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Clinico-haematological parameters in dengue in adults: a retrospective study from a tertiary care hospital

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Abstract

Background: Dengue is an arboviral infection, endemic in India. The clinical presentation can vary from fever with rashes to severe bleeding tendencies as in dengue hemorrhagic fever (DHF), and dengue shock syndrome, leading to death. Various laboratory parameters get deranged in Dengue, like total platelet counts, haematocrit and total leucocyte counts. Monitoring these symptoms and lab parameters can help to prevent the cases from complications. Aims and Objectives: This study was undertaken to study clinical presentations, the haematological and biochemical parameters and the outcome of the patients suffering from dengue.

Materials and methods: This was a retrospective study conducted in the department of Microbiology, Father Muller Medical College Hospital, Mangalore. All patients above the age of 18 years who were diagnosed as dengue, with positive result for NS1Ag or IgM or IgG antibodies were included in the study. The data from individual patients were noted down from individual files and entered in to the Microsoft excel. Data collected will be analysed by frequency and percentage

Results: The study included 130 patients, two third of which were males. Majority of the patients were of the age group of 18-30 years 48(36.92%) and only 12 patients' (9.23%) were with serious presentation so that to be managed in Intensive care unit. Most of the patients presented with typical symptoms of Dengue i.e., fever 128 (98.46%), 104 (80%) patients had thrombocytopenia. The ultrasonography of abdomen (USG) showed splenomegaly in 24.62% of the patients. The pleural effusion was seen in 10 patients, and ascites seen in 15 patients. Two patients succumbed to death, with best of the efforts.

Conclusion: In Dengue infection, some of the signs and symptoms of low platelet counts and plasma leakage, like bleeding gums, malena, haematuria, and pedal edema, ascites, pleural effusion, respectively, needs to be monitored carefully so that the required supportive therapy to be initiated at the earliest so as to reduce the mortality.

Keywords: Dengue, adults, bleeding tendencies, plasma leak

Introduction

Dengue is an arboviral infection transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes and is emerging as one of the most important mosquito-borne viral disease. It is a serious global public health problem, with 2.5 billion people at risk and an annual range of 50 to 390 million infections, which include dengue fever, dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS) [1-5]. From a historical perspective, the word dengue came from "denga or dyengo" which in Africa means haemorrhage. The first definite clinical report of Dengue is attributed to Benjamin Rush in 1789 [6]. He coined the term "break-bone fever" because of the symptoms of myalgia and arthralgia [5].

The Dengue virus (DEN) was isolated in Japan in 1943 by inoculation of serum of patients in suckling mice [7] and at Kolkata in 1944 from serum samples of US soldiers [8]. It is a small single-stranded RNA virus comprising four distinct serotypes DENV-1, DENV-2, DENV-3 and DENV-4. These closely related serotypes of the dengue virus belong to the genus Flavivirus, family Flaviviridae [1-4]. Distinct genotypes or lineages (viruses highly related in nucleotide sequence) have been identified within each serotype, highlighting the extensive genetic variability of the dengue serotypes [5].

Dengue infection is a systemic and dynamic disease and causes illness including undifferentiated fever, dengue fever (DF), dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS). It has a wide clinical spectrum that includes both severe and non-severe clinical manifestations [9]. After the incubation period, the illness begins abruptly and is followed by the three phases febrile, critical and recovery [5]. The mechanisms by which pathophysiologic changes occur in dengue fever are still not fully understood [5]. The interaction of several factors seems to be responsible for the development of the severe disease [1-6]. These factors include the following: the virulence of the circulating strain, the presence of efficient or high density vector, the wide circulation of the virus, and characteristics of the host as genetic factors, ethnicity, presence of chronic diseases, and subsequent DENV infections [10, 11].

In general, dengue is a self-limiting acute febrile illness followed by a phase of critical defervescence, in which patients may improve or progress to a severe form. Severe illness is characterized by hemodynamic disturbances, increased vascular permeability, hypovolemia, hypotension, and shock. Thrombocytopenia and platelet dysfunction are common in both cases and are related to the clinical outcome [12]. For a disease that is complex in its manifestations, management is relatively simple, inexpensive and very effective in saving lives so long as correct and timely interventions are instituted [5].

India's notable 2.1% share of global international travel in 2012 [13], its increasing role in the global economy [14] and its growing public health problem with dengue [15, 16] calls for a closer look at the dengue challenge. Although dengue has been notifiable in India since 1996, the disease's impact has been underestimated because of insufficient information on incidence and cost of dengue illness [17]. This study was undertaken with the principal objectives to study the various clinical presentations of dengue fever, study the haematological and biochemical parameters in patients with dengue fever and to study the outcome of the patients suffering from dengue.

Materials and methods

This was a retrospective study conducted in the department of Microbiology, Father Muller Medical College Hospital, Mangalore in May 2015. All patients above the age of 18 years, who got admitted with the history of fever and suspicion of dengue from July to August 2014, were included in the study. The serological assays for Dengue were performed using standard kit (J Mitra & Co. Pvt Ltd, New Delhi). Adults with positive result for NS1Ag or IgM or IgG antibodies against dengue virus were considered dengue positive group. The exclusion criteria included patients with pre-existing substantial chronic liver, kidney or heart disease; patients with history of haematological disorders and patients diagnosed with malaria, leptospirosis, scrub typhus, hepatitis and enteric fever. All the clinical and laboratory details during the study time period were considered. The data from individual patients were noted down from individual files and entered in to the Microsoft excel. Data collected will be analysed by frequency and percentage.

Results

The study included 130 patients, two third of which were males (82, 63.08%) and 48 (36.92%) were females (Table

1). Majority of the patients who were diagnosed with dengue were of the age group of 18-30 years 48 (36.92%), followed by 31-40 years, 34 (26.15%) (Table 1). The least were seen in the older age group 51-60years (Table 1). Most of the patients (118) were managed in the wards and only 12 patients' (9.23%) were serious presentation so that be to managed in Intensive care unit (Table 1). Most of the patients were managed and but two patients (1.54%) succumbed to death even after best of the efforts (Table 1). Most of the patients presented with typical symptoms of dengue i.e., fever 128 (98.46%), followed by body ache (79.23%), joint pain (54, 41.54%), rashes over body (16, 12.31%), retro orbital pain (6, 4.62%). atypical symptoms included vomiting (55, 42.31%), loose stools (11, 8.46%) (Table 1). It was observed that 104 (80%) patients had thrombocytopenia as per WHO criteria ($< 1 \text{ lakh/mm}^3$) (Table 1). Most of the patients (74, 56.9%) had a total count of 4000-11000 cells/mm³ in contrast to leucocytosis and leukopenia was seen in 34 and 22 patients, respectively (Table 1). The hematocrit below 40 was observed in majority (78) and 22 patients had a hematocrit value >45 (Table 1). The results also indicated that 41 patients had an abnormal LFT and 27 patients abnormal RFT, with a mortality of 2 patients (Table 1). The ultrasonography of abdomen (USG) showed hepatomegaly in 20.77%, splenomegaly in 24.62% and hepatosplenomegaly in 6.15% of the patients (Table 2). The study also showed that plasma leakage in terms of pleural effusion was seen in 10 patients, and ascites seen in 15 patients (Table 2).

Table 1: Clinical details of the patients admitted for dengue in a tertiary care hospital

		Frequency (Percentage)
Gender	Male	82 (63.08)
	Female	48 (36.92)
Age	18-30	48 (36.92)
	31-40y	34 (26.15)
	41-50	18 (13.85)
	51-60y	11 (8.46)
	> 60	19 (14.62)
Platelet	$< 1 \text{ Lakh}$	104 (80)
	$>1 \text{ Lakh}$	26 (20)
Total Leucocyte Count	<4000	22 (16.92)
	4000-11000	74 (56.92)
	>11000	34 (26.15)
Hematocrit	<40	78 (60)
	40-45	30 (23.08)
	>45	22 (16.92)
Abnormal Biochemical parameters	LFT	41 (31.54)
	RFT	27 (20.77)
Admissions	MICU	12 (9.23)
	Ward	118 (90.77)
Outcome	Mortality	2 (1.54)
	Alive	128 (98.46)

Discussion

Dengue fever is a serious global public health problem [1-3]. The number of cases seen in India is on the rise. In most cases, classical dengue fever presents as an acute febrile illness and requires only support therapy which includes mainly anti-pyretics and fluid therapy [1-8]. A small number of cases progress to Dengue Haemorrhagic Fever (DHF), which is a more severe form of the disease [5]. It is important, therefore, to be able to predict which cases of

dengue fever are likely to progress to the severe form of the disease based on the symptomatology and routine blood investigations.

In our study, the male: female ratio was 1.7: 1 for male is to female and was different when compared to previous studies [18-21]. The reason was not clearly known, as this was a retrospective study. But it can be attributed to the fact that more males get exposed to this day-time biting mosquito at the work place, especially at construction site, etc. With regard to symptoms, fever was the most common symptom seen in the patients included in the study and is comparable with other studies conducted in India [18-26]. Body ache was seen in about 80% of the patients. Other common symptoms included myalgia (46.9%) and headache (29.2%) (Table 2). Other symptoms that patients presented with were edema, breathlessness, bleeding gums, retro orbital pain, sore throat, melena, abdominal distension, altered sensorium and hematuria. These symptoms, though rarely seen are indicators of the severity of the disease.

Among the haematological parameters, total platelet count plays a major role. Thrombocytopenia has always been one of the criteria used by WHO guidelines as a potential indicator of clinical severity [5, 21-24]. The mechanisms involved in thrombocytopenia and bleeding during DENV infection are not fully understood. Several hypotheses have been suggested to elucidate the mechanism involved. In this context, DENV could directly or indirectly affect bone marrow progenitor cells by inhibiting their function [27] to reduce the proliferative capacity of hematopoietic cells [28]. Indeed, there is evidence that DENV can induce bone marrow hypoplasia during the acute phase of the disease [29]. We observed thrombocytopenia in 80% of our cases, and these results are in agreement to various Indian studies [18-26, 30-32].

Out of 130 patients in the study, the evidence of fluid leakage into interstitial space was evident as Ascites, Pleural effusion and pedal oedema in 11.54%, 7.69% and 6.15%, respectively. The frequency of features of fluid leakage was marginally less when compared to previous studies [19, 20]. As per WHO guidelines pedal oedema, ascites and pleural effusion are the supporting evidence of plasma leakage, the distinguishing feature of DHF. Even after the best of the efforts to manage these dengue cases, we had a two cases succumbed to death, with the fatality rate of 1.5%. This is lower to other Indian studies which showed fatality rate from 3.8% to 7% [21, 22]. The two cases succumbed to death due to delayed presentation to hospital and had DHF.

Conclusion

India is endemic to Dengue virus as the vector for the transmission is present all over. The patients can present with atypical symptoms, so the suspicion of the dengue in these patients is very important especially during the peak season of transmission. Some of the signs and symptoms low platelet counts and plasma leakage, like bleeding gums, malena, haematuria, and pedal edema, ascites, pleural effusion, respectively, needs to be monitored carefully so that the required supportive therapy to be initiated at the earliest. The effective management of Dengue patients mainly include appropriate fluid management and prevention of bleeding tendency plays a major role in outcome of the disease.

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