Original Research Article

Study of clinico-haematological profile in dengue fever - A prospective study

K Naveen[1*], R S Shankarappa[2], S Vathsala[3]

{[1]Associate Professor, [2]Assistant Professor, Department of General Medicine} {[3]Associate Professor, Department of Dermatology}, Shridevi Institute Of Medical Sciences And Research Hospital, Tumakuru, Karnataka, INDIA.
Email: drnaveen26@gmail.com

Abstract

Background: Dengue fever with its severe clinical manifestations as dengue haemorrhagic fever and dengue shock syndrome has emerged as a major health problem of international concern. We commonly see patients referred in view of dengue serology positive without warning signs and non severe dengue. Hence the present study is planned to study various clinical manifestations of dengue and analyse the haematological parameters of the same. **Methodology:** This is an observational study and conducted prospectively total of 100 cases with fever and dengue serology positive were studied. **Results:** In our study, bradycardia documented in 39% of cases, leucopenia seen in 53% of cases, thrombocytopenia of less than 1lakh is found in 74% of patients, Haematocrit of less than 40 found in 44% of patients, dengue fever diagnosed in 69% of cases followed by dengue haemorrhagic fever diagnosed in 23% and dengue shock syndrome in 8% of cases. **Conclusion:** Majority of cases are still DF, requires only supportive management and not requiring platelet transfusion. So most of the cases should be managed at the local hospital without referring, to reduce cost burden on patients. Early recognition of warning signs and meticulous management reduce the morbidity and mortality of dengue.
Key Word: dengue fever.

[*]**Address for Correspondence:**
Dr Naveen k, House no 168, Near Adarsha Nursing Home, Sharadha Devi Nagar, Tumkur, Karnataka 572102 INDIA.
Email: drnaveen26@gmail.com
Received Date: 12/03/2020 Revised Date: 24/05/2020 Accepted Date: 10/06/2020
DOI: https://doi.org/10.26611/10211513

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 11 July 2020

INTRODUCTION

The origin of word dengue is derived from the Swahili phrase "Ka-dingapepo" meaning "cramp like seizure caused by an evil spirit". The Swahili word "dinga" may possibly have origin in the Spanish word "dengue". Dengue made its debut as early as 1780, when Benjamin Rush described the condition as "break bone fever". Dengue fever (DF) with its severe clinical manifestations as dengue haemorrhagic fever(DHF) and dengue shock syndrome (DSS) has emerged as a major health problem of international concern. Dengue is the most extensively spread mosquito borne disease, transmitted by infected mosquitoes of aedes species. Dengue infection in humans results from four serotypes DENV 1 to 4 of Flavivirus genus. With an estimated 50-100 million cases of dengue infection occurs annually in over 100 endemic countries, most cases are reported from Southeast Asia.[1] India comes under category B of the classification meant for SEAR. Here DHF is an emerging disease with multiple virus serotypes and cyclical epidemics are frequently exist. Although the first recorded outbreak of dengue fever in India was in 1812, evidences of dengue infection was studied only by 1954, which showed that DEN-1 and DEN-2 were widespread.[2] The prevention and control of dengue infection in India is carried by National vector borne disease control programme (NVBDCP). As per NVBDCP guidelines, blood samples were collected, to screen for vector borne disease between April 2016 to march 2017 in state of Karnataka. About 34084 blood samples were suspected for dengue and blood samples were collected from 17130 cases, out of them 3453 cases showed positivity for dengue with slide examination rate of 80.8% and slide positivity rate of 93.3%.Out of population of 28,33,214 of tumakuru,957 cases were

How to cite this article: K Naveen, R S Shankarappa, S Vathsala. Study of clinico-haematological profile in dengue fever - A prospective study. *MedPulse International Journal of Medicine.* July 2020; 15(1): 09-14. https://www.medpulse.in/Medicine/

suspected of dengue in which 439 tested positive.[3] Dengue fever is an acute febrile illness and has a wide spectrum of clinical presentations with unpredictable clinical outcome. Majority of patients have self-limiting clinical course and only a small proportion of patients progress to DHF or DSS. This is when they acquire a second infection by a different dengue viral antigen.[4] Hematopoetic system is the earliest and commonly affected system in Dengue infection with thrombocytopenia being most common laboratory finding.[5]

The mechanism of thrombocytopenia remains unclear in DF. Possible mechanisms may include.[6]

1. Direct bone marrow suppression by the virus
2. Anti-dengue antibody mediated platelet destruction
3. Peripheral consumption of platelets
4. Isolated viral replication in the platelet.

The study findings confirmed that, by using a set of clinical and/or laboratory parameters, one sees a clear-cut difference between patients with severe dengue and those with non-severe dengue.

We commonly see patients being referred in view of dengue serology positive without warning signs and non severe dengue. As this is a tertiary care referral centre with availability of blood products, for few surrounding taluks. Hence the present study is planned to study various clinical manifestations of dengue and to further analyse the haematological parameters of the same. And we found very few studies from this region with detailed description of both clinical and haematological profile in dengue illness. The study of clinic haematological profile in dengue would have a substantial impact on treatment of dengue.

By reducing unnecessary burden on patients

By reducing referals to higher centres

By reducing morbidity and mortality associated with dengue.

Aims and objectives

1. To study the clinical presentations of dengue fever.
2. To study the hematological features of dengue fever.

MATERIALS AND METHODS

This is an observational study and conducted prospectively for a period of 6 months from August 2019 to January 2019 from Department of Medicine, Shridevi Institute of Medical Sciences and Research Centre, Tumakuru.

A total of 100 caseswho gave consent to participate in the study was included through the inclusion and exclusion criteria mentioned below.

Inclusion criteria

1. Those admitted in shridevi institute of medical sciences and research hospital having fever of more than 1day duration.
2. Dengue NS1antigen or IgM dengue positive.

Exclusion criteria

1. Age less than 14 years.
2. Other causes of thrombocytopenia like due to infections other than dengue, megaloblastic anaemia, cirrhosis etc.
3. Patients with history of haematological disorders.

Written informed consent for the study was obtained from all of the patients aged 18 years or older or from the parents or guardians of the patients younger than 18 years.

Detailed clinical history, examination and required investigation were done for all patients.

Data was entered in Microsoft Office Excel Sheet 2010.

Definition used in the study[7,8]

Dengue fever

Fever is an acute febrile illness of 2-7 days duration (sometimes with two peaks) with two or more of the following manifestations:

- Headache
- Retro -orbital pain
- Myalgia/arthralgia
- Rash
- Leukopenia.

DHF: Dengue Haemorrhagic Fever is a probable case of dengue and haemorrhagic tendency evidenced by one or more of the following:

- Positive tourniquet test (A positive test is declared when > 20 petechiae appear in a 2.5cm square or 3 cm diameter circle on the skin surface on the forearm). In patients in shock, the test usually becomes positive if it is performed after the recovery from shock. The test may be negative or mildly positive (> 10 petechiae/2.5 sq cm) during the phase of profound shock.
- Petechiae, ecchymosis or purpura
- Bleeding from mucosa (mostly epistaxis or bleeding from gums), injection sites or other sites
- Haematemesis or melena
- Thrombocytopenia (platelets 100,000/cu.mm or less) and
- Evidence of plasma leakage due to increased capillary permeability manifested by one or more of the following:
  >20% rise in haemotocrit for age and sex
  >20% drop in haemotocrit following treatment with fluids as
  compared to baseline
  Signs of plasma leakage (pleural effusion, ascites or
  hypoproteinaemia).

DSS(Dengue shock syndrome): Some patients of DHF manifest signs of restlessness, abdominal pain, and shock

(rapid andweak pulse, cold clammy extremities, diaphoresis,circumoral cyanosis, irritability or change in mentalstatus). These cases known as DSS, are characterised by narrowing of the pulse pressure to 20 mm Hg or hypotension and in severe cases undetectable BP and pulse.

Thus, diagnosis of DSS is based on all the criteria of DHF plus manifestations of shock.

Ethical approval taken from Institutional Ethical Committee.

Table A : Grading of severity of dengue fever.[9]

DF/DHF	Grade*	Symptoms	Laboratory
DF		Fever with two or more of be following: 1.Headache 2.Retro-orbital pain 3. Myalgia 4. Arthralgia	Leucopenia,occasionally thrombocytopenia may be present, no e/o plasma loss
DHF	I	Above signs + positive tourniquet test	Thrombocytopenia < 100,000, Hematocrit rise ≥ 20%
DHF	II	Above signs + spontaneous bleeding	- do -
DHF	III	Above signs + circulatory failure (weak pulse, hypotension, restlessness)	- do -
DHF	IV	Profound shock with undetectable BP and Pulse	- do -

*DHF Grade III and IV are also called as DSS.

RESULTS

In our study a total of 100 patients were studied and all patients undergone dengue serology testing. Dengue NS1antigen positive in 37% patients, IgM Dengue positive in 27 %patients, NS1 and IgM Dengue positive in 20% patients, NS1 and IgG positive in 4%, IgM and IgG Dengue positive in 3% patients. All three tests(NS1,IgM and IgG) positive in 9% patients (table no.1).

Table 1: Dengue serology report of patients

Dengue serology	No. of patients	percent of patients
NS1 antigen	37	37%
IgM Dengue	27	27%
NS1 antigen+ IgM Dengue	20	20%
NS1 antigen+IgG Dengue	4	4%
IgM Dengue + IgG Dengue	3	3%
NS1 antigen+ IgM Dengue + IgG Dengue	9	9%
Total	**100**	**100%**

In our study, age and gender distribution shows majority of the patients age is between 21 to 40years. Its about 49% among them 63% are male and rest 37% were female.28% of patients are in age group between 41 to 60 years among them 68% are female and 32% were male,19% of patients are in less than 20 years of age among them 74%male and rest 26% were female.4% of patients belong to more 61years of age among them both male and female shares 50% each(table no 2).

Table 2: Age and Gender distribution of patients

Age in years	Gender		No of patients	Percent of patients
	Male	Female		
<20	14	5	19	19%
21-40	31	18	49	49%
41-60	9	19	28	28%
>61	2	2	4	4%
Total	**56**	**44**	**100**	**100%**

In our study patients fever is present in 100% of cases. Headache present in 68% of patients, like wise myalgia in 72% of patients, joint pain in 43% of cases, vomiting in 31% of patients, pain abdomen in 33% of patients, generalised weakness in 81% of patients, cough in 11% of patients, itching in 14% of patients and viral rash present in 20% of patients. Bleeding

manifestation seen in 23% of patients, pedal edema in 9% of patients, ascites in 28% of patients, pleural effusion in 3% of patients, hepatomeghaly seen in 18% of patients and signs of shock in 8% of cases(table no 3).

Table 3: Symptoms and Signs of patients

Symptoms And Signs	Present		Absent	
	No of patients	Percent of patients	No of patients	Percent of patients
Fever	100	100%	0	0%
Headache	68	68%	32	32%
Myalgia	72	72%	28	28%
Joint pain	43	43%	57	57%
Vomiting	31	31%	69	69%
Pain abdomen	33	33%	67	67%
Generalised weakness	81	81%	19	19%
Cough	11	11%	89	89%
Itching	14	14%	86	86%
Rash	20	20%	80	80%
Bleeding manifestation	23	23%	77	77%
Pedal edema	9	9%	91	91%
Ascites	28	28%	72	72%
Pleural effusion	3	3%	97	97%
Hepatomeghaly	18	18%	82	82%
Shock	8	8%	92	92%

In our study, bradycardia was documented in 39% of cases, tachycardia in 2% of cases and normal pulse rate in 59% of cases (table no 4).

Table 4: Pulse rate among patients

Pulse rate (bpm)	No. of patients	Percent of patients
<60	39	39%
61-100	59	59%
>101	2	2%
Total	**100**	**100%**

In our study, leucopenia was seen in 53% of cases followed by normal total leucocytes in 42% and remaining 9% hadleucocytosis(table no 5).

Table 5: Total leucocyte counts among patients

Total leucocyte counts	No.of patients	Percent of patients
<4000	53	53%
4000 to 11000	42	53%
>11000	9	9%
Total	**100**	**100%**

In our study, thrombocytopenia of less than 1lakh was found in 74% of patients and platelet count of more than 1 lakh was found in 26% of cases(table no 6).

Table 6: Platelet counts among patients

Platelet count	No.of patients	Percent of patients
<1 lakh	74	74%
>1 lakh	26	26%
Total	**100**	**100%**

In our study, haematocrit of less than 40 was found in 44% of patients, haematocrit of 40.1 to 45 was found in 36% and haematocrit of more than 45.1 was found in 20% of cases(table no 7).

Table 7: Haematocrit among patients

Haematocrit	No. of patients	Percent of patients
<40	44	44%
40.1 to 45	36	36%
>45.1	20	20%
Total	**100**	**100%**

In our study, DF was diagnosed in 69% of cases followed by DHF diagnosed in 23% of cases and DSS in 8% of cases (table no 8).

Table 8: Spectrum of dengue illness among patients

Spectrum of dengue illness	No. of patients	Percent of patients
Dengue fever(DF)	69	69%
Dengue haemorrhagic fever(DHF)	23	23%
Dengue shock syndrome(DSS)	8	8%
Total	**100**	**100%**

DISCUSSION

In this study, a total of 100 patients were admitted with fever and they were evaluated and studied for dengue NS1antigen and IgM dengue antibody positivity. In this study, confirmation of dengue by serology shows, NS1antigen positive in 37% patients, as compared to Patta Apparao *et al..*[10] NS1antigen positive in 50.3% and study done by Vidyadhara Rani P *et al..*[11]NS1 antigen positive in 63%. In this study, IgM Dengue was positive in 27 %patients,NS1 and IgM Dengue was positive in 20% patients, as compared to study by Patta Apparao *et al..*[10] IgM positive in 14.4%,NS1 and IgM in 25.2% and study done by Vidyadhara Rani P *et al..*[11] IgM positive in 6%,NS1 and IgM positive in 5%. In this study on dengue, age distribution shows majority of the patients are of age group of 21 to 40 years its about 49%,28% of patients are of age group between 41 to 60 years,19% of patients are in less than 20years. Study done by Shekar EC *et al..*[12]is almost comparable with our study,47% cases belong to 21-40 years, 32% belong to >40years and 21% belong to 13-20 years group, as compared to study done by Vidyadhara Rani P *et al..*[11]where majority of cases 43.52% cases were in the age group of 15-30 years, 20.5% belonged to 31to 50 years of age and 6.64% cases belonged to above 50 years of age group.

In our study, gender distribution shows 56% males and 44% females, as compared to study by Shekar EC *et al..*[12] where 53% were males and 47% were females and study done by Vidyadhara Rani P *et al..*[11] where61.46% were males and 38.53% were females.

In our study, all of patients presented with fever(100%) followed by generalised weakness 81%. Myalgia in 72%, headache in 68% and multiple joint pain in 43% of patients, as compared with other studies done by Shekar EC *et al..*[12], Pradnya Mukund Diggikar *et al..*[13] and Vijay Sagar *et al.*[14] where fever present all 100 % of patients. Study done Shekar EC *et al..*[12] documented common symptom as myalgia (71%) followed by joint pain (65%), headache (61%),pain abdomen(56%) and simultaneously documented signs of bleeding manifestation in 21% and shock in 9% of cases. Study done by Pradnya Mukund Diggikar *et al.* [13] documented myalgia in 80% of patients, joint pain in 46% and bleeding manifestation in 10% of patients. Study done by Vijay Sagar *et al.*[14] documented headache in 70%, joint pain in 66%, myalgia in 37% of cases and bleeding manifestation in 15% of cases.

Table 9

Symptoms and Signs	Percent of patients(%)			
	Present study	Shekar EC *et al.*[12]	PradnyaMukund Diggikar *et al.*[13]	Vijay Sagar *et al.*[14]
Fever	100	100	100	100
Headache	68	61	20	70
Myalgia	72	71	80	37
Joint pain	43	65	46	66
Vomiting	31	48	22	-
Pain abdomen	33	56	10	-
Generalised weakness	81	-	-	-
Cough	11	-	-	-
Itching	14	-	-	-
Rash	20	40	22	21
Bleeding manifestation	23	21	10	15
Pedal edema	9	8	-	-
Ascites	28	15	-	-
Pleural effusion	3	-	-	-
Hepatomeghaly	18	4	-	6
Shock	8	9	-	-

In this study, pulse rate documentation demonstrates bradycardia in 39% of the cases as compared to study done by Yadav RK *et al.*[15] where showed sinus bradycardia in 60% 0f cases and study done by Ramesh S *et al.*[16] showed bradycardia in 27% of cases. In this study, leucopeniais seen in 53% of cases which is almost comparable with study done by Butt N *et al..*[17]where shows 52.8%. Whereas the study done by Shekar EC *et al.*[12] showed Leucopeniaonly in 18% cases. In this study, thrombocytopenia of less than 1lakh is found in 74% of patients meeting the WHO criteria i.e< 1 lakh cells / cumm which is almost comparable with the study by Pradnya Mukund Diggikar *et al.*[13] which shows 78% and study done by Vidyadhara Rani P *et al.*[11] which shows 73.02% cases of thrombocytopenia. But study done by Vijay Sagar*et al.*[14] observed only 15% of cases with thrombocytopenia. In the present study, DF is the most common type seen in69% followed by DHF in 23% and DSS in 8% of cases. Study by Pradnya Mukund Diggikar *et al.* [13] observed 76% of DF, 12% of DSS, 10% had DHF. Study by Shekar EC *et al.*[12] shows DF in 81%, DHF in 10% and DSS in 9% of cases. Study by Vijay Sagar *et al.* [14] observed DF in 79%, DHF in17% and DSS in 4% of cases.

CONCLUSION

Dengue fever is the one of the most common important arboviral infections. It has become a one of the major public health problem. in India where cyclic epidemics are becoming more frequent. Spectrum of dengue illness varies from non severe to more severe form of dengue(DHF and DSS). Majority of cases are still DF, requires only supportive management and do not require platelet transfusion. So most of the cases should be managed at the local hospital without reffering to higher centre, so as to reduce cost burden on patients. Early recognition of warning signs and meticulous management can reduce the morbidity and mortality of dengue.

REFERENCES

1. www.who.int/southeastasia/news/speeches/symposium on dengue prevention and control September 2014.
2. DENGUE .Guidelines for diagnosis, treatment, prevention and control, 2nd Edition, World Health Organization, Geneva 2009; 1-144.
3. National vector borne disease .Available at:https://www.karnataka.gov.in/hfw/nhm/pages/ndcp_cd_nvbdcp.aspx. Accessed on 21 December 2017.
4. Ramos MM, Tomashek KM, Arguello DF, *et al...* Early clinical features of dengue infection in Puerto Rico. Trans R Soc Trop Med Hyg 2009;103(9):878–84.
5. Chuang YC, Lin YS, Liu CC, *et al...* Factors contributing to the disturbance of coagulation and fibrinolysis in dengue virus infection. J Formos Med Assoc 2013;112(1):12-7.
6. Gupta E, Dar L, Kapoor G, *et al...* The changing epidemiology of dengue in Delhi, India.Virol J 2006;3:92.
7. Park K. Epidemiology of Communicable Diseases:Dengue syndrome. In: Park's textbook of Preventive and Social Medicine. 20th ed. Jabalpur, India: M/sBhanarsidasBhanot 2009: 218-22.
8. Goel.A, Patel DN, Lakhani KK, Agarwal SB, Aarwal A, Singla S *et al...*Dengue fever- A dangerous foe. J Indian AcadClin Med 2004; 5; 3:247-58.
9. WHO/SEARO. Guidelines for treatment of dengue fever/ dengue hemorrhagic fever in small hospitals, New Delhi. 1999.
10. PattaApparao, D.K.V. Prasad and Lavanya, S.V. 2018.Seasonal, Serological Markers and Platelet Count Association with Dengue Fever.Int.J.Curr.Microbiol.App.Sci. 7(10): 2513-2517.
11. Vidyadhara Rani P, Naveen Kumar S. Evaluation of thrombocytopenia in dengue infection along with seasonal variation. IAIM, 2018; 5(2): 57-63.
12. Shekar EC, Laxminarayana, Kishan B, Kumar S, Rao B. A prospective study to analyze the clinical, biochemical and hematological parameters of dengue fever in Mahatma Gandhi Memorial Hospital, Warangal, Telangana, India.Int J Adv Med 2017;4:218-24.
13. PradnyaMukundDiggikar, Prasanna Kumar Satpathy, Gaurav Dinesh Bachhav, Kanishka Dinesh Jain, AnujaMukeshPatil, PrafullChajjed. Study of clinical profile and complications of dengue fever in tertiary care hospital of pune city.NJMR;Volume 6;Issue I;Jan – Mar 2016:84-86
14. Vijay Sagar, Rashmi Singh, Ratnesh Kumar. Clinical-Hematological Profile of Patient with Dengue Infection in Bihar: A Prospective Study. Int.J.sci. res. volume-6 | issue-5 | may - 2017 | issn no 2277 - 8179 | if : 4.176 | ic value : 78.46
15. Yadav RK, Kumar S. To study cardiac manifestations in patients presenting with dengue infection and to find out the correlation of cardiac manifestations to warning signs of dengue. Int J Adv Med 2017;4:323-8.
16. Ramesh S, Basavaraju M, Sandeep R, Sharma, Shetty shivakumar, Srinivasa M, Surakshith T. K, Ravichethan Kumar. "Study of Bradycardia in Dengue Fever". Journal of Evolution of Medical and dental sciences 2014;vol.3,Issue 09,March 3;Page:2378-2388,DOI:10.14260/jemds/2014/2148.
17. Butt N, Abbassi A, Munir SM, Ahmad SM, Sheikh QH. Haematological and biochemical indicators for early diagnosis of dengue viral infections. J College Physicians Surg. 2008;18:282-5.

Source of Support: None Declared
Conflict of Interest: None Declared