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Original Research Article.

Dengue: An Insight into Clinical and Hematological Profiles

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ABSTRACT

Background: Dengue is a mosquito bone flavoviral disease which has emerged as a serious health issue in past decades. It is associated with multiple clinical manifestation and mortality in severe cases. These can be reduced by timely diagnosis and proper management. Thus the aim of our study is to assess the clinical and hematological profile of patients infected with dengue.

Methods: This study was conducted in the department of Pathology at Varun-Arjum Medical College and Rohilkhand Hosptital, Shahjahanpur, Banthara, Uttar Pradesh, India.

Results: Total 75 patients was included in our study of which most of the patients were males (70.67%),13.33%, 64% and 22.67% of cases in our study were present with severe dengue, dengue with and without warning signs respectively. Fever was most common feature presented (100%) followed by headache (84%), myalgia (78.67%), nausea/Vomiting (34.67%) and Abdominal pain (22.67%). Thrombocytopenia was most common hematological finding (73.33%). 42.67% of patients had Leucopenia, 45.33% had Hematocrit value > 45% while 7% of cases had prothrombin time >14 sec and partial thromboplastin time more than 40 sec. All the patients were given antipyretics while 37.33 %, and 7% of patients received IV fluids and platelet transfusion.

Conclusion: Dengue is increasing globally due to uncontrolled urbanization and unhygienic sanitation. Sustained control measures, knowledge of warning signs in association with proper laboratory investigations and proper fluids management can yield worthful outcomes.

Key words: Dengue, Warning Signs, Thrombocytopenia, Leucopenia, Prothrombin Time.

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INTRODUCTION

Dengue being the most common disease affects about 2.5-3 billion individuals globally.[1] Annually 50-100 million people are infected with 70% of world population infected with dengue lying in Asia-Pacific belt.[2] Rapid and unmanaged urbanization, water pollution, development of insecticide resistant mosquitoes are the major contributors for the increased prevalence of dengue.[3]

Dengue is caused by the Flavivirus which has four serotypes (viz DEN-1 TO DEN-4) all of which can eventually infect the humans.[4] Dengue is transmitted by the female mosquitoes belonging to species like *Aedes Aegypti* (mostly) and *Aedes Albopictus* (to some extent).[5] These mosquitoes act as vector for the transmission of disease to human host. These vectors can transmit dengue immediately by a change in host (when feeding gets interrupted) or after 8-10 days of incubation period, during which the virus replicates in salivary glands of the vector.[6] Once humans are infected, symptoms appears after 3-14 days. The illness can be manifested as classical dengue fever, dengue hemorrhagic fever and dengue shock syndrome.[7]

The classical symptoms include nausea, vomiting high fever, muscle and joint pain. The involvement of muscle and joint results in severe bone pain, a condition known as break bone fever.[8] Dengue shock syndrome or dengue hemorrhagic fever involves life threatening symptoms like blood plasma spillage, decreased platelet count and severe organ impairment.[8] Dengue shock syndrome is dengue hemorrhagic fever accompanied with circulatory failure, narrow pulse pressure, hypertension.[9] Leukopenia and lymphocytosis are the most prominent hematological change associated with dengue. With the progression of disease, there is 20% increase in hematocrit value from base line.[10] In 2009, WHO revised the guidelines for classification of dengue and categorized it as dengue without warning signs, dengue with warning signs and severe dengue.[11] The warning signs included positive torniquette test, hypotension, pulse pressure <20, pleural effusion, ascites, gall bladder with edema and altered sensorium. Dengue virus was first identified in India in 1945 and in 1956 first occurrence of dengue fever was

reported. In 1963, first evidence of hemorrhagic dengue fever was observed in Calcutta. Since then the outbreaks of this disorder are reported in different parts of Indian subcontinent. In last 10 years, the case fatality has also increased above 1%.[12] Dengue fever is one of the most emerging causes of hospitalization and death in India. According to WHO, Indian scenario shows more than a century old record of persistence of dengue fever.[13] Though studies have shown the cause of dengue and its effect on general population, there is still requirement of diagnostic tool for proper diagnosis and management of dengue, which is crucial for saving life. Thus this study was aimed to analyze various clinical and hematological profiles of patients with dengue fever so as to aid in the screening of disease by healthcare professionals.

MATERIALS AND METHODS

This study was a hospital based study conducted in the Department of Pathology, Varun-Arjun Medical College and Rohilkhand Hospital, Shahjahanpur, Banthara, Uttar Pradesh, India. 75 patients positive for dengue confirmed by serological test were included for the study. Prior to study ethical clearance from the institute and informed consent were taken from the patients.

Inclusion Criteria

- Patients of both genders (positive for dengue fever) who were willing to participate

Exclusion Criteria

- Patients with negative test for dengue
- Patients having concomitant typhoid, malaria and leptospirosis

The patients positive for dengue were further categorized as those with dengue with no warning signs, dengue with warning signs and sever dengue as per WHO guidelines. These patients were evaluated for clinical signs and symptoms followed by analysis of hematological profile involving TLC, hemoglobin, hematocrit, platelet count, prothrombin time (PT) and partial thromboplastin time (PTT). Serum bilirubin, AST and ALT were also estimated. Data was collected and analyzed using SPSS 16 Software.

RESULTS

Total of 75 patients suffering from dengue were enrolled in the study, of which 70.67% were male and 29.33% were female with male to female ratio of 2.4:1. Dengue was commonly seen in the age group of 20-40 years in both genders (Table 1). 13.33% of patients were suffering from severe dengue. While 22.67% were without warning signs and 64% showed dengue fever with warning signs (Table 2) the common clinical feature presented by the patients was fever (100%), followed by headache (84%), myalgia (78.67%), nausea/vomiting (34.67%), abdominal pain (22.67%). Hepatomegaly and splenomegaly was seen in 22.67% and 17.33% of cases respectively while icterus (hyperbilirubinemia) and transaminitis was seen in 6.67% and 42.67% of cases (Table 3).

43.33% of patients showed increased hematocrit value (>45%) while leucopenia and thrombocytopenia were observed in 42.66% and 73.33% of patients respectively. Among hematocytopenic patients 16% had platelet less than 20000/cumm while 50.67% had between 20000-50000/cumm and 20% had between 50000 -1 lakh/cumm. Hemoglobin was less than 10gm% among 12% of patients while PT and PTT were increased above 14 sec in 7% of the patients (Table 4).

Antipyretic drug was given to all the patients involved whereas (37.33%) of patients required IV fluids and 12% and 7% cases under went fresh blood and platelet transfusion respectively (Table5).

Table 1: Age and gender wise categorized patients

Age	Male	Female	Total
<20	8	3	11(14.67%)
20-40	34	12	46(61.33%)
40-60	9	5	14(18.67%)
>60	2	2	4(5.33%)
Total	53 (70.67%)	22 (29.33%)	
Male : Female		2.4:1	

Table 2: Distribution of dengue cases according to WHO

Type	No.	(%)
Dengue without warning sign	17	22.67%
Dengue with warning signs	48	64%
Severe dengue	10	13.33%

Table 3: Category of patients according to clinical features

Clinical signs	No.	(%)
Headache	63	84 %
Nausea/Vomiting	26	34.67%
Fever	75	100 %
Diarrhea	5	6.67 %
Abdominal pain	17	22.67 %
Myalgia	59	78.67 %
Lethargy	16	21.33 %
Skin rashes	18	24 %
Ithching	11	14.67 %
Bleeding	15	20 %
Bradycardia	11	14.67 %
Breathelessness	9	12 %
Pleural effusion	13	17.33 %
Hepathomegaly	17	22.67 %
Spleeenomegaly	13	17.33%
Hyperbilirubinemia	5	6.67 %
Transaminitis	32	42.67 %

Table 4: Hematological profile of patients

Parameters	No.	(%)
Hematocrit (<45%)	34	45.33%
Leucopenia	32	42.67%
Thrombocytopenia	55	73.33%
< 20000/Cumm	12	16%
20000-50000/Cumm	38	50.67%
50000-100000/Cumm	15	20%
>100000/Cumm	9	12%
Hemoglobin (<10gm%)	9	12%
Prothrombin time > 14 sec (PT)	5	7%
Partial thromboplastin time >40 sec (PTT)	5	7%

Table 5: Management of Dengue

Treatment	No.	(%)
Antipyretics	75	100 **%**
IV Fluids	28	37.33**%**
Fresh Blood Transfusion	9	12**%**
Platelet Blood Transfusion	5	7**%**

DISCUSSION

Dengue fever has been persisting in India for more than two centuries. It is caused by the virus that belongs to genus *Flaviviridae*. Dengue mainly affects tropical countries and the incidence has increased globally in recent decades. In India, dengue has emerged as a major health issue because of its regular outbreaks with the increasing number of deaths. The main reason of such dramatic increase is unplanned urbanization and poor sanitation. In this study, we mainly focused on clinical presentation and hematological profile of patients infected with dengue followed by the treatment modality. Of 75 cases 70.67% were males and 29.33% were female with male to female ratio of 2.4:1. Male to female ratio was 2.67:1 in the study of Deshwal R et al[1] while it was 1.94:1 according to Chhotala YH et al.[14] Study conducted in Kerala also showed the predominance of male patients with male to female ratio of 1.08:1.[15] Similar pattern was also seen in study of Avasthi S et al,[16] Lepakshi G et al[17] and Karoli R et al.[18] Dengue in present study was most commonly present in the age group of 20-40 years. In study of Chhotala YH et al[14] dengue was most prevalent in age group of 20-29 while it was between 21-30 years and 11-30 years in the studies of Gupta et al[19] and Bandyopadhaya et al respectively.[20] As per WHO classification, we found that 22.67% of people had dengue without warning signs, 64% had dengue with warning signs and 13.33% had severe dengue. In study of Jain H et al 23%, 64.65% and 12.3% of patients had dengue without warning signs, with warning sign and severe dengue respectively.[21]

In our study fever was most common clinical features, showed by patients (100%). It was in accordance with the previous studies in India.[17,22] Headache was present in 84%of cases which was similar to findings of Chhotala YH et al[14], and Kumar R et al[23] while it was in contrast to that reported by Munde et al.[24] Myalgia was present in 78.67% of patients which was concomitant with studies of Khan YM et al[7] and Jain H et al[21] while this finding was opposed to that Kausher MM et al[25] who showed lower incidence of 32.87%. In our study abdominal pain, nausea and vomiting were present in 22.67%, 3.6% and 34.67% of cases respectively. Studies of Singh R et al[26] and Munde et al[24] showed lower incidences of abdominal pain 3.6% and 15% respectively. Vomiting was present in 5.4% of 11% cases respectively in studies of Singh R et al[26] and Munde et al.[24] Bleeding was observed in 20.8% of cases. Bleeding is a common features of dengue due to low platelets and blood leakage from vessels. Study of Khan MY et al[7] showed bleeding manifestation in 9.33% of cases while Kauser MM et al[25] and Kumar A et al[27] presented it to be 1.36% and 4.7 % respectively. Similarly Horvath R et al[28] reported the same to be 63%. Skin rash and itching were present in 24% and 14.67% of cases respectively which were in contrast to that of Kausar MM et al[25] and Kumar A et al[27] while similar to that of Singh R et al[26] and Daniel R et al.[15] In our study icterus was observed in 6.67% of cases which was in accordance with Khan YM et al[7] who showed it to be 9.33% while Singh R et al[26] demonstrated it to be 17.1%. Bradycardia was shown by 15.7% of cases in this study. In study of Daniel R et al[15] it was 16.8%.

Hepatomegaly, splenomegaly and transaminitis were respectively present in 22.07%, 18.2% and 43% of patients respectively. Hepatomegaly was seen in 12.66% of patients in study of Khan YM et al[7] while splenomegaly was present in 15.32% of cases, which was comparable to that of Deshwal R et al (13.2%)[1] and Lepakshi G et al (18%).[17] Transaminitis (increase in level of transaminase) was documented among 88.54% of cases[1] while it was 88% in study of Kularatne et al.[29] Likewise Munde et al[24] reported it to be 83.78%. All these reports were higher than that of our observation while our observation was comparable with that of Jain H et al (38%).[21]

In our study, we studied hematological parameters like hematocrit, platelet count leucocyte count, hemoglobin, prothrombin time (PT) and partial thromboplastin time (PTT). Hematocrit was raised to more than 45% in 45.33% cases which was higher than that observed by Khan YM et al (23.33%) of cases.[7] In study of Jain H et al, hematocrit was more than 35% in 84% of cases.[21] Leucopenia was observed in 43.08% of cases which was comparable to that of previous studies[1,15,17,30], but studies of Karoli et al[18] and Ali N et al[31] showed leucopenia in 89% and 26.6% of cases respectively. About 73.62% of patients involved in our study was thrombocytopenic. Ali N et al[31] found that 07.1% of patients have thrombocytopenia while Khan YM et al[7] Munde et al[24] and Karoli R[18] et al reported that 56.66%, 75% and 89% of patients respectively were detected with thrombocytopenia. Among the thrombocytopenic cases observed in this study, 16% of patients had platelet count less than 20000/cumm, 50.67% had platelet count between 20000-50000/cumm, 20% between 50000-100000/cumm and 12 % had platelet level above 100000/cumm. Jain H et al[21] observed 80% of cases to have platelet count less than 100000/cumm of which 10% of cases had <20000/cumm and majority had it between 50000-1.0lakh/cumm. The main cause of thrombocytopenia may be bone marrow suppression or immune medicated clearance as well as spontaneous aggregation of platelet to endothelium infected with virus.[23]

Thrombocytopenia was most common laboratory investigation of our study. Ageep A K et al[32], Mittal H et al[33] and Seema A[16] et al also reported it to be the most common observation with the persistence out rate of 88%, 92.6% and 88.4% respectively. Lower hemoglobin was observed in 12% of cases while increased PT and PTT were observed in 7%. Irfan A[34] reported prolonged APTT in 26% of cases. 2.5% and 16.7% of patients involved in study of Ali N et al[31] had deranged PT and APTT respectively.

CONCLUSION

Dengue prevalence is increasing due to improper urbanization and sanitation. It is associated with symptoms like fever, headache, skin rashes, nausea, vomiting, abdominal pain, bradycardia etc. thrombocytopenia is the most common laboratory observation in dengue infection. As incidence of dengue is increasing, there is need of improving diagnostic and treatment modality. Early diagnosis, proper monitoring and fluid management is necessary to reduce morbidity and mortality. Clinical features, laboratory investigations properly along with blood smear examination in order to aid early diagnosis and prevent complications. Further studies are also required for better understanding of this disease and its therapy that can lead to prompt response to contemporary treatment with less severe complications.

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