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Clinical and Serological Study of Recent Dengue Outbreak in Chittagong, Bangladesh

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Abstract:
Introduction: *Dengue a viral febrile illness had an outbreak in Bangladesh in the year 2019 in its different cities. So objective of the present study was to observe the clinical serological pattern of dengue in our context.*
Methods: *Present study was conducted in the Department of Medicine, Chattogram Maa O Shishu Hospital Medical college during a period of six month in the year 2019. 33 cases were of dengue fever was included in the study. Dengue was diagnosed on clinical ground with serological tests. Fever with other focal signs was excluded from the study. clinical and serological features were evaluated .*
Results: *Among the total 33 patients revealed most were at age group <20 years 9(27.3%) and 21-30 years were 12(36.4%) and the mean ± SD of age was 31.55±16.03 years and female was 11(33.3%), male was 22(66.7%) had male to female ratio of 2:1. Regarding common clinical presentations of the study patients, arthralgia of large and small joints were present in 32(96.9%) and 91(93.9%) patients, respectively, fever was present in 30(90.9%) patients. Other features were headache 21(63.6%), muscle pain 15(45.5%), conjunctivitis 5(15.6%), pain behind the eyes 23(69.7%), nausea 12(36.4%), vomiting 11(33.3%), anorexia 21(63.6%), abdominal pain 11(33.3%), skin rash 24(72.7%), orificial bleeding 2(6.1%), swollen salivary glands 2(6.1%) lymphadenopathy 3(9.1%) asymptomatic 1(3.0%). Study of serological tests revealed that 24(72.7%) patients were NS1 positive 24(72.7%), Ig M positive in 4(12.1%) and Ig G positive in 13(39.4%) cases. Among all 33 cases mean ± SD of Hb was 13.51±2.04 gm/dl, total count was 6736 ±3628/cumm, neutrophil was 64±15%, lymphocyte was 29 ±14%, platelet count was 196151± 98271 /cumm and hematocrit was 41±8.6.*
Conclusions: *Clinical and serological profile of dengue fever cases are variable and common laboratory features alert clinicians for the prevention of fatal evolution.*

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I. Introduction:

Dengue fever (DF) is a human viral mosquito-borne infection of public health significance and every years millions of infections occur. The main dengue vector is the female of the *Aedes aegypti* mosquito. There are four serotypes of the dengue virus (DEN-1–DEN-4), which is an RNA flavivirus. These visruses are antigenically related and infection with one serotype produces lifelong immunity to that serotype, immunity to other serotypes lasts only a few months[1,2].

Dengue fever is an acute febrile illness of 2-7 days duration(sometimes with two peaks) with two or more of these manifestations: headache, retro-orbital pain, myalgia/arthralgia, rash, hemorrhagic manifestations(petechiae and positive tourniquet test) and leucopenia. In children, DF is usually mild. Dengue hemorrhagic fever is a probable case of dengue and hemorrhagic tendency evidenced by one or more of these manifestations: positive tourniquet test, petechiae, ecchymosis or purpura, bleeding from mucosa (mostly epistaxis or bleeding from gums) injection sites or other sites, hematemesis or melena, thrombocytopenia (platelets 100000/cu mm or less) and evidence of plasma leakage due to increased capillary permeability manifested by one or more of these >20% rise in haematocrit for age and sex, >20% drop in haematocrit following treatment with fluids as compared to baseline, signs of plasma leakage (pleural effusion,ascites or hypoproteinaemia)Dengue shock syndrome (DSS) : All the above criteria of DHF plus signs of circulatoty failure manifested by rapid and weak pulse , narrow pulse pressure (< or equal to 20 mm of Hg) hypotension for age , cold and clammy skin and restless[3].

There are many infectious diseases in Bangladesh. Of these, vector-borne diseases such as malaria, filariasis and kala-azar are endemic in different regions of the country. Dengue virus was first reported from Bangladesh in the year of 1964 and after that some y sporadic cases found in succeeding few years. But in the year 2000 major epidemic of dengue fever and dengue hemorrhagic fever took place. DEN3 was the predominant virus that year and DEN3 remained in the circulation till 2002.[4]

But no formal documentation was done and, up to 1986, it was thought that four major cities of Bangladesh were free of dengue haemorrhagic fever[5]. But over the last decade the scenario has changed. Dengue and DHF have evolved as serious emerging infectious diseases causing high morbidity and significant mortality in almost all countries in south-east Asia.[6,7]

In the year 2019 again a major outbreak occurs in different big cities of Bangladesh but its documentations are scarce. So in this study it was tried to determine the common pattern of presentation of dengue fever in the Chittagong perspective, and also to determine the clinical parameters of the subjects hospitalized for dengue fever and their serological parameters ..

II. Methods:

A total of 33 subjects were evaluated in the study during a six months study period where samples were enrolled by purposive convenient sampling technique. Enrolled patients were clinically evaluated and investigations are done. Informed written consent was taken from patients or their attendant before enrolment and after discussing the protocol. Cases reported in this study include only those that had all epidemiological, clinical information, and laboratory data available. The database included age, sex, clinical features like fever, headache, myalgia, arthralgia, bodyache, conjunctival congestion, purpura, epistaxis, other bleeding signs, respiratory complains and laboratory results (NS1, IgM, IgG, hematocrit and platelets, total count of WBC,). Blood samples (5 ml) were collected from each patient during or after the acute phase (2-8 days) in order to perform the serological diagnosis of dengue infection. Sera were obtained after centrifugation at 240 (x g) and 1500 rpm and were stored at -20 C. Imunochromatographic test like NS1, IgM and IgG were done according to the manufacturer procedures . Serotype identification and virus isolation could not be done due to lack of facilities. All data were analyzed by SPSS version 20 and expressed in table The study was approved by ethical review committee of the institution of CMOSHMC and in every step of data collection and patients care, ethical consideration was observed critically.

III. Results:

Table 1 showing age group distributions of study patients where <20 years were 9(27.3%), 21-30 years were 12(36.4%), 31-40 years were 4(9.1%), 41-50 years and 51-60 years were 3(9.1%) each and >61 years were 2(6.1%). Table 2 showing gender distributions where female was 11(33.3%) and male was 22(66.7%). Male to female ratio was 2:1. Table 3 showing common clinical presentations of the study patients where arthralgia of large and small joints were present in 32(96.9%) and 91(93.9%) patients respectively, fever was present in 30(90.9%) patients. Other features were headache 21(63.6%), muscle pain 15(45.5%), conjunctivitis 5(15.6%), pain behind the eyes 23(69.7%), nausea 12(36.4%), vomiting 11(33.3%), anorexia 21(63.6%), abdominal pain 11(33.3%), skin rash 24(72.7%), orificial bleeding 2(6.1%), swollen salivary glands 2(6.1%) lymphadenopathy 3(9.1%) asymptomatic 1(3.0%) cases. Table 4 showing 24(72.7%) patients were NS1 positive 2(6.1%) were negative and 7(21.2%) cases it was unknown. Table 5 showing Ig M and Ig G status where IgM negative was 14(42.4%), positive was 4(12.1%) and test not done in 15(54.5%) whereas regarding Ig G status negative was 5(15.2%), positive was 13(39.4%) and not done in 15(45.5%) cases. Table 6 showing different descriptive statistics where age range of 33 patients were 15-75 years and mean ± SD of age was 31.55±16.03 years, Hb was 13.51±2.04 gm/dl, total count was 6736 ±3628/cumm, neutrophil was 64±15%, lymphocyte was 29 ±14%, platelet count was 196151± 98271 /cumm and hematocrit was 41±8.6.

Tables:

Table 1: Age group of the study patients(n=33)

Age group	Frequency	Percent
<20 years	9	27.3
21-30 years	12	36.4
31-40 years	4	12.1
41-50 years	3	9.1
51-60 years	3	9.1
>61 years	2	6.1
Total	33	100.0

Table 2: Gender distribution of the study patients

Gender	Frequency	Percent
Female	11	33.3
Male	22	66.7
Total	33	100.0

Table 2 showing gender distributions where female was 11(33.3%) and male was 22(66.7%). Male to female ratio was 2:1.

Table 3: Presenting symptoms of the patients

	Frequency	Percent
Arthralgia of large joints,	32	96.9
Arthralgia of small joints,	31	93.9
fever	30	90.90
Headache	21	63.6
Muscle pain	15	45.5
Conjunctivitis	5	15.6
Retro-orbital pain	23	69.7
Nausea	12	36.4
Vomiting	11	33.3
Anorexia	21	63.6
Abdominal pain	11	33.3
Skin rash	24	72.7
Orificial bleeding	2	6.1
Swollen salivary glands	2	6.1
Lymphadenopathy	3	9.1
Asymptomatic	1	3.0

Table 4: **NS1 status**

		Frequency	Percent
	Negative	2	6.1
	Positive	24	72.7
	Unknown	7	21.2
	Total	33	100.0

Table 5: **Ig M and Ig G status**

		Frequency	Percent
Ig M	Negative	14	42.4
	Not done	15	45.5
	Positive	4	12.1
Ig G	Negative	5	15.2
	Not done	15	45.5
	Positive	13	39.4

Table 6: Descriptive Statistics of the study patients

	N	Range	Mean ± SD
Age(years)		15- 75	31.55±16.03
Hemoglobin level(gm/dl)		8.40-19.60	13.51±2.04
Total count(/cmm)		1900-20000	6736 ±3628
Neutrophil count(%)	33	30%-.91%	64±15
Lymphocyte count(%)		6%-.66%	29 ±14
Platelet count(/cmm)		10000-390000	196151± 98271
Hematocrit level(%)		25%-77%	41±8.6

IV. Discussion:

This study describes the clinical profile laboratory features of dengue fever in adult patients admitted in a tertiary care hospital Chittagong, Bangladesh. In our study common age group distributions was <20 years 9(27.3%) and 21-30 years 12(36.4%) and mean age was 1.55±16.03 years. Male patients were more and male female ratio was 2.:1. These findings are related to a study done by Sharma et al.[5]

Common clinical presentations of the study patients joint symptoms, fever, headache, GIT upsets and bleeding manifestations. Here a high incidence of gastrointestinal and hemorrhagic symptoms were noted. In a study these symptoms were 38% and 16.6% reported respectively by Sharma et al.[5] In a study from Nimmannitya et al[6]. around 96% of patients had congested pharynx, and rhinitis was reported in 13% of the patients. Bleeding from various sites was seen much less in the present series. This is in contrast to the finding of Horvath from Australia.[7] and Sharma from India[5] who reported 63% and 69% of bleeding episodes respectively.

In this study increased bleeding from venepuncture sites was not counted. Although thrombocytopenia was a common finding, there was poor correlation between thrombocytopenia and bleeding tendencies, an observation similar to the one made by Sharma et al.[5]

. Regarding serological evaluation NS1 positive in 24(72.7%) cases and Ig M and Ig G positive in 4(12.1%) and 13(39.4%) cases respectively. Antibody response to infection differs according to the immune status of the host . When dengue infection occurs in persons who have not previously been infected with a flavivirus in that case the patients develop a primary antibody response characterized by a slow increase of specific antibodies. Ig M antibodies are the first immunoglobulin isotype to appear. These antibodies are detectable in 50% of patients by days 3-5 after onset of illness, increasing to 80% by day 5 and 99% by day 10. IgM levels peak about two weeks after the onset of symptoms and then decline generally to undetectable levels over 2–3 months. Anti-dengue serum IgG is generally detectable at low titres at the end of the first week of illness, increasing slowly thereafter, with serum IgG still detectable after several months, and probably even for life[9,10]

There are some patients who had NS1 positive found in the present study. After day 5, dengue viruses and antigens disappear from the blood coincident with the appearance of specific antibodies. NS1 antigen may be detected in some patients for a few days after defervescence. Dengue serologic tests are more available in dengue-endemic countries than are virological tests. Low levels of a detectable dengue IgM response – or the absence of it – in some secondary infections reduces the diagnostic accuracy of IgM ELISA tests. Results of rapid tests may be available within less than one hour. Reliance on rapid tests to diagnose dengue infections should be approached with caution, however, since the performance of all commercial tests has not yet been evaluated by reference laboratories . First-time (primary) DENV infections typically have a stronger and more specific IgM response than subsequent (secondary) infections, for which the IgM response is low compared with a strong IgG response. These patterns underscore the need for evaluating the performance of commercially available tests, especially for diagnosis of secondary DENV infections[11].

Hemoglobin, total of WBC, neutriphil and lymphocyte, platelet count and hematocrit were found variably among the study patients. 41±8.6. Leukopenia is the most prominent hematological change, sometimes with counts of less than 2 x 10^3/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 10^9/L)[12]

V. Conclusion:

Dengue fever evolves with clinical and pathological alterations starting on the 3rd day and becoming most evident on the 5th day with values restored to normal by the next few days. The disease was more common among in individuals aged less then 30 years and male gender. Variable immunological response and hematological abnormalities are found. The study results are relevant in the characterization of biological markers and can be used as markers for the diagnosis thereby enabling early help with the adaption of therapeutic conduct for specific patients.

Conflict of interest: None

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