICU) care, ventilator support, blood transfusion packed red blood cells (PRBC)/single donor platelets (SDP)/random donor platelets (RDP); given in patients with clinical bleeding or platelets count $< 10,000$ per mm and mortality during the hospital stay.³

All the variables were entered into a microsoft excel and analyzed using SPSS version 17.0 software. The continuous variables are presented as mean (standard deviation (SD)) or median (range). Categorical variables are expressed as frequencies and percentages.

Ethical approval

All the prerequisite approval was obtained from the ethics committee and institutional review board of the hospital.

RESULTS

A total of 75 patients with DF were included. Dengue NS-1 antigen was positive in 58 (77.3%) patients, IgM antibody was observed in 10 (13.3%), while both these in 7 (9.3%). Of these, 51 (68.0%) patients were males and 24 (32.0%) were females. A total of 25 (33.3%) patients were in the age group of 21-30 years followed by 21 (28%) in 31-40 years, 8 (10.7%) in 18-20 years, 8 (10.7%) in > 60 years, 7 (9.3%) in 50-60 years and 6 (8%) in 41-50 years. Type-2 diabetes mellitus was the most commonly observed co-morbidities among the patients 16 (21.3%), followed by chronic obstructive pulmonary disease 13 (17.3%), coronary artery disease 5 (6.7%), hypertension 4 (5.3%), chronic kidney disease 3 (4%). Also, a total of 14 (18.7%) patients had a co-infection, with 10 (13.3%) patients having malaria and 4 (5.3%) having chikungunya.

Clinical features signs and symptoms

Fever was the universal finding observed in all the 75 patients 100%. The mean (SD) and median (range) duration of fever were 4.2 (1.4) days and 4.0 (2.0-7.0) days respectively, with 80% patients having duration of fever between 2- < 5 days and 20% between ≥ 5 -7 days. The other clinical features included myalgia in 56 (74.7%) patients, retro-orbital pain/headache in 52 (69.3%), vomiting in 34 (45.3%), cough in 16 (21.3%), joint pain in 14 (18.7%), skin rash in 12 (16.0%), abdominal pain in 12 (16.0%), shortness of breath in 12 (16.0%), bleeding in form of petechiae, ecchymosis and epistaxis in 12 (16.0%), itching predominantly localized to palmar and plantar aspects of hands and feet in 5 (6.7%), oliguria in 3 (4.0%), malena in 1 (1.3%), and hematuria in 1 (1.3%).

Laboratory and radiological profile

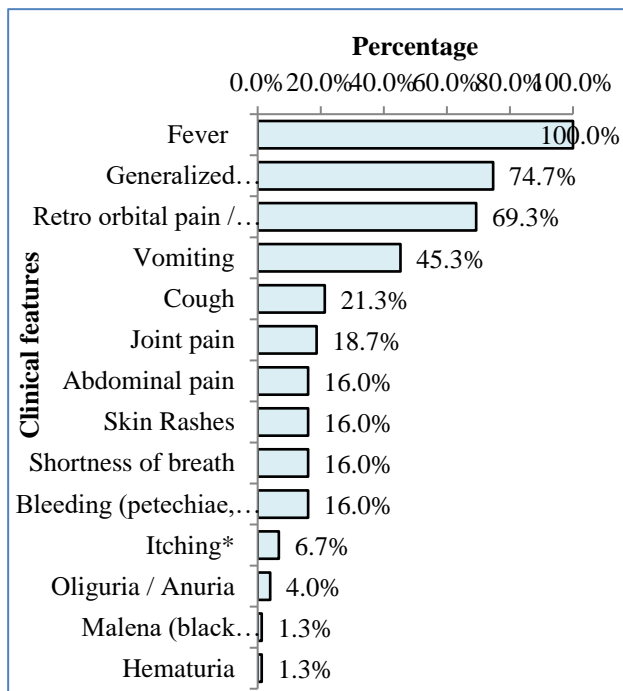
The mean (SD) and median (range) hemoglobin (Hb) observed among the patients were 13.9 (2.5) gm/dl and 14.00 (8.0 to 20.0) gm/dl respectively, with Hb < 12 gm/dl in 28 (37.3%) patients, ≥ 12 - < 14 gm/dl in 12 (16.0%), ≥ 14 - < 16 gm/dl in 24 (32.0%) and ≥ 16 gm/dl in 11 (14.7%). The mean (SD) and median (range) total leucocytes count were 4,200 (3,090) cells/mm³ and 4,000 (1,000 to 25,000) cells/mm³, respectively, with total leucocytes count $< 4,000$ cell/mm³ in 35 (46.7%) patients, ≥ 4000 - < 11000 cells/mm³ in 39 (52%) and ≥ 11000 /mm³ in 1 (1.3%). The mean (SD) and median (range) platelet counts were 56,800 (44,800) cells/mm³ and 45,000 (2,000 to 1,80,000) cells/mm³, respectively, with $< 50,000$ /mm³ in 37 (49.0%), $\geq 50,000$ - $< 100,000$ /mm³ in 25 (33%) and $\geq 1,00,000$ to $< 1,50,000$ lakhs/mm³ in 10 (13%) and $\geq 1,50,000$ /mm³ in only 3 (4%) patients (Table 1). With respect to the liver function test, both SGOT and SGPT were elevated in 52 (69.3%) patients, with 62 (82.7%) patients having SGOT level (> 45 U/L; elevated) and 52 (69.3%) patients having SGPT level (> 45 U/L; elevated).

Table 1: CBC profile and liver enzymes among dengue fever patients.

Laboratory tests	Mean \pm SD	Median	Min-Max	Normal range
Hemoglobin (gm/dl)	13.85 \pm 2.50	14.00	8.0-20.0	12.3-17.5 ¹⁶
Leucocytes count (per mm³)	4,200 \pm 3,090	4,000	1,000-25,000	4,500-11,000 ¹⁶
Platelet counts (per mm³)	56,800 \pm 44,800	45,000	2,000-1,80,000	1,50,000-4,50,000 ¹⁶
SGOT (U/L)	638 \pm 2,153	96	25-14,598	5 to 40 ¹⁹
SGPT (U/L)	310 \pm 895	58	15-6,601	7 to 56 ¹⁹

gm: Gram; dl: Deciliter; mm: Millimeter; U: Unit; L: Liter; SGOT: Serum glutamic oxaloacetic transaminase; SGPT: Serum glutamic pyruvic transaminase.

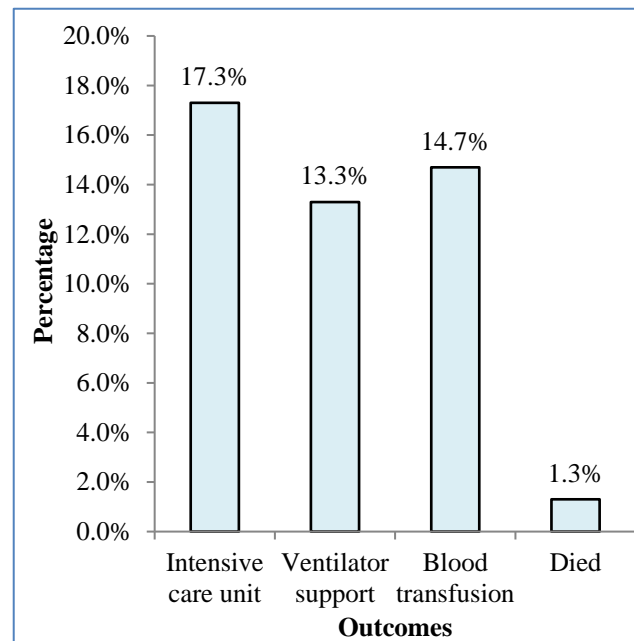
On chest X-ray examination, pleural effusion was observed in 5 (6.7%) patients. While, the ultrasound whole-abdomen showed gall bladder wall thickening/odema in 5 (6.7%) patients, mild fatty liver in 4 (5.3%), splenomegaly in 3 (4.0%), hepatomegaly in 2 (2.7%), ascites in 1 (1.3%), cholelithiasis in 1 (1.3%), fluid in gall bladder in 1 (1.3%) and grade-I fatty liver in 1 (1.3%), hepatic cyst, thick and oedematous gall bladder in 1 (1.3%), and right-sided pleural effusion in 1 (1.3%).


Figure 1: Clinical features among dengue fever patients.

*Predominantly localized to palmar and plantar aspects of hands and feet.

Outcomes

A total of 17.3% (13/75) patients required ICU care and 13.3% (10/75) needed ventilator support. The blood transfusion (PRBC/SDP/RDP) was required in 14.7% (11/75) patients. Only 1 patient (1.3%) died during the hospital stay.


Figure 2: Outcomes among dengue fever patients.

DISCUSSION

Dengue is endemic to the Indian sub-continent and has become a major public health problem in India.¹² Our study had a predilection to males and younger age group patients. Among our patients, type-2 diabetes mellitus was the most commonly observed co-morbidities 21.3%, followed by chronic obstructive pulmonary disease 17.3%. Also, a total of 18.7% patients also had a co-infection (malaria: 13.3% and chikungunya: 5.3%), indicating that DF can co-exist with other arboviral infection (chikungunya) and vector-borne parasitic disease (malaria), posing a challenge for diagnosis due to overlapping clinical features.

Fever was the most common presentation seen in all 100% of the patients, followed by myalgia 74.7%, headache 69.3%, and vomiting 45.3%. In consistent with our study, Deshwal et al reported that fever was the most common symptoms 100% followed by headache 94.8% and myalgia 90.7%.¹³ Likewise, Gajera et al observed that fever was the most common symptoms 95%, followed by myalgia 70%, arthralgia 60% and headache 50%.¹⁴

These clinical presentations may be helpful in early diagnosis and better management of dengue infection. However, these clinical features are non-specific to dengue patients and it might mimic other infections. Therefore, the laboratory and radiological tests are required to differentiate and confirm the diagnosis.

With respect to the laboratory tests, the mean Hb level (13.9 gm/dl) among dengue patients in our study was observed to be within the normal range (12.3-17.5 gm/dl), which might be due to either limited impact of dengue infection on red blood cells or plasma leakage.¹⁶ However, 46.7% patients reported leucopenia (leukocytes <4,000 per mm³) in line with 51% reported by Meena et al 2016.¹⁵ The observed leucopenia might be caused by the destruction or inhibition of myeloid progenitor cells as the bone marrow examination showed mild hypocellularity in the first seven days of fever then normal cellularity in the convalescent phase.¹⁷ Also, 96% patients had thrombocytopenia (platelet count <1,50,000/mm³) with 49% having <50,000/mm³, but the majority of these patients had a non-severe form of dengue infection, that is why only 16% of our patients had bleeding diathesis. In consistent with our finding, Meena et al reported that 90% of dengue patients have thrombocytopenia, with 61% having platelet count from 20,000-60,000 per cubic mm.¹⁵ There are several hypotheses to explain thrombocytopenia such as an infected megakaryocyte by the virus, peripheral destruction and cross-reaction of antibodies against platelets.¹⁷

The liver is the most common organ to be involved in dengue. Hepatic manifestations are either a result of direct viral toxicity or dysregulated immunologic injury in response to the virus, leading to asymptomatic elevation of hepatic transaminases (SGOT and SGPT), with increase in SGOT more than SGPT.¹⁸ In support to this finding, our study also reported elevated serum SGOT median: 96 U/L; 82.7% having SGOT >45 U/L and SGPT median: 58 U/L; 69.3% having SGPT >45U/L. In consistency with our finding, raised liver serum transaminases ranged from 83.8% in Mandal et al to 88.5% in Deshwal et al.^{13,20}

In the present study, chest X-ray examination revealed pleural effusion in 6.7%, and ultrasonography finding reported gall bladder wall thickening/odema in 6.7% patients, splenomegaly in 4.0%, hepatomegaly in 2.7%, and ascites in 1.3%, indicating less severe dengue patients in our study. In support to our finding, Santhosh et al recommended that sonographic features of thickened GB wall, pleural effusion (bilateral or right side), ascites, and hepatosplenomegaly should definitely support the diagnosis of DF in patients presenting with fever and associated symptoms, particularly during an epidemic.²¹

With respect to the outcomes among dengue patients, ICU admission was required in 17.3% patients, ventilator support in 13.3% and blood transfusion in 14.7%.

However, only 1.3% (one patient) died during the hospital stay, highlighting that DF if detected early and with access to proper medical care (ours being the tertiary care hospital) can lead to minimal mortality. In consistent with our finding, the mortality rate was observed to be 1.3% in Vulavala et al.²²

The limitations of our study were sample size was limited due to the time constraint of the study, so the study population might not be representative of the general population; limited follow-up period; lack of study of dengue virus serotype; and non-inclusion of OPD and probable dengue patients.

CONCLUSION

Dengue is a notifiable disease and has become a major public health problem in India. The most common clinical presentation in patients with dengue infection is fever, seen in all cases followed by symptoms of myalgia and headache, vomiting, cough, joint pain. The most common laboratory abnormalities are leucopenia, thrombocytopenia and deranged liver enzymes. ICU care, ventilator support and blood products transfusion are required in ~10% of the dengue patients with a good overall prognosis. There is no specific treatment for dengue/severe dengue, but early detection and access to proper medical care lowers fatality rates. Due to lack of awareness, effective and early management, unavailability of the vaccine, dengue remains a challenge for public health authorities in India. Proper confirmation of diagnosis, early institution of therapy, public awareness and vector control are important factors to be taken into consideration in order to form policies on dengue prevention and management.

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REFERENCES

1. Stanaway JD, Shepard DS, Undurraga EA. The global burden of dengue: an analysis from the Global Burden of Disease Study 2013. *Lancet Infect Dis*. 2016;16:712-23.
2. WHO. Home/Newsroom/Fact sheets/Detail/Dengue and severe dengue. Available at <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>. Accessed on 10 May 2010.
3. World Health Organization. Geneva, Switzerland: WHO. Dengue: guidelines for diagnosis, treatment, prevention and control; 2009.
4. Murhekar MV, Kamaraj P, Kumar MS, Khan SA, Allam RR, Barde P, et al. Burden of dengue infection in India, 2017: a cross-sectional population based serosurvey. *Lancet Global Health*. 2019;7.

5. National Vector borne Disease Control Program. Dengue/DHF situation in India. Available at <https://nvbdcp.gov.in/index4.php?lang=1&level=0&linkid=431&lid=3715>. Accessed on 10 May 2020.
6. Bäck AT, Lundkvist A. Dengue viruses - an overview. *Infect Ecol Epidemiol*. 2013;3:10.
7. Dinkar A, Singh J. Dengue infection in North India: An experience of a tertiary care center from 2012 to 2017. *Tzu Chi Med J*. 2020;32:36-40.
8. Chatterjee N, Mukhopadhyay M, Ghosh S, Mondol M, Das C, Patar K. An Observational Study of Dengue Fever in a Tertiary Care Hospital of Eastern India. *J Assoc Physicians India*. 2014;62(3):224-7.
9. Madan SP, Bhatawadekar S, Lahiri K. Clinico-demographic profile and seroprevalence of dengue at a tertiary care hospital- study from Maharashtra. *Int J Health Sci Res*. 2018;8(1):43-8.
10. Kumar A, Rao CR, Pandit V, Shetty S, Bammigatti C, Samarasinghe CM. Clinical manifestations and trend of dengue cases admitted in a tertiary care hospital, Udipi district, Karnataka. *Indian J Community Med*. 2010;35(3):386-90.
11. Doke PP, Pawar S. Profile of Dengue Fever outbreaks in Maharashtra. *Indian J Community Med*. 2000;25(4):170-6.
12. Kumar M, Sharma R, Parihar G, Sharma M. Seroprevalence of Dengue in Central Rajasthan: A Study at a Tertiary Care Hospital. *Int J Curr Microbiol App Sci*. 2015;4(9):933-40.
13. Deshwal R, Qureshi MI, Singh R. Clinical and Laboratory Profile of Dengue Fever. *J Association Physicians India*. 2015;63.
14. Gajera VV, Sahu S, Dhar R. Study of Haematological Profile of Dengue Fever and its Clinical Implication. *Annals Applied Bio-Sci*. 2016;3(3):2455-396.
15. Meena KC, Jelja 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):621-24.
16. Complete Blood Count (CBC) Test. Available at <https://www.webmd.com/a-to-z-guides/complete-blood-count#2>. Accessed on 20 May 2020.
17. Chaloeuwong J, Tantiworawit A, Rattanathammethee T, Hantrakool S, Chai-Adisaksopha C, Rattarittamrong E, et al. Useful clinical features and hematological parameters for the diagnosis of dengue infection in patients with acute febrile illness: a retrospective study. *BMC Hematology*. 2018;18:20.
18. Samanta J, Sharma V. Dengue and its effects on liver. *World J Clin Cases*. 2015;3(2):125-31.
19. Davis CP. Liver Blood Tests (Normal, Low, and High Ranges and Results). Available at https://www.medicinenet.com/liver_blood_tests/article.htm#what_are_the_basic_functions_of_the_liver. Accessed on 20 May 2020.
20. Mandal SK, Ganguly J, Sil K, Chatterjee S, Chatterjee K, Sarkar P, et al. Clinical profile of dengue fever in teaching hospital in Eastern India. *Nat J Med RES*. 2013;3:173-76.
21. Santhosh VR, Patil PG, Srinath MG, Kumar A, Jain A, Archana M. Sonography in the diagnosis and assessment of dengue Fever. *J Clin Imaging Sci*. 2014;4:14.
22. Vulavala S, Reddy Y, Kamarthy P. Study of clinical and laboratory profile of Dengue fever patients. *EJPMR*. 2016;3(11):613-16.

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