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Haematological Profile of Dengue Viral Infection-Study of Recent Epidemic - 2013 in North West Rajasthan

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Abstract
Background: *Dengue is a major health problem in many parts of India and Bikaner is one of the endemic areas for dengue. In 2013 an outbreak of dengue fever epidemic in Bikaner was repealed. Several factors have been attributed to increased morbidity and mortality in dengue with altered hematological and coagulation parameters playing an important role. Infection with dengue virus can cause a spectrum of three clinical syndromes classic dengue fever (DF), dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).*
Methods and Material: *The present study was undertaken to determine the hematological profile of dengue virus infection in hospital admitted patients. One hundred and fifty four patients admitted in P.B.M. hospital in September- November, 2013 with fever more than 38.5^{0C} and IgM dengue positive serology were studied.*
Results: *Out of 154 cases in this study 143 cases belonged to DF, 9 cases to DHF and 2 cases to DSS based on WHO criteria. Severe and moderate anaemia were found in 2.60% and 46.10% patients respectively while 51.30% patients having normal haemoglobin level. Leukopenia found in 54 cases (35.06%) and leucocytosis in 7 cases (4.55%) cases while thrombocytopenia 137 (87.01%) patients according to WHO criteria.*
Conclusion: *Dengue fever was a more common manifestation than DHF or DSS. During epidemic, dengue should be strongly considered on the differential diagnosis of any patient with fever. The treatment of dengue is mainly fluid management and supportive. All patients were followed for 4 weeks and recovered completely.*
Keywords : *Dengue fever, Dengue hemorrhagic fever; Dengue shock syndrome; Thrombocytopenia; IgM Dengue.*

I. Introduction

Dengue is the most important arthropod-borne viral disease of public health significance. Dengue fever is an acute febrile disease characterized by sudden onset of fever of 3-5 days, intense headache, myalgia, retro-orbital pain, anorexia, gastrointestinal disturbances and rash. Dengue viruses are flavivirus, which include four serotypes1,2,3 and 4.[1,3] The viruses are transmitted to man by the bite of infective mosquitoes, mainly Aedes aegypti. The incubation period is 4-7 days, but range from 3 to 14 days.[3]
The disease is now endemic in most tropical, subtropical countries.
Dengue fever (DF) with its severe manifestations such as DHF and DSS has emerged as a major public health problem of international concern

Today, Dengue ranks as the most important mosquito- borne viral disease in the world. Current estimates report that, at least 112countries are endemic for Dengue and about 40% of the world populations (2.5-3 billion people) are at risk in tropics and subtropics.

Annually 100 million cases of dengue fever and half a million cases of DHF occur worldwide.

II. Material & Methods

The study was carried out in the department of Pathology, Sardar Patel, medical college and associated group of hospitals, Bikaner. This study was hospital based prospective study, including all the patients with dengue fever who were admitted in hospital during epidemic in 2013.

Clinically suspected cases of dengue with serological confirmation of either dengue specific antigen assay and/or IgM and/or IgG antibody detection were selected. Evaluation of hematological parameters and peripheral smear study was carried out.

Inclusion Criteria:

All the blood samples sent to the department of pathology, which are found to be positive by serology (IgM antibody / IgG antibody), were included.

Exclusion Criteria:

1. Suspected dengue cases in which serology was found to be negative.
2. Serologically positive cases of dengue, which were also positive for other coexistent infections Eg. Malaria, typhoid, are excluded from the study.

Patients' clinical data were collected. Serology derived from a venous blood sample collected from the patients presenting with symptoms suggestive of dengue and placed in a sterile glass bottle were transported to the laboratory immediately. A commercially available Dengue NS1 Ag & Ab Combi-card test kit will be used to detect NS1 antigen and IgM and IgG antibodies. Evaluation of hematological parameters were done by collecting 2 ml of sample on EDTA prefilled vial and transporting it to the laboratory immediately. The analysis was done by the automated Analyzer. Peripheral smears were studied after staining with the field's and Leishman's stain.

III. Observation

We have done a hospital based prospective study on a total of 154 patients admitted to our hospital with fever (>101^0F) and IgM seropositive dengue were studied. Out of 154 patients 143(92.9%) patients were diagnosed to have DF, 9(5.8%) patients were diagnosed to have DHF and 2(1.3%) patients were diagnosed to have DSS based on WHO criteria.

The present study included 35 (22.7%) female and 119 (77.3%) male patients. Dengue infection was more common in males due to geographical distribution

IV. Figures and Tables

Table -1: Sex Distribution Of Df, Dhf And Dss

Sex	DF	Percentage	DHF	Percentage	DSS	Percentage
	NO.	%	NO.	%	NO.	%
Female	34	23.78	0	0	1	50
Male	109	76.22	9	100	1	50
Total	143	100	9	100	2	100

Dengue was more among males i.e., 109(76.22%) than in females i.e., 34(23.78%). DHF cases was seen only among males i.e,9(100%) while DSS have equal incidence in Male and female with one case in each (50% each) (Table-1).

Table 2-:Age Wise Distribution

Age group (In years)	Number of cases	Percent
<10	7	4.54
10-20	39	25.32
21-30	60	38.96
31-40	21	13.63
41-50	19	12.33
51-60	6	3.89
>60	2	1.29
Total	154	100

Majority of the cases having dengue infection belong to the age group of 21-30 years (38.96%)followed by 10-20 year age group(25.32%). So it was more common in younger population.

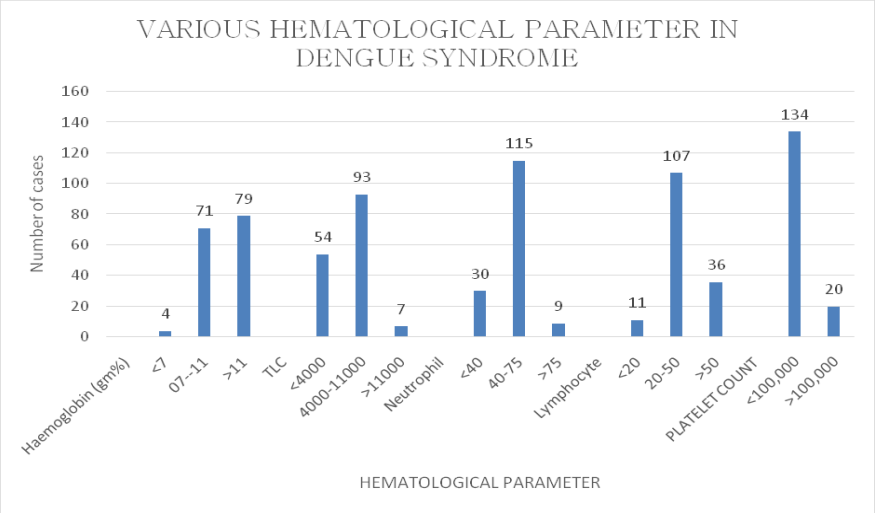
Table 3: Hematological Parameters

Haemoglobin (gm%)		**Platelet count**		TLC		Neutrophil		Lymphocyte	
NO.	HB gm%	**Count**	No. of cases	Per mm^3	No.of cases	DLC-N	%	DLC-L	%
<7	4	**<100,000**	134	<4000	54	<40	30	<20	11
7-11	71	**>100,000**	20	4000-11000	93	40-75	115	20-50	107
>11	79	Total	154	>11000	7	>75	9	>50	36
	154			Total	154	Total	154	Total	154

Severe (<7 gm%) and moderate(7-11gm%) anaemia were found in 4(2.60%) case and 71 (46.10%) cases respectively while 79 (51.30%) cases having normal haemoglobin level. As per WHO criteria 134 (87.01%) patients had thrombocytopenia on admission.

Out of 154 patients, 93(60.39%) patients had total leukocyte counts between 4,000and 11,000. Leukopenia was present in 54 (35.06%) patients while leucocytosis was present in 7 (4.55%) patients. In 30(19.48%) cases Neutropenia was found and 115 (74.68%) and 9 (5.84%) cases were found to showing normal and Neutrophila respectively in DLC. In 11(7.14%) cases Lymphopenia was found and 107 (69.48%) and 36 (23.38%) cases

were found to showing normal and lymphocytosis respectively in DLC. All cases were found to reactive for IgM and non-reactive for IgG on serology.



V. Discussion

The word dengue is believed to have originated from Swahili language "ki denga pepo", which describes sudden cramp like seizure. The clinical symptoms suggestive of dengue virus infection can be traced back to Chinese Chin Dynasty (265-420 AD) where disease was considered as water poison and was known to be associated with water and insects[1].

Dengue is the most rapidly spreading mosquito-borne viral disease in the world. In the last 50 years, incidence has increased 30-fold with increasing geographic expansion to new countries and, in the present decade, from urban to rural settings. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries[2].

In India dengue has seen resurgence in recent times. Reported case fatality rates in India are 3-5 %.[3]

India comes under category B of the classification meant for SEAR. Here DHF is an emerging disease, cyclical epidemics are frequent and multiple virus serotypes exist. The first recorded outbreak of dengue fever in India was in 1812, but only in 1954 they started to look for neurological evidence of dengue infection, which showed that DEN-1 and DEN-2 were widespread[2].

A double peak hemorrhagic fever epidemic occurred in India for the first time in Calcutta between July 1963 and March 1964. DEN-2 virus strain were isolated from patients with severe hemorrhagic manifestation during first peak[4,5].

In New Delhi, outbreaks of dengue fever were reported in 1967, 1970, 1980. An explosive outbreak of dengue fever occurred between Augusts to October in the year 1982.

DEN-1 and DEN-2 were reported from 36 patients. There were no hemorrhagic manifestation or fatalities recorded during this episode[5].

In the city of Mangalore, dengue fever cases were seen from July to August 1993. It was associated with palatal petichiae and facial flush[2].

Dengue often presents in the form of large outbreaks. There is however also a seasonality of dengue, with outbreaks occurring in different periods of the year. The seasonality is determined by the peak transmission of the disease influenced by characteristics of the host, the vector and the agent. The monsoon and post monsoon surge of the disease is very well documented.

Classical dengue fever is an acute febrile illness but in a small percentage of dengue infection, a more severe form of disease known as DHF occurs. Early recognition and meticulous management are very important to save precious lives from this killer disease.

In index study total of 154 patients admitted to our hospital with fever of $>101^0$F and IgM Dengue positive were included.

Out of 154, 35(22.7%) female and 119 (77.3%) male patients, out of which 34 (23.78%) females and 109(76.22%) males were diagnosed to have DF. Male to female ratio was 3.4:1. This was corresponding to the other studies by Paresh s shah et al[6] and Neerja M et al[7] i.e., 4:1, 2:1 respectively. In index study, DHF was common in males than females.

In the index study, Dengue fever was seen in 92.8% of the study population. The incidence of DHF and DSS was 5.8%and 1.4% respectively. In a study done by Neerja M et al[7] the prevalence of DF, DHF, DSS was

85%, 5%, 10% respectively. In a study done by Pancharoen et al[8] there was high incidence of DHF i.e., 60.4%. The results of the present study correspond to a study by Neerja M et al[7].

In index study, 134 (87.01%) patients had thrombocytopenia. The association of thrombocytopenia with dengue virus infection has been proved to be significant ($p < 0.001$). Studies by Singh N P et al[10] and Khan E et al [2]showed the incidence of thrombocytopenia in 94.7%, 61.39%, 81.4% respectively. In the index study bleeding manifestations were seen more in patients with thrombocytopenia than with patients of normal platelet count.

In index study we found leukopenia in 35.06% which was nearly correlated with the study of Ratageri V[11] et al (leukopenia in 24% patients) and Santwana Verma[12] et al (leucopenia in 47.05% patient).

Destruction of platelets appears to occur because of complement activation (presumably because platelets bind virus antigens) and also because of peripheral sequestration.[13,14]

Because dengue virus has been shown to suppress marrow production of platelets, both decreased production and increased utilization of platelets may contribute to bleeding early in infection. Bone marrow studies in patients with DHF have shown marked depression of all marrow elements and down regulation of haematopoiesis.[14]

Clinical feature of dengue can be divided into five presentations.

1) Non specific febrile illness, 2) Classical dengue fever, 3) DHF, 4) DSS and

5) Unusual syndromes such as encephalopathy, fulminant liver failure, myocarditis, acute renal failure,etc.

Management of dengue fever is symptomatic with bed rest, antipyretics and analgesics. Aspirin is avoided as it may aggravate gastritis or bleeding

VI. Conclusion

Dengue serosurveillance studies may give some idea about advent, intensity, transmission season, seasonal incidence, waxing and warning, and impending epidemic of dengue and DHF. A large-scale active longitudinal serosurvey along with the study of vector capacity and vector competence would provide more correct information. Dengue fever was a more common manifestation than DHF or DSS. During epidemic, dengue should be strongly considered on the differential diagnosis of any patient with fever in endemic areas. The treatment of dengue is mainly fluid management and supportive. The haematological parameter should be monitored during therapy.

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