

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

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ABSTRACT

Background: Dengue fever and dengue hemorrhagic fever has emerged as a global public health problem in recent decades.⁽¹⁾ It is an acute febrile illness with symptoms of sudden onset of fever, headache, bodyache, generalized weakness, retro-orbital pain and rash.⁽²⁾ Its diagnosis is based on clinical and laboratory data. Clinical symptoms and signs along with laboratory tests i.e. both non-specific [blood count, platelet count, prothrombin time (PT)] and specific tests (viral isolation tests and serology for antibody examination) are evaluated for diagnosis.^(3,4)

Aim: To study haematological profile in patients of dengue fever.

Objective: To correlate haematological parameters with clinical details.

Methods: The present study is a two year hospital based prospective study of all the haematological parameters in patients diagnosed serologically positive as dengue fever in tertiary care centre from June 2019 to May 2021, which includes 210 cases.

Results: 104 cases (49.5 %) were in the 2nd decade of life, which was the most common age group. There were 115 (54.7 %) males and 95 (45.2%) females. The most common presenting complaint was fever (185 cases). 98 cases (46.6%) were noted with hemoglobin ranging from 12-15 gm/dl and with hematocrit levels ranging from 40-49%. 128 cases (60.9 %) had TLC within normal limit. Maximum number of patients i.e. 87 cases (41.4 %) had platelet count with moderate thrombocytopenia. In DHF and DSS cases, 18 (72%) cases showed moderate thrombocytopenia. According to bleeding manifestations, petechiae was noted in 18 cases, hematemeses in 8 cases whereas 3 cases presented with melena. MPV and PDW in thrombocytopenic patients was found to be significantly higher than in non-thrombocytopenic patients.

Conclusion: Hematocrit (HCT) and platelet count monitoring is useful to determine therapeutic intervention in case of dengue fever.

Keywords: Dengue fever, haematological profile, clinical correlation.

INTRODUCTION

Dengue fever and dengue hemorrhagic fever has emerged as a global public health problem in recent decades.⁽¹⁾ In India also dengue fever is an important health problem.⁽⁵⁾ Dengue fever is usually an infectious condition caused by an arthropod borne virus.⁽¹⁾

It is an acute febrile illness with symptoms of sudden onset of fever, headache, bodyache, generalized weakness,

retro-orbital pain and rash.⁽²⁾ Its diagnosis is based on clinical and laboratory data. Clinical symptoms and signs along with laboratory tests i.e. both non-specific [blood count, platelet count, prothrombin time (PT) and liver function tests] and specific tests (viral isolation tests and serology for antibody examination) are evaluated for diagnosis.^(3,4)

The spectrum of dengue infection spreads from an undifferentiated fever and

dengue fever (DF) to dengue haemorrhagic fever (DHF) with shock and expanded dengue syndrome⁽⁶⁾.

The most prominent hematological change is thrombocytopenia and leukopenia. Lymphocytosis is a commonly noted with reactive lymphocytes. There is progressive increase in hematocrit concentration during the progression of dengue fever almost upto 20% increase from the patient's baseline.^(7,8).

DHF and/or DSS are the major cause of mortality lead by multiple reasons for abnormal haemostasis and thrombopahty and coagulation derangements.

Present study was planned to evaluate the hematological profile of the seropositive (IgM, IgG and NS1 antigen) dengue patients admitted in our institute which is a tertiary care centre.⁽⁵⁾

This study was done after permission from institutional ethical committee.

OBJECTIVE: To correlate haematological parameters with clinical details.

MATERIALS AND METHODS

The present study was a two year hospital based prospective study of all the haematological parameters in patients diagnosed serologically positive as dengue fever in tertiary care centre from June 2019 to May 2021, which includes 210 cases. The study was cross sectional, which was done in department of pathology with attached tertiary care hospital.

INCLUSION CRITERIA: -

All the patients, having serologically confirmed dengue (NS1 antigen, IgG or IgM) fever patients above the age of 18 years admitted in our hospital.

Informed consent was taken from these cases.

EXCLUSION CRITERIA:-

- 1) Patients with history of known other haematological disorder.
- 2) Patients with concomitant infection.
- 3) Patients below the age of 18 years.

A detailed history of patient was taken which includes patient's age, sex, complaints, clinical presentation and laboratory investigations were recorded in all cases. Hb estimation, cell counts for example RBC and WBC, PCV, platelet and platelet indices were recorded on 3 part automated hematology analyzer (NIHON KOHDEN).

OBSERVATION AND RESULTS

All the patients were above the age of 18 years old irrespective of sex, having fever and serologically positive dengue fever were included in this study.

Table-1 : Age distribution of all cases.

Age (Years)	No. of cases	%
18 – 30	104	49.5 %
31 – 40	30	14.2 %
41 – 50	34	16.1 %
51 – 60	22	10.4 %
>61	20	9.5 %
Total	210	100 %

Youngest patient was 18 years old and oldest was 78 years old in the present study. 104 cases (49.5 %) were in the 2nd decade of life, which was the most common age group. Mean age of presentation was 34 years old.

There were 115 (54.7 %) males and 95 (45.2%) females; with slight male preponderance with M:F ratio of 1.2:1.

Table-4: Distribution of clinical features

Symptoms	No. of cases	Percentage
Fever	185	88 %
Bodyache	122	58 %
Headache	106	50.4 %
Lethargy	100	47.6 %
Retro orbital pain	36	17.1 %
Rash	26	12.3 %
Bleeding manifestation	28	13.3%

The most common presenting complaint was fever (185 cases) followed by bodyache (122 cases) in maximum patients and least presenting complaint was rash (26 cases).

Table 5: Clinical spectrum of dengue positive cases.

Diagnosis	Number	Distribution
Dengue fever	185	88 %
Dengue hemorrhagic fever	23	10.9 %
Dengue shock syndrome	2	0.9 %
Total	210	100 %

Majority of the cases (88%) were having dengue fever (185 cases). While 23 cases (10.9%) had dengue hemorrhagic

fever and 2 cases (0.9%) were of dengue shock syndrome.

Table-7: Distribution of cases on the basis of hemoglobin and hematocrit level

Hemoglobin level			Hematocrit		
Hb (gm/dl)	No. of cases	%	HCT (%)	No. of cases	%
6.4 – 9	19	9.0 %	19 – 29	19	9.0 %
9.1 – 12	66	31.4 %	30 – 39	66	31.4 %
12.1 – 15	98	46.6 %	40 – 49	98	46.6 %
15.1 – 18	27	12.8 %	50 – 59	27	12.8 %
Total	210	100 %	Total	210	100 %

Most of the patients i.e. 98 cases (46.6%) were noted with hemoglobin ranging from 12-15 gm/dl followed by 66 cases (31.4%) Hb ranging from 9-12 gm/dl. Least cases i.e. 19 (9%) showed Hb ranging from 6.4 – 9 gm/dl.

Maximum patients i.e. 98 cases (46.6%) were noted with hematocrit levels ranging from 40-49 %, followed by 66 cases (31.4%) PCT ranging from 30 – 39 %. Least cases i.e. 19 (9 %) showed PCT ranging from 19 – 29 %.

Table-8: Distribution of cases on the basis of total leucocyte count

TLC (cell/mm ³)	No. of cases	%
< 4000	72	34.2 %
4000 – 11000	128	60.9 %
>11000	10	4.7 %
Total	210	100 %

Maximum number of patients i.e. 128 cases (60.9 %) had TLC within normal limit, followed by 72 cases (34.2 %) having leucopenia and minimum were 10 cases (4.7 %) having leucocytosis.

Table-9: Differential WBC count pattern

Differential count pattern	Leucopenia	Normal WBC count	Leucocytosis
Lymphocytosis	29/72 (40.2 %)	59/128 (46 %)	3/10 (30 %)
Neutrophilia	15/72 (20.8 %)	23/128 (17.9 %)	4/10 (40 %)
Within normal limit	28/72 (38.8 %)	46/128 (35.9 %)	3/10 (30 %)

Table-12: Distribution of cases on the basis of platelet count

Platelet (cells/mm ³)	No. of cases	%
< 20,000	7	3.3 %
20,000 – 60,000	87	41.4 %
61,000 – 1.5 lakh	81	38.5 %
> 1.5 lakh	35	16.6 %
Total	210	100 %

Maximum number of patients i.e. 87 cases (41.4%) had platelet count with moderate thrombocytopenia, followed by 81 cases (38.5%) having mild

thrombocytopenia and minimum cases were seen (7 cases i.e. 3.3%) having severe thrombocytopenia.

Table- 13: Distribution of cases of thrombocytopenia on the basis of severity of disease

Thrombocytopenia	Dengue fever	DHF and DSS	Total
Mild	81 (54%)	0 (0%)	81
Moderate	69 (46%)	18 (72%)	87
Severe	0 (0%)	7 (28%)	7
Total	150/175	25/175	175

Table-14: Distribution of cases of thrombocytopenia on the basis bleeding manifestations.

Bleeding manifestation	Platelet count (per cu.mm)						Total
	≤20,000	21-30,000	31-40,000	41-50,000	51-1 lac	>1 lac	
Petechiae	5	7	6	0	0	0	18
Hematemesis	4	2	2	0	0	0	8
Melena	2	1	0	0	0	0	3
Total number with platelet count, n (%)	11 (37.9)	10 (34.4)	8 (27.5)	0	0	0	29

Table- 16: Mean Platelet Volume (MPV), Plateletcrit (PCT) and Platelet Distribution Width (PDW) in Thrombocytopenic and Non - Thrombocytopenic Patients (categorization based on analyser)

Category	No. of patients	Percentage	Mean platelet count (x 10 ⁹ /L)	Mean platelet volume (fL)	Plateletcrit (%)	Platelet distribution width
Thrombocytopenic (<150 x 10 ⁹ /L)	175	83.3 %	72.35 (±39.03)	9.29 (±1.58)	0.05 (±0.03)	17.81 (±1.47)
Non - thrombocytopenic (>150 x 10 ⁹ /L)	35	16.6 %	251.11 (±94.59)	7.55 (±1.43)	0.18 (±0.09)	16.67 (±1.16)
P value			<0.0001	0.103	<0.0001	0.1010

The mean MPV in thrombocytopenic patients [9.29(±1.58)] was found to be significantly higher than in non-thrombocytopenic patients.

The mean PDW in thrombocytopenic patients [17.81(±1.47)] was also found to be significantly higher than in non thrombocytic patients.

Thrombocytopenia patients revealed statistically significant high MPV and PDW and low plateletcrit.

DISCUSSION

The study of hematological profile of seropositive (IgM, IgG and NS1 antigen) dengue fever patients was done in department of pathology in our institute which is a tertiary care centre.

Most (49.5%) patients in our study were in the 2nd decade of life with M:F ratio of 1.2:1. A similar finding was observed by Shamsunder Khatroth⁽⁹⁾, Kailash C. Meena et al.⁽⁵⁾ and Yashaswini LS et al⁽¹⁰⁾.

Fever was the most common symptom noted in dengue patients. Followed by bodyache and lethargy and least cases were having rash. Similar findings were observed in the studies done by other authors.^(12,13,14,10)

Dengue fever was common clinical spectrum observed in present study. Similar findings were noted by other authors.^(5,14)

In our study for serology pattern in dengue patients, 122 (58%) cases were having IgM pattern followed by IgM + NS1 antigen pattern. Least i.e. 11 (5.2%) cases were having IgM + IgG pattern. However Kunal Tewari et al⁽¹⁵⁾ study, IgM+ IgG had maximum number of cases. NS1 antigen pattern was most commonly noted by Joshi AA et al⁽¹¹⁾.

In present study maximum patients had hemoglobin levels ranging between 9.1 – 15gm/dl with hematocrit levels ranging between 30-49%. Similar findings were also noted by Shamsunder Khatroth⁽⁹⁾ and Kailash C Meena et al⁽⁵⁾.

In our study maximum dengue patients were having leucocyte count ranging from 4000 – 11000/cumm.

However, counts were on the lower side of the normal limit.

Similarly, Shamsunder Khatroth, Ferede et al, Priya and Bindu M also noted maximum cases in leucocyte count ranging within normal limit. However, Kailash C. Meena et al, Yashaswini L S et al and Joshi AA et al showed maximum patients in leucopenia range.^(9, 13,12, 5, 10, 11)

In our study, maximum patients (83.2 %) had thrombocytopenia. Among thrombocytopenic patients 41.4 % cases had moderate thrombocytopenia ranging 20,000 – 60,000/cumm and 3.3 % cases were having severe thrombocytopenia (<20,000/cumm). Kailash C. Meena et al, Ferede et al, Tahlan A et al and Shamsunder Khatroth had similar findings.^(5, 13, 12, 9)

Bleeding manifestation was noted in 29 patients. Amongst which petechiae was noted in 18 cases, hematemesis in 8 patients and melena was noted in 3 cases. Kunal Tewari et al⁽¹⁵⁾ and Yashaswini LS et al⁽¹⁰⁾ had same observation.

In our study mean platelet count, mean platelet volume and platelet distribution width showed highly significantly increase in the values for thrombocytopenic dengue patients than non-thrombocytopenic dengue patients. Aashna et al⁽¹⁶⁾ had similar findings of platelet indices according to thrombocytopenia.

CONCLUSION

Hematocrit (HCT) monitoring is useful to evaluate the degree of plasma leakage and to determine therapeutic intervention in case of dengue fever. Platelet count and platelet indices play significant role in predicting severity of outcome of dengue fever.

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