



A STUDY ON HEMATOLOGICAL AND BIOCHEMICAL ALTERATIONS AND ASSOCIATED COMPLICATIONS AMONG PATIENTS ADMITTED WITH DENGUE FEVER IN A TERTIARY CARE HOSPITAL, THRISSUR, KERALA

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ABSTRACT

Background: Dengue is a fast emerging mosquito borne pandemic prone viral disease affecting many parts of the world. The elucidation of the exact clinical profile is important for patient management and thus crucial for saving life. The hematological and biochemical alteration in dengue fever is important for assessing severity and treatment for the disease. **Methods:** A descriptive study was undertaken and data was collected by reviewing the records of patients admitted with dengue fever over a time period from January 2018 to August 2019. Total 131 records of confirmed cases of Dengue with IgM or IgG positive were included in the study. The demographic details and complications of dengue fever including hematological and biochemical parameters were collected from the records using a questionnaire. **Results:** Out of 131 patients admitted with dengue, more than half (60.3%) of them were males. Majority 113(86%) of them were suffering from dengue fever and 17 (13%) of them had Dengue hemorrhagic fever and only 1 individual had dengue shock syndrome. Among 131 confirmed dengue cases, 20 (15%) of them had bleeding manifestations and most common site of bleeding was from gastro intestinal tract. About 93 (71%) of study population had raised AST and about 50 (38.2%) of them had low platelet count. There was a statistically significant association between severity of dengue and platelet count, AST, aPTT, and Hematocrit values. **Conclusions:** The hematological and biochemical parameters were associated with complications of Dengue Fever.

KEYWORDS

Dengue fever, hematological parameters, biochemical parameters

INTRODUCTION

Dengue virus, a mosquito-borne human viral pathogen, it has recently become a major national health problem particularly in the tropical and subtropical countries, predominantly in the urban and peri-urban areas¹. The geographic distribution of dengue virus has greatly expanded and the number of cases has dramatically increased during the past three decades². The disease is subsequently transmitted by mosquito *Aedes aegypti* mostly in rainy season. This may be a reason why the epidemics of dengue tend to coincide with the rainy season³.

There are four dengue virus serotypes, called DEN-1, DEN-2, DEN-3, and DEN4. They belong to the genus *Flavivirus*, and family *Flaviviridae*. After a person is bitten by an infective mosquito, the virus undergoes an incubation period of 3 to 14 days after which the person may experience acute onset of fever accompanied by a variety of nonspecific signs and symptoms.

Initially, characterized by prodromal symptoms like malaise and headache for 2 days. Followed by acute onset of fever, backache, arthralgias, headaches, generalised pain (breakbone fever), pain on eye movement, lacrimation, nausea, vomiting, relative bradycardia, prostration, depression, hyperaesthesia, dysgeusia, lymphadenopathy.⁴ Fever is usually continuous or 'saddle back', having breaks on 4th or 5th day and then recrudescence; usually lasting for 7-8 days. The rash seen initially as flushing faint macular rash in the first 1-2 days. Maculopapular, scarlet morbilliform blanching rash seen from days 3-5 which spreads centrifugally and sparing palms and soles.⁵ Dengue hemorrhagic fever (DDHF) and Dengue Shock Syndrome (DSS) are two complications of dengue fever, seen in individuals who are immune to one dengue virus serotype and are the infected with another.⁶

Hemorrhagic manifestations in patients with dengue fever are not uncommon and range from mild to severe. Skin hemorrhages, including petechiae and purpura, are the most common, along with gum bleeding, epistaxis, menorrhagia, and gastrointestinal (GI) bleeds. Hematuria occurs infrequently, and jaundice is rare.⁷ The hematological and biochemical parameters that can be altered in DHF and DSS are leucopenia, thrombocytopenia and hemoconcentration. A platelet count of $\leq 100 \times 10^9/\mu\text{L}$ is usually found between the days 3 and 8 of illness⁸. The primary pathophysiologic abnormality seen in DHF is an acute increase in vascular permeability that leads to leakage of plasma into the extra vascular compartment, resulting in hemoconcentration and decreased blood pressure⁹.

Hemostatic changes in DHF and DSS involve three factors: vascular changes, thrombocytopenia, coagulation disorders¹⁰. In a hospital

based study conducted by Rajesh Kumar et al,¹¹ on Dengue fever with thrombocytopenia and its complications, it was found that out of 58 cases with severe thrombocytopenia, complications were present in 36 cases. 19 patients had DHF, 5 suffer from severe dehydration, 3 from DHF with bleeding manifestation, 3 from DSS, 2 from fever induced seizures and 4 from neurological complications.

Hence the present study was undertaken with an objective to describe various hematological and biochemical alterations among patients admitted with dengue fever and describe various complications of dengue fever seen among them. The study also focuses to find out if there is any association between hematological parameters and complications of dengue fever.

METHODS

A cross-sectional study was conducted among the IgM and IgG confirmed cases of dengue admitted in the Department of Medicine and Department of pediatrics of our Medical college from August 2019 to December 2019. There were 153 case files of confirmed cases of dengue fever which was retrieved from medical record department. Out of which 22 case files were excluded because of incomplete records. Total 131 case files were included for present study. The data was collected by reviewing the records of patients and the information regarding demographic details, (age, gender & religion), severity of disease (Dengue fever, DHF, DSS) site of bleeding, hematological and biochemical parameters were retrieved from these records using a questionnaire. The institutional ethical clearance was obtained prior to the study. The obtained data was coded and entered in Microsoft Excel and SPSS version 21 was used for analysis. Appropriate statistical methods such as mean, percentage, proportion and chi square were used for analysis.

RESULTS

In total, 131 completely filled records were obtained for the study. The mean age of the study population is 34.24 ± 19.88 years with a minimum age of 1 year and maximum of 82 years. In this study population, around 24% is less than 21 years and 26% is between 21 and 30 years. 11%, 16% and 15% of the population falls in the age groups 31-40, 41-50 and 51-60 years respectively. Only 9% of the population is above 60 years.

Table:1 The socio demographic details of study population

Parameter	Classification	Number total-131	Percentage
Age	<21	31	23.7%
Sex	Male	79	60.3 %
Religion	Hindu	64	48.9%

Christian	26	19.8 %
Muslim	41	31.3%
Female	52	39.7%
21-30	34	26%
31-40	14	10.7%
41-50	21	16%
51-60	19	14.5%
>60	12	9.2%

Out of the 131 patients considered for the study, 60% were males and 40% were females.

Considering the religion 49%,20%,31% were from Hindu, Christian, Muslim respectively.

Out of 131 positive dengue case 113(86%) of them reported with Dengue fever, 17(13%) of them had Dengue Haemorrhagic fever and 1 individual had Dengue shock syndrome. Fig No: 1

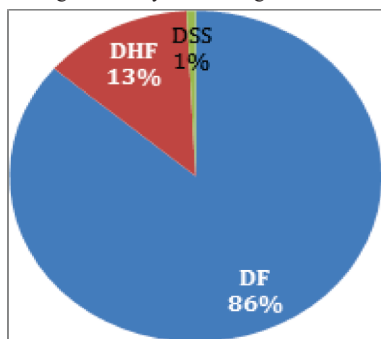


Fig. No 1: Distribution of study population according to the severity of dengue

Among 17 patients with DHF, the most common site of bleeding was Gastrointestinal tract (12), followed by gums(4) sub conjunctiva(2) and respiratory tract(2). Fig. No: 2

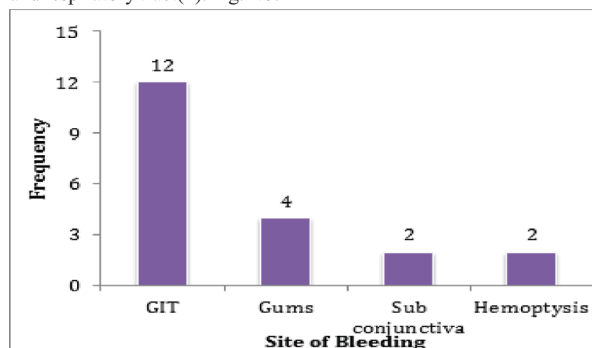


Figure no 2: Site of bleeding among Dengue haemorrhagic fever cases

Out of 131 patients, 23(17.6%) have haemoglobin value <12, 21(16%) have abnormal hematocrit, 80 (61.1%) have WBC count <4000, 50(38.2%) have platelet count low(1lakh), 7(5.3%) have raised bilirubin(>2), 93(71%) have elevated AST(>45) and 27(20.6%) have raised aPTT (>33.6). Table No: 2

Table no 2: Distribution of haematological and biochemical parameters among study population.

Parameter	Classification	Number Total -131	Percentage	
Haemoglobin	<12	23	17.6%	
Haematocrit	Normal <45	110	84%	
WBC Count	<4000	80	61.1%	
Platelet count	Low <1 lakh	50	38.2%	
Bilirubin	Normal(<2mg)	124	94.7%	
AST	Normal <45	38	29%	
Apt	Normal <33.6	104	79.4%	
	DF	DHF	DSS	
Abnormal>45	14	7	0	21

Normal	75	5	1	81
Raised>33.6	27	20.6%		
4000 – 11000	46	35.1%		
>11000	5	3.8%		
12- 16	95	72.5%		
>16	13	9.9%		
Raised >45	93	71%		
Raised(>2)	7	5.3%		
Normal	81	61.8%		
Abnormal>45	21	16%		
4000-11000	37	9	0	46
>11000	5	0	0	5
Raised >45	77	16	0	93
Raised >2	4	3	0	7

The present study showed that there was a statistically significant association between haematological parameters like raised haematocrit and classification of Dengue fever. (p value – 0.02).

There was a statistically significant association between the platelet count and severity of dengue. p value – 0.01. Biochemical parameters like AST and Apt were also associated with complications of dengue P value 0.01 , <0.001 respectively. Table: 3

Table no 3: Association between severity of dengue and laboratory and haematological parameters.

Parameter	Classification	Dengue classification			Total	Statistical significance
Haematocrit	Normal <45	99	10	1	110	Fisher's exact value – 7.62 P value – 0.02
WBC Count	<4000	71	8	1	80	Fisher's exact value – 4.55 P value – 0.33
Platelet count	Low	38	12	0	50	Fisher's exact value – 9.29 P value – 0.01
Bilirubin	Normal <2	109	14	1	124	Fisher's exact value – 4.2 P value – 0.12
AST	Normal <45	36	1	1	38	Fisher's exact value – 8.75 P value – 0.01
Apt	Normal <33.6	100	4	0	104	Fisher's exact value – 34.07 P value – <0.0001
	Raised >33.6	13	13	1	27	

DISCUSSION

In our study, 17% have DHF, 1% have DSS and remaining 86% have DF. It was found that the prevalence of DF were more in the age group of 21-30(26%) followed by age group <21 (23.7%), which was comparable to the study conducted by Patel et al having the most common age group affected between 25-35¹². Thrombocytopenia is one of the most important clinical hallmark seen in dengue fever in febrile state. Skin hemorrhages, including petechiae and purpura, are the most common, along with gum bleeding, epistaxis, menorrhagia, and gastrointestinal (GI) bleeds. In another study conducted by Patel et al, out of 250 seropositive cases of Dengue fever, there were 83% cases of Dengue fever, 16% cases of DHF and 1% cases of DSS.. and the most common clinical feature being high fever(95%). In our study, various sites of bleeding were considered and most common being GIT(12) followed by gums (40) and the least being sub conjunctiva(2) and hemoptysis(2).

In our study, distribution of haematological and biochemical parameters among the patients were assessed. It was found that 17.6% of study population have anemia(Hb<12). Abnormal haematocrit(>45) found in 16%. 61.1% of patients have leukopenia(WBC<4000) and 38.2% of patients have thrombocytopenia. In a study by Priyanka M Patel et al, leukopenia and thrombocytopenia seen in 44% and 59% respectively.

The present study shows a statistically significant association between complications of dengue with haematological parameters like platelet count, haematocrit and aPTT. In our study, Bleeding manifestations are

present in 1.76% having DF ,100% having DHF and100% having DSS.

In another study by Priyanka M Patel et al,¹² coagulation profile tests such as PT and APTT were observed in 75 seropositive cases of dengue and increased PT and APTT were seen in 10 (13%) and 8 (11%) seropositive cases of dengue, respectively. In a similar study conducted by Rachel Daniel¹³ bleeding manifestation occurred in 38 patients (15.2%).

CONCLUSION

The haematological and biochemical parameters were associated with complications of dengue fever. This enables to strengthen community awareness, early diagnosis, management, and vector control measures, thereby reduce the morbidity and mortality associated with Dengue Fever.

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