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Laboratory Parameters of Dengue Infection in a Medical College Hospital

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Abstract

Introduction & objective: *Dengue is an acute illness caused by Aedes mosquito, commonly caused by Aedes aegypti. It is an endemic disease in South East Asian countries especially in Bangladesh. In 2019 a outbreak occurred in Bangladesh. The objective of the study was to see the laboratory parameter and outcome of dengue fever in a tertiary medical college hospital. Early diagnosis and laboratory investigations is essential to prevent the mortality associated with this disease.* ***Materials & Methods:*** *This prospective study was conducted on dengue ward at Khulna medical college hospital from 1 July 2019 to 31 December 2019. The diagnosis of dengue infection was confirmed by serology. Sera were processed by dengue ELISA. Investigations like haemoglobin estimation, haematocrit, platelet count, total count; differential leukocyte count, peripheral smear, coagulation profile were performed.* ***Results:*** *Total number of cases was 98. Of them 62 (63.2%) was male and 36 (36.73%) was female. Fever was most common (100%) manifestation and duration of fever ranges from 5 to 8 days with a mean duration of 6.31 (± 0.95) days. Blood for NS1 was positive in 90 (91.83%) cases; most cases 71 (72.44%) become positive between 2nd to 4th day. 90 (91.83%) cases developed thrombocytopenia and it starts at 5th day in 45 (45.91%) cases. Anti IgM was positive in 4 (4.08%) cases; 2 at 4th day and 2 at 5th day of illness. IgG was positive in case at 8th day of illness.* ***Conclusion:*** *These findings help physicians in early diagnosis of dengue by suspecting these features as of dengue and can prevent morbidity and mortality associated with dengue.*

Key words: *Dengue, Thrombocytopenia, Hematocri.*

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Introduction:

Transmission of dengue to humans occurs by the bite of the female Aedes aegypti mosquito infected by one of four serotypes of the virus. 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 bites an individual in the viremia phase, viral replication (extrinsic incubation) begins in the vector in from eight to twelve days. In humans, the incubation period ranges from 3 to 15 days (intrinsic incubation) with an average of 5 days.

According to estimates of the World Health Organization (WHO), about 50 million cases of dengue fever occur annually worldwide and 2.5 billion people live in risk areas[1].

In 2005, the World Health Assembly, through WHA Resolution 58.3, in a review of the International Health Regulation (IHR), included dengue fever as an emergent public health disease, with implications for health safety due to the spread of the epidemic beyond national boundaries[2].

Leukopenia is the most prominent hematological change, sometimes with counts of less than 2 x 10 /µL. However, there are reports of mild leukocytosis at the onset of the disease, with neutrophilia.

Lymphocytosis is a common finding, with the presence of atypical lymphocytes. The hematocrit

concentration should be monitored according to the days of illness, remembering that, with the

progression to DHF, there will be a 20% increase in hematocrit from the patient's baseline, associated with thrombocytopenia (< 100 x 10 /L)[3].

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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[4].

In this context, the present study aimed to assess the biochemical and hematological dynamics of patients with dengue fever in order to increase the sensitivity of the screening by healthcare professionals in the most serious cases and to try to identify laboratory markers that may indicate this evolution.

The objective of this study was to assess the laboratory parameter of the dengue infection in a tertiary hospital.

Materials and Methods:

It was a prospective observational study. The whole number of patients included in our study was 98 (n = 98). The study period was from 1 July 2019 to 31 December 2019.

Confirmed cases of dengue fever admitted in Dengue isolation ward of Khulna medical college hospital were taken into account by purposive sampling method. All patients were with positive dengue tests, either NS1 antigen or IgM, IgG. Patients who were positive for malaria, meningitis, and enteric fever were excluded from the study.

The patient was examined in detail for various clinical signs like pallor, icterus, cyanosis, lymphadenopathy, edema feet, edema face, and signs of dehydration like weak and thready pulse, sunken eyes etc, conjunctival congestion, and presence of rashes over the body. Detailed examination was also done for search of signs of bleeding manifestations like Purpura, Petechiae, ecchymoses, low blood pressure i.e. hypotension, cold and clammy peripherals, etc.

Cases were followed up daily for the clinical and laboratory parameters. Blood parameters were monitored every day till remarkable improvement seen clinically and haematologically. TC of WBC, Total Platelet Count, Hb, haematocrit, for each patient were recorded. Daily vitals were monitored. Chest X-ray, ultrasonography, and liver function tests were done on selected cases.

The patients were treated with oral paracetamol, intravenous fluids, blood and platelet transfusion, and inotropes when necessary. The frequency of various signs and symptoms and the laboratory tests were calculated.

The results were tabulated and correlated. The outcomes were recorded.

Results:

Total number of cases was 98. Of them 62 (63.2%) was male and 36 (36.73%) was female. The male-female ratio was 1.7: 1. Most of the patients 27 (27.55%) was in the age group of 21-30 years. followed by 13-20 years (25.53%).

Most of the patient 62 (63.2) attacked at the month from June to October. Average Hospital stay was 7.4 (ঽ 1.26) days. Duration of fever ranges from 5 to 8 days with a mean duration of 6.31 (± 0.95) days.

Blood for NS1 was positive in 90 (91.83%) cases; most cases 71 (72.44%) become positive between 2nd to 4th day. Among them 31 (31.63%) become positive at 3rd day of fever followed by 20 (20.40%) cases in 2nd day ; 20 (20.40%) cases in 4th day; 13 (3.26%) cases 5th day, 5 (5.10%) cases in 1st day ; 1 (1.02%) case 6th day.

Table-I: NS 1 in Dengue patients.

Day	No	Percentage
1	5	5.10
2	20	20.40
3	31	31.63
4	20	20.40
5	5	5.10
6	1	1.02

Anti IgM was positive in 4 (4.08%) cases; 2 at 4th day and 2 at 5th day of illness. Ig G was positive in 1 case at 8th day of illness.

Table-II: IgM in dengue patients.

Day	No	Percentage
4	2	2.04
5	2	2.04

Total count of WBC was normal in 73 (74.48%) cases but among them in 50 (51.02%) cases it in lower limit. (4000-5000 /cc). Leucopenia was found in 21 (21.48%) cases and leukocytosis in 4 (4.08%) cases.

Table -III: Total count of WBC.

Total count of WBC	No	Percentage
< 4000	21	21.48%
> 4000 – 5000	49	50 %
> 5000- 11000	24	24.48%
>11000	4	4.08%

90 (91.83%) cases developed thrombocytopenia. Platelet count starts declining at 5th day in 45 (45.91%) cases; 20 (20.40%) cases at 4th day; 15 (15.30%) cases at 6th day; 10 (10.20%) cases at 3rd day. Lowest platelet count was at 6th day in 41 (41.83%) cases, 7th day in 31 (31.63%) cases; 5th day in 18 (18.36%) cases.

Table-IV: Day of lowest platelet count.

Day	No	Percentage
5	18	18.36
6	41	41.83
7	31	31.63
8	03	3.06

Table-V: Hct value in dengue cases.

Male		
Value	**No**	**Percentage**
<42	47	47.95
42-54	15	13.30
>54	0	0
Female		
Value	**No**	**Percentage**
<38	30	38.77
38-46	3	3.06
>46	3	3.06

SGPT was increased in 53 (54.08%) cases. In 40 (40.81) % cases values between 41-80 and 13 (13.26%) cases above 80. S creatinine was increased in 20 (20.40%) cases.

Table-VI: SGPT in Dengue cases.

SGPT	No	Percentage
0 – 40	45	45.91
41- 80	40	40.81
81 - 100	13	13.26

Transfusion was given in 15 (15.30%) cases. Among them Blood transfusion was given in 12 (12.24%) cases & Platelet transfusion was given in 3 (3.06%) cases. Complete recovery was in 96 (97.95%) cases and Death 2 (2.04%) cases.

Discussion:

Dengue is a flaviviral infection of humans spread by Aedes Aegyptii mosquito which breeds more commonly in stored clean waters[1]. This RNA virus has four types namely Type 1–4. Involvement of younger age group is an indicator of higher incidence of infection [5].

Dengue fever is an infectious disease which is difficult to distinguish from other viruses prevalent in our region as there are no specific markers that can diagnose the disease early. Because it is a disease that can evolve with serious consequences and even be fatal, this study aimed at analyzing epidemiological data and laboratory dynamics in order to try to identify biomarkers that are predictive of severity.

In our study male was more common than female. The male to female ratio was 1.7: 1. In a study by Aswari Raut[6] male was 75% and female 25%. According to Quader Ahmed et al.[7] dengue fever occurs more in male patients than their female counterparts.

Most of the patients (53%) was between age 13-30 years. This finding is similar to a study by Syed Reazul Hasan[8] where 58.89% cases were within 13-30 years of age. Average Hospital stay was 7.4 (± 1.26) days. In a study by Ghazala[9] mean duration was 6 days.

Fever was most common presentation 100%. Mohan Kashinkunti et al.[10] suggests that fever was the most common presenting symptom (100%) in and around India. In our study duration of fever ranges from 5 to 8 days with a mean duration of 6.31 (± 0.95) days.

Blood for NS1 was positive in 90 (91.83%) cases & Anti IgM was positive in 4 cases; most cases 71 (72.44%) of NS1 become positive between 2nd to 4th day. Among them majority cases 31 (31.63%) of NS1 become positive at 3rd day of fever; 2 at 4th day and 2 at 5th day of illness. In the study done by Metha et al.[11] 52% cases were positive for NS1Ag while 41% and 26% were positive for IgG and IgM respectively.

Total count of WBC was normal in 73 (74.48%) cases but among them in 50 (51.02%) cases is at the lower end of normal limit. (4000-5000 /cc). Leucopenia was found in 20 (20.40%) cases and leukocytosis in 4 (4.08%) cases. Leucopenia was present in 9.3% cases in a study by ABM Shahidul Alam[12].

Thrombocytopenia was very common (91.83%) in our study also in other studies[6]. Platelet count started declining in most cases (45.91%) at 5th day. Lowest platelet count was at 6th day in 30 cases, 7th in 21 cases; 5th in 18 cases. In a study by K.T.D. Thai[13] platelets began to drop below 100,000/mm^3 from day 4 of the disease and both tended to recover on day 9.

Mean Hct value is 40.13 (±5.02). In our study no significant changes were found in Hct. This finding is contradictory to most of the studies[14,15]. SGPT was increased in 53 (54.08%) cases. In 40 (40.81) % cases values between 41-80 and 13 (13.26%) cases above 80. in a study by Nayak et al[16] liver involvement was noted among 97.33%. S creatinine was increased in 20% cases.

Blood transfusion was needed in 12 cases and Platelet transfusion needed in 3 cases. These findings similar to a study by Tewari KN et al[17,18,19]. Complete recovery in 96 (97.95%) cases and Death in 2 cases. In several studies the mortality was found to be approximately 10%[8,20] .

Conclusion:

We identified important clinical presentations and useful CBC parameters to enable the differentiation of dengue patients from other patients with other causes of acute febrile illness. Dengue infection has a wide spectrum of clinical manifestations. A high index of suspicion for early diagnosis, monitoring and prompt fluid management and supportive treatment can decrease case fatality rate significantly. In our study we have enlisted all the necessary investigations. This study will elaborate knowledge about the disease and will improve the outcome. An accurate diagnosis using these data will enable further investigation to be tailored and early treatment for the patient.

Conflicts of Interest: None.

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