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AN INVESTIGATION TO DETERMINE THE CLINICO-HEMATOLOGICAL PROFILE OF PATIENTS DIAGNOSED WITH DENGUE FEVER

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Abstract

Aim: To determine the clinical and hematological profile in patients with Dengue fever.

Materials and Methods: A prospective study was conducted in the Department of General Medicine, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India and Dubey Nursing Clinic Friends Colony Patna, Bihar for 1 year. Total 120 patients with complaints of fever and clinical features of dengue with positive NS1 antigen test or dengue antibody serology IgM or IgG or both were included in the study.

Results: Most of the cases (47.5%) were seen in the 20-30 year age group followed by 40-50 years 20.83%, 30-40 years 15%. Majority of the patients were males 78 (65%) compared to females, 42 (35%) and the male to female ratio was1.8:1. Fever was the most common presentation and was seen in 106 cases (88.33%) cases. 54 (45%) cases showed Hb of 9-12 gm %, followed by 38(31.67%) cases showed Hb of 12-15 gm %, 9 (7.5%) had Hb of below 9 gm % and 19 (15.83 %) had Hb of above 15 gm% .63(52.5 %) cases showed hematocrit of 25-35% and 35 (29.17 %) showed hematocrit of 35-45%. 21 (17.5 %) cases , count of 4000- 11000 cells/cu mm seen in 81(67.5%) cases, >11000/ cumm was seen in 18 cases (15%) and <4000 in 17.5%. Out of 120 cases of dengue fever, 87.5% cases had thrombocytopenia and 12.5% cases had severe thrombocytopenia (<20,000/cumm) with bleeding manifestation.

Conclusion: Hemoconcentration, leucopenia, thrombocytopenia, and raised liver enzymes SGOT and SGPT along with reactive/ plasmacytoid lymphocytes on peripheral smear gives enough clues to test for dengue serology so that dengue cases can be diagnosed in their initial stages.

Keywords: hematology, profile, Hb, thrombocytopenia

Introduction

Dengue infection is one of the most common mosquito borne viral diseases of public health significance. It is caused by one of the four serotypes of the dengue virus (DEN-1, DEN-2, DEN-3 and DEN-4) also referred to as an arbovirus (arthropod-borne viruses) that belongs to the genus Flavivirus of the family Flaviviridae.[1,2] The virus serotypes are closely related but antigenically distinct. It is a disease with a wide clinical spectrum and a wide variety of presentations, ranging from asymptomatic to an undifferentiated fever to the more severe life threatening forms such as Dengue hemorrhagic fever (DHF)/ dengue shock syndrome (DSS).[3]Transmission to humans occurs by the bite of the female Aedes aegypti mosquito infected by one of four serotypes of the virus. This mosquito, a domestic species adapted to urban conditions, is the main vector in India. In recent decades, the incidence of dengue infection has increased around the world and has become a major international public health concern.[4]An estimated 50 million dengue infections occur worldwide annually and approximately 2.5 billion people, i.e., two-fifth of world's population in tropical and subtropical countries are at risk. The reported case fatality rate in India is 3–5%.[5,6] Most developing countries have epidemics of febrile illnesses including typhoid, measles, leptospirosis, and severe acute respiratory distress syndrome that can be confused with dengue due to similar clinical features.[7]Of biochemical variables, the most frequent changes occur in liver function tests such as in serum aspartate aminotransferase (AST), serum alanine aminotransferase (ALT), Gamma-glutamyl transpeptidase and alkaline phosphatase levels, and serum albumin concentrations.[8-10]The period of transmission from humans to mosquitoes begins one day before the start of fever up to the sixth day of illness corresponding to the viremia phase. After a female Aedes mosquito bites an individual in the viremia phase, viral replication (extrinsic incubation) begins in the vector from eighth to twelve days. In humans, the incubation period ranges from 3 to 15 days (intrinsic incubation) with an average of 5 days.[11]

Materials and Methods

A prospective study was conducted in the Department of General Medicine, Netaji Subhas Medical College and

Hospital, Bihta, Patna, Bihar, India and Dubey Nursing Clinic Friends Colony Patna, Bihar for 1 year.

Methodology

Total 120 patients with complaints of fever and clinical features of dengue with positive NS1 antigen test or dengue antibody serology IgM or IgG or both were included in the study. Age, gender, clinical presentation, duration of fever, dehydration, hemodynamic status, urine output, hepatomegaly, ascites, pleural effusion, presence of petechiae, positive tourniquet test, other bleeding manifestations, hematocrit and platelet count were recorded at presentation. Febrile patients with positive NS1 antigen or IgM or both on rapid card tests (IgG may be positive or negative) were included in this study. Patients with only IgG positive on rapid card tests were excluded from the study. Patients with other identified illnesses like typhoid, corona (if RT-PCR +ve) and malaria which were coexisted with dengue positive serology were excluded from the study. Hemogram was done on automated cell counter analyzer (Sysmex XP 100) which included hemoglobin, hematocrit, total leucocyte count (TLC), differential leucocyte count (DLC) and platelets count. Platelets counts were cross checked on stained smears. Hematocrit raised >20% of normal was considered as hemoconcentration. Increase in total leucocyte count upto 20% of normal was considered as hemoconcentration. Leukopenia was taken as total leucocyte count <4,000/mm^3. Thrombocytopenia was taken as platelets count <1,00,000/mm^3. Biochemical parameters included serum Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), were done on Cobas c 311 from Roche (Hitachi) biochemistry machine.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (microsoft excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

Most of the cases (47.5%) were seen in the 20-30 year age group followed by 40-50 years 20.83%, 30-40 years 15%. Majority of the patients were males 78 (65%) compared to females, 42 (35%) and the male to female ratio was 1.8:1 (Table 1). Fever was the most common presentation and was seen in 106 cases (88.33%) and followed by Myalgia (55.83%). Other symptoms observed were nausea and vomiting (20%), abdominal pain (19.16%) and itching (26.66%) (Table 2). Present study showed hemoglobin range of 6.5 gm% to 16.5 gm%. 54 (45%) cases showed Hb of 9-12 gm %, followed by 38(31.67%) cases showed Hb of 12-15 gm %, 9 (7.5%) had Hb of below 9 gm % and 19 (15.83 %) had Hb of above 15 gm% (Table 3). In the present study, 63(52.5 %) cases showed hematocrit of 25-35% and 35 (29.17 %) showed hematocrit of 35-45%. Raised hematocrit (>45%) was noted in 22(18.33%) of patients at presentation.The total leukocyte count ranged from 1500 cells/mm^3 to >11000 cells/mm^3. Leucopenia with less than 4000 cells/mm^3 was present in 21 (17.5 %) cases, count of 4000-11000 cells/mm^3 seen in 81 (67.5%) cases and >11000/mm was seen in 18 cases (15%) as per Table 4. In the present study out of 120 cases of dengue fever, 87.5% cases had thrombocytopenia and 12.5% cases had severe thrombocytopenia (< 20,000/mm^3) with bleeding manifestations. Serum AST and ALT were elevated in 83 (69.17%) cases and were normal in 37 (30.83%) cases.In the present study, hepatomegaly was noted in 42 (35 %) and splenomegaly was seen in 18(15%) of cases.

Table 1: Demographic Profile of Patients

Gender	No. of patients =120	%
Male	78	65
Female	42	35
Age (Years)		
Below 20	9	7.5
20-30	57	47.5
31-40	18	15
41-50	25	20.83
51-60	8	6.67
Above 60	3	2.5
Total	120	100%

Table 2: Distribution of Clinical features

Clinical features	No. of cases	%
Fever (alone or with other symptoms)	106	88.33
Myalgia	67	55.83
Headache	3	2.50
Nausea and vomiting	24	20.0
Skin rashes	9	7.50
Petechiae	11	9.17
Itching	32	26.66
Abdominal pain	23	19.16

Table 3: Distribution of study population by hemoglobin and hematocrit level

Hemoglobin level			Hematocrit		
Hb (gm/dl)	No. of cases	%	Hct (%)	No. of cases	%
Below 9	9	7.5	Below 25	-	-
9-12	54	45	25-35	63	52.5
12-15	38	31.67	35-45	35	29.17
Above 15	19	15.83	45-55	22	18.33
Total	120	100%	Total	120	100%

Table 4: Distribution of cases according to total leukocyte count and platelet count

Total leukocyte count			Platelet count		
TLC (cells/cumm)	No. of cases	%	Platelet (cells/cumm)	No of cases	%
< 1500	-	-	<20,000	15	12.5
1500-4,000	21	17.5	20,000-50,000	68	56.67
4000-11,000	81	67.5	50,000-1.4lakh	19	15.83
>11,000	18	15	>1 .5 lakhs	18	15
Total	120	100%	Total	120	100%

Discussion

In our study most of the cases (47.5%) were seen in the 20-30 year age group followed by 41-50 years 20.83%, 31-40 years 15%. Deshwal, et al.[12] studied a total of 515 patients of Dengue. In their study the maximum patients were in 21-40 year age group (62.91%). Vibha, et al.[13] studied 100 patients, and observed 49 (49%) to be in the 15to25year age group followed by 33 (33%) cases in the 26 to 35 years age group. Meena, et al.[14] (12 did a randomized study of 100 patients with Dengue fever. According to age, maximum cases (29%) were in 21-30 years and rest (27%) were in 15-20 years, (21%) were in 31-40 years, (16%) were in 41-50 years and (7%) in 51- 60 years. Ahmed, et al.[15] (n=205) observed the age range for dengue as 10-65 years and the mean agewas31.29 years (SD±13.65). Our findings are comparable with the observations of the above authors.

Majority of the patients were males 78 (65%) compared to females, 42 (35%) and the male to female ratio was1.8:1. Deshwal, et al.[12] and Vibha, et al.[13] too observed a male predominance in their studies with 72.8% and 70% male patients respectively. The male to female ratio was 1.7:1 in Vibha, et al.[13] study. In the study by Ahmed, et al.[15] the number of males was 193 (94.15%), while females were 12 (5.85%) with male to female ratio of 9:1 approximately. Meena, et al.[14] (n=100) also observed a male predominance with 63 cases (63%) and 37 (37%) female patients. Our findings correlate well with the above authors. The male predominance can be explained by the fact that usually it's the male population that has excess outdoor activity and the likelihood of being exposed to the vector mosquitobites.

Fever was the most common presentation and was seen in 106 cases (88.33%) and other symptoms were Myalgia 55.83%, Petechiae 9.17%, Fever and Skin rashes (9.0%), Nausea and vomiting (20.0%) and Fever and Itching (26.66%). Itching was predominantly localized to palm and sole. In the study by Deshwal, et al.[12]fever was universal followed by headache (94.75%), myalgia (90.67%), conjunctival injection (39.41%), morbilliform skin rash (37.86%), abdominal pain (24.46%), retro-orbital pain (18.25%), itching predominantly localized to palmar and plantar aspects of hands and feet (13.39%). In the study by Vibha, et al.[13] 95 (95%) of the patients had fever as presenting symptom. Other symptoms were myalgia in 70 (70%) cases, arthralgia in 60(60%) cases and headache in 50 (50%) cases.

Present study showed hemoglobin range of 6.5 gm% to 16.5 gm%. 54 (45%) cases showed Hb of 9-12 gm %, followed by 38(31.67%) cases showed Hb of 12-15 gm %, 9 (7.5%) had Hb of below 9 gm % and 19 (15.83 %) had Hb of above 15 gm%. In the study by Meena, et al.[14]hemoglobin ranged from 7.5-17.5 g/dl, mean hemoglobin value was 12.6 g/dl. Hemoglobin level more than 15gm% was seen in 6% cases. Dongre, et al.[16]observed hemoglobin level from 3.6 gm/dl to 16.7gm/dl with a mean of 11.9 gm/dl.

In the present study, 63(52.5 %) cases showed hematocrit of 25-35% and 35 (29.17 %) showed hematocrit of 35-45%. Raised hematocrit (>45%) was noted in 22(18.33%) of patients at presentation. Deshwal, et al.[12] observed raised hematocrit of >47% in 20.7% of patients at presentation. Vibha, et al.[13] observed > 40% hematocrit in 28 (28%) cases. In present study, hematocrit ranged from 20% to 51%. The mean hematocrit value of dengue positive cases in our study was 39.08%. In DHF and DSS, an increase in hematocrit levels was noted and was above 45%. Dongre, et al.[16] observed an increased hematocrit of > 40% in only 16patients.

The total leukocyte count ranged from 1500 cells/cumm to >11000 cells/cumm. Leucopenia (total leucocyte less than 4000 cells/cumm) was present in 21 (17.5 %) cases, count of 4000- 11000 cells/cu mm seen in 81(67.5%) cases and >11000/ cumm was seen in 18 cases(15%). In Deshwal, et al. [12] study leucopenia was noticed in around 20.19% of cases. In Meena, et al.[14] study total leukocyte count ranged from 1310 to16700 cell/mm^3, with mean total leukocyte count of 4701 cells/cumm. A total leukocyte count of less than 4,000 cell/cumm was present in 51 (51%) patients whereas, a total leukocyte count of more than 11,000 cell/cumm was present in 4 (4%) patients. Almost 45% patients had total leukocyte counts between the normal range. Dongre, et al. [16] observed leucopenia (total leucocytecounts<4000/cumm) in 81cases and normal count (count between 4000 to11000/cumm) in111cases. Leucopenia with lymphocytosis was seen in 40 patients.

In the present study out of 120 cases of dengue fever, 87.5% cases had thrombocytopenia and 12.5% cases had severe thrombocytopenia (< 20,000/cumm) with bleeding manifestations.

Deshwal, et al.[12]observed a platelet count of 50,000/cumm at presentation in 69.5% of cases, though it kept on falling further during hospitalization under observation. In their study minimum platelet count noted was 8,000/cumm. In Meena,et al.[14] study, (n=100), 90 (90%) cases had thrombocytopenia, in which 61 patients had platelet count between 20,000-60,000. Out of these 61 patients, seven patients (11.47%) had bleeding manifestation. Dongre, et al.[16] observed thrombocytopenia, platelet count <10,0000 in 112 patients. Six cases had counts less than 20000/cumm, 32 cases had counts between 20,000-50,000/cumm, 42 caseshadcounts between 50,000-75000/cumm and 129 cases had counts more than 75000/cumm.Serum AST and ALT were elevated in 83 (69.17%) cases and were normal in 37 (30.83%) cases. Deshwal, et al.[12]noted raised liver serum transaminases in 88.54% of their patients.In the present study, hepatomegaly was noted in 42 (35 %) and splenomegaly was seen in 18(15%) of cases. Deshwal, et al.[12] too reported hepatomegaly in 14.75% and splenomegaly in 13.20% of their cases. Most of the patients were treated symptomatically and platelet transfusion was done in severe

thrombocytopenia (Platelet count <20,000/cumm) with bleeding manifestation.

Conclusion

Hemoconcentration, leucopenia, thrombocytopenia, and raised liver enzymes SGOT and SGPT along with clinical features of dengue gives enough clues to test for dengue serology so that dengue cases can be diagnosed in their initial stages. This facilitates early treatment and aggressive fluid replacement therapy with good nursing care so that fatality rates can be reduced. This would minimize morbidity and mortality arising out of serious complications of dengue fever.

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