



Research Article

## PROFILE, PRESENTATION AND OUTCOME OF DENGUE DISEASE SUBJECTS IN TERTIARY CARE HOSPITAL IN WEST BENGAL

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### ABSTRACT

**Introduction:** Cases of Dengue infection are on rise worldwide as well as in India. The different serotypes of Dengue virus and different spectrum make it amenable to diverse presentation and outcome. West Bengal (WB) has encountered various episodes of Dengue outbreaks and Dengue disease is prevalent in WB population. Thus we aimed to describe the epidemiological profile of Dengue cases, their clinical features and outcome. **Material methods:** We recruited 40 subjects suffering from symptoms of Dengue disease after diagnosis was confirmed using Dengue NS1 Antigen card test, NS1 Antigen, IgM and IgG ELISA and after ruling out malaria by Widal for malaria antigen. Demographic details, presenting complaints, symptoms and signs were noted. Various biochemical, haematological and coagulation markers were analysed and ultrasonographic assessment was also done. Subjects were followed up and outcome noted. **Result:** Most common age group presenting with Dengue fever was third and fourth decade (mean = 27.6 ± 12.6 yrs). Subjects with low socioeconomic status (65%), rural residents (67.5%), Skilled workers (30%) and housewives (27.5%) were most common to report. Fever (95%) followed by vomiting (85%) was most common symptoms. Bleeding diathesis were reported in 12.5% cases. Dengue fever was present in 72.5% while Dengue hemorrhagic fever (DHF) I was reported in 12.5%, DHF II in 7.5%, DHF III in 5% and Dengue shock syndrome (DSS) in 2.5%. Sixty five % subjects were discharged from hospital, while rests were referred to higher center. No deaths were reported in this study. Significant association of outcome was noted with General condition at admission indicating higher rate of discharge in subjects with fair general condition (p=0.018); Premedications (p=0.029) and diagnosis (p=0.002). **Conclusion:** Nearly 70% subjects presenting with Dengue disease were DF while 25% subjects were DHF and 2.5% DSS. Favourable significant association was noted with premedication while that of higher grade of Dengue disease with referral.

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### INTRODUCTION

Dengue is an acute viral infection with potential fatal complications caused by Dengue viruses (DV) belonging to family *Flaviviridae* and transmitted mainly by *Aedes Aegypti* mosquito but also by *Aedes albopictus*. (Gupta et al, 2012; Whitehorn et al, 2010; WHO, 2009). With first epidemic dating back to 1780s and first case report being drafted in 1789 and successful isolation of virus in 1943, despite ever evolving knowledge and diagnostic as well as treatment facilities the cumulative Dengue diseases burden has attained an unprecedented proportion in recent times with a sharp increase in the size of human population at risk. (Bhatt et al, 2013; Gubler, 2002)

Indian variants of Dengue Virus include DV1 isolated from Vellore in 1956. This belongs to American-African genotype and is distributed in four lineages India I, II, III and Africa lineage. (Patil, et al, 2011) The American genotype of DV-2 circulated predominantly in India during the pre-1971 period and DV-3 was reported in Delhi in 2003 which marked a changing trend in DV circulation. DV-4 has been occasionally isolated in India. (Kukreti et al, 2008)

Clinical features of Dengue disease are classified based on its severity into three categories: undifferentiated fever, Dengue fever (DF) and Dengue hemorrhagic fever (DHF). DHF can be further divided into 4 severity grades. (WHO, 2009) DHF grade III and IV is also named Dengue shock syndrome (DSS). Even though there have been many reports of difficulties in the use of this classification, it is widely used at the present time. (Simmons et al, 2012)

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Despite these insights in the various aspects of spectrum of Dengue disease, the varied presentation in populations remains the unaddressed issue. Studies including different populations in order through which pattern of disease, complication and outcome can be established are warranted.

We thus aimed to study clinico-epidemiological profile and outcome of Dengue cases admitted in tertiary level Hospital in Purulia, West Bengal, with objectives to describe the epidemiological profile of Dengue cases admitted to access their clinical features and outcome.

## MATERIAL AND METHODS

This Hospital based observational analytical descriptive study was performed from January 2016 to December 2018 in Department of General Medicine, Deben Mahato Sadar Hospital, Purulia West Bengal. The catchment area of Institute included Purulia district and nearby borders of Jharkhand. The study was approved by institutional ethics committee of Bankura Sannilani Medical College and was performed in accordance with Declaration of *Helsinki*. Study subjects included all cases aged 12-75 years, presenting and admitted with symptoms like myalgia, headache, abdominal pain with or without bleeding manifestation and positive on IgM ELISA antibody and NS1 antigen. Expected proportion in population from previous studies was 2.5%. (Hati *et al*, 2006) With 5% type I error and absolute precision 5% calculated sample size came out to be 37 thus we included 40 subjects in study after informed consent.

After obtaining detailed history and performing thorough clinical examination, the patients presenting with above mentioned symptoms were subjected to Dengue NS1 antigen card test using Dengue Day 1 test kit™ by J. Mitra and Co. Pvt. Ltd® New Delhi, India (Catalogue no. IR028050); based on rapid solid phase immuno-chromatographic test for the qualitative detection of Dengue NS1 Antigen and differential detection of IgM and IgG antibodies to Dengue virus in Human serum/plasma. Those found positive were further confirmed by ELISA using Dengue NS1 antigen assay kit, Qualpro diagnostics®, India (Catalogue No. 404080096). Based on double sandwich ELISA technique using manufacturer's protocol on Erba Lisascan™ EM ELISA 96 well plate scanner and Erba Lisa wash™, ELISA plate washer, Erba Mannheim®, Mannheim Germany. Haemogram with platelet count was performed using Transasia Sysmex XP-100™ automated 3-Part differential multiparameter hematology analyzer, Transasia® India. Liver function tests, kidney function tests, blood sugar levels were assessed using Erba Chem 7, Erba® Diagnostics Mannheim GmbH, Mannheim Germany semi automatic clinical chemistry analyser and coagulation parameters PT, INR were performed on Erba ECL105 semiautomatic coagulometer, Erba® Diagnostics Mannheim GmbH, Mannheim Germany, using manufacturer's protocol. Ultrasonography of abdomen was performed using HD7 diagnostic Ultrasound system™, Philips ultrasound inc.® WA USA. All study subjects were followed till their discharge from institute, referral to higher centre or death. Subjects were referred to the higher institute only when they were found to be critically ill and further management was not possible at our centre or if they requested for referral. Referred subjects were followed up telephonically till their discharge or death.

Data was expressed as percentage and mean  $\pm$  S.D. Kolmogorove-Smirnov analysis was performed for checking linearity of the data. Fischer's exact test or Chi square test was used to analyze the significance of difference between frequency distribution of the data. P value <0.05 was considered as statistically significant. SPSS© for windows™ Vs 17, IBM™ Corp NY and Microsoft excel™ 2007, Microsoft® Inc USA was used to perform the statistical analysis.

## OBSERVATIONS AND RESULTS

**Table 1** indicated the general characteristics of study subjects. In our study mean age of participants was found to be 27.6  $\pm$  12.6 yrs. Twenty seven (67.5%) subjects out of total forty were male while 13 subjects (32.5%) were female. Subjects from rural areas were predominantly present (27 subjects, 67.5%) while six subjects (15%) were from semi urban area and seven subjects (17.5%) were from urban area.

**Table 2** denotes the presenting features of study subjects. Most common symptom encountered was fever in 95% subjects to be followed by vomiting in 85% subjects. Retro-orbital and frontal headache was present in 77.5% while non specific non localised headache was present in 70% subjects. Conjunctival congestion and myalgia was complained by 72.5% subjects each. Gastrointestinal symptoms in the form of Abdominal pain and constipation were present in 17 subjects each (42.5%). Finding of bleeding i.e hematemesis was present in 5 subjects (12.5%) and malena in 2 subjects (5%). Rash was included in presenting complaints in 65% (26 subejcts). On examination, general condition was found to be fair in 18 subjects (45%) and low and poor in 9 subjects each (22.5%). Four subjects were found to be dehydrated and poor general condition (10%). Tourniquet test was found to be positive in 18 subjects (45%) and icterus was noted in 15 subjects (37.5%). Oedema was noted in 18 subjects (45%). Organomegaly in the form of hepatomegaly was present in 20 subjects (50%) while splenomegaly was found in 17 subjects (42.5%). Vitals and laboratory findings are indicated in **Table 3**. Leucopenia was found to be present in 12 (30%) subjects. Special investigations results viz. card test and ELISA are listed in **Table 4**. NS1 Ag was found to be reactive in 15 subjects (37.5%), while it was weekly reactive in 19 subjects (47.5%) and non reactive in 4 subjects (10%). Dengue IgM ELISA was reactive in 24 subjects (60%) and weakly reactive in 16 subjects (40%). Dengue IgG was reactive in 17 subjects (42.5%) and negative in 23 subjects (57.5%). Widal for malaria was negative in all for both Vivax and Falciparum. After scrutinizing the clinical features and investigations it was finally reported that (Figure 1) Dengue fever was present in 29 (72.5%) subjects Dengue hemorrhagic fever was present in 10 subjects out of them DHF I in 5 (12.5%), DHF II in 3 (7.5%) and DHF III in 2 (5%) was detected. Dengue shock syndrome was present in 1 subejct (2.5%). All the subjects received antipyretic medication, antibodies and fluids. Premedication were administered in 19 (47.5%) subjects. Out of total 40 subjects 26 subjects were discharged (65%) and 14 were referred (35%) to the higher centre for further management. No death was reported in our study (Figure 2).

**Table 5** shows association of various factors with outcome in study subjects. No significant association of outcome was noted with Age, occupation, social status, Residence, Antigen or antibody positivity. Significant association of outcome was

noted with General condition at admission indicating higher rate of discharge in subjects with fair general condition (p=0.018); Premeditations, indicating significantly higher rate of discharge in subjects with premedication (p=0.029) and diagnosis indicating higher grade of Dengue disease (DHF II, DHF III and DSS) were associated with referral (p=0.002).

**Table 1** General characteristics of study subjects

		Frequency /mean±S.D.	Percentage
Age (years)		27.6 ± 12.6	
Gender	Female	13	32.5
	Male	27	67.5
Occupation	Businessman	3	7.5
	Housewife	11	27.5
	service	2	5.0
	skilled laborer	12	30.0
Occupation	Student	7	17.5
	unskilled laborer	5	12.5
Socioeconomic status	Low	26	65.0
	Middle	14	35.0
Residence	Rural	27	67.5
	Semi Urban	6	15.0
Residence	Urban	7	17.5

**Table 2** Presenting features in study subjects

Presenting Features	No. of subjects	Percentage	
Fever	38	95.0	
Rash/ Ptechiaie	26	65.0	
Hematemesis	5	12.5	
Malena	2	5	
Conjunctival congestion	29	72.5	
Myalgia	29	72.5	
Symptoms	Non Specific non localised	28	70.0
	Headache		
Retro orbital or frontal headache	31	77.5	
Abdominal pain	17	42.5	
Constipation	17	42.5	
Vomiting	34	85.0	
Sore throat	14	35.0	
Pruritis	15	37.5	
Arthralgia	30	75	
General condition	Fair	18	45.0
	Low	9	22.5
	Poor	9	22.5
Dehydrated and poor	4	10.0	
+ve tourniquet test	18	45.0	
Examination finding	Icterus	15	37.5
	Oedema	18	45.0
	Hepatomegaly	20	50.0
	Splenomegaly	17	42.5

**Table 3** Vitals and Laboratory findings

Finding	Mean	S.D.
Pulse (/min)	58.2	11.5
BP systolic (mmHg)	102.3	14.0
BP diastolic (mmHg)	65.7	8.4
Hb (g%)	12.98	1.80
WBC (/Cumm)	2350	2420
Platelet counts (10 <sup>5</sup> /cumm)	1.19	0.38
PT (Sec)	17.79	3.83
INR	2.27	0.71
T Bil (mg/dl)	1.82	0.90
D Bil (mg/dl)	0.62	0.13
S. Urea (mg/dl)	37.50	11.60
S. Creat (mg/dl)	1.41	0.51
ESR (mm)	26.85	8.83
AST (IU/L)	78.28	20.37

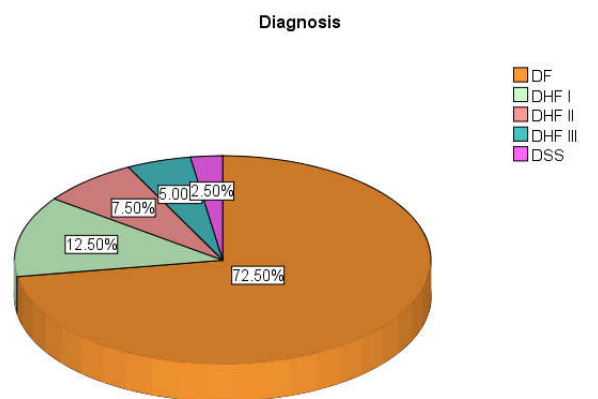
ALT (IU/L)	78.18	16.68
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**Table 4** Specific laboratory findings in study subjects

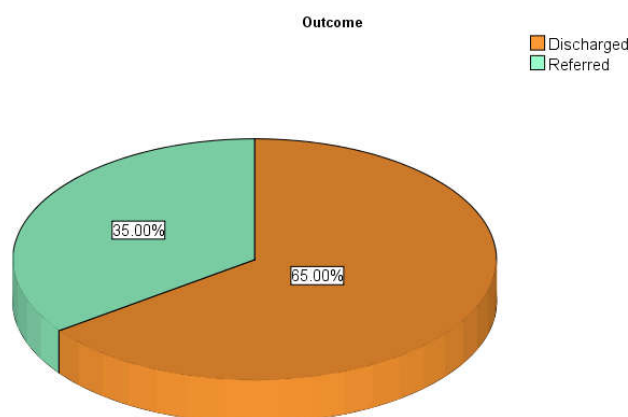
Specific laboratory tests	Number of subjects	Percentage	
NS1 Ag	Negative	2	5.0
	non reactive	4	10.0
	Weekly	19	47.5
	Reactive	15	37.5
Dengue IgM ELISA	Weakly	16	40.0
	Reactive	24	60.0
Dengue IgG	Negative	23	57.5
	Reactive	17	42.5
Widal/(pv/pf) for malaria	Both Negative	40	100.0

**Table 5** Association of various factors with outcome in study subjects

	Chi square	P value
Age	1.31	0.725
Gender	0.152	0.491
Occupation	2.581	0.764
Social status	0.005	0.651
Residence	3.812	0.057
General condition	10.085	0.018
NS1 Ag	2.54	0.467
Dengue IgM ELISA	0.073	0.524
Dengue IgG	0.406	0.384
Premedications	4.945	0.029
Diagnosis	16.53	0.002



**Fig 1** Diagnosis in study subjects



**Figure 2** Outcome in study subjects

## DISCUSSION

Dengue is emerging as a major public health problem in India. It is one of the major public health threats in Kolkata.(Sarkar *et al*, 2010) Since the first epidemic in Kolkata during 1963-64, many places in India have been experiencing Dengue

infection.(Aikat *et al*, 1964; Sarkar *et al*, 1972; Balaya *et al*, 1967; Rodrigues *et al* 1972). India witnessed widespread Dengue fever outbreak in the year 2012. Tamil Nadu reported the highest number of cases in the country being 9,249, followed by West Bengal which reported 6,067 cases. The other states which also reported increased number of Dengue cases were Maharashtra, Kerala, Karnataka, Odisha, Delhi, Gujarat, Puducherry, Haryana, and Punjab.(Varshney 2012) West Bengal in 2015 also reported a Dengue outbreak. Epidemiological investigation and serological reports indicate that the outbreak was due to Dengue virus infection. The outbreak continued from September 2015 till December 2015. The outbreak was not localized and almost all the wards got affected. Collectively Dengue is showing rise both worldwide and in India.(Debnath *et al*, 2017)

This study highlighted the demographic distribution, clinical aspects and outcomes of Dengue fever. Also we assessed the severity as per different types of Dengue disease.

In our study Maximum subjects were in age group  $\leq 30$  years (30 subjects, 75%) to be followed by fourth decade. Skilled labourers (12 subjects 30%) and housewives (11 subjects, 27.5%) were most common occupations to be admitted with Dengue disease. Maximum subjects were from low economic income group and rural origin. *Aedes* mosquito is a daytime feeder and it bites mostly indoor subjects (Thus referred to as office biter). Skilled workers and housewives are thus are at high risk to this mosquito. In a study by Ashwini Kumar *et al* conducted in Karnataka India, most common age group to be involved was found to be 15-44 yrs with frequency of 57.3% both age groups 5-14 yrs and 45-60 yrs were having 15.5% subjects  $>60$  yrs age group composed of 4.3% subjects while  $<5$  yrs age group had 7.5% . Most common population employment wise was unskilled labourer with 30.9% subjects to be followed by preschool/school age children with 29.6% subjects and housewives 24.4% subjects.(Kumar *et al*, 2015) In an another study from India Kauser MM *et al* found maximum subjects belonged to age group  $<30$  yrs with frequency of 68.49% to be followed by fourth decade (16.43%) and fifth decade 9.58%. The distribution of age group was similar to our study as was the distribution in gender including 63.01% subjects as male and 36.98% subjects as female. Maximum subjects belonged to profession of farmer (34.24%), to be followed by students (26.02%), businessman (16.43%) and labour (13.69%).(Kausar *et al*, 2012)

Jitendra sing *et al* also noted fever to be the most common clinical finding present in all (100%) subjects to be followed by headache (78.7%), though the author has not elaborated on the characteristics of headache. Myalgia was noted in 62.03% subjects and arthralgia in 3.7%. Nausea and vomiting were other prominent findings with respective frequency of 56.01% and 41.66%. Abdominal complaints in the form of discomfort or pain were reported by 51.38% subjects. Findings suggestive of decreased coagulation were reported in the form of petechiae in 10.18% epistaxis in 6.48% and hematemesis in 1.58%. Malena was noted in 1.58% subjects and hematuria in 5.55%. Bleeding per vaginum was reported by 1.38% subjects. Most of these findings were in accordance with our study.(Singh *et al*,2015)

Kumar *et al* also noted fever as most common findings (99.1%) but second most common finding was myalgia in 64.6% subjects and vomiting and headache were third most

common with 47.6% frequency for each. Abdominal pain was noted by 37.6% and skin rash by 21.7%. Petechiae were present in 18% subjects. Unlike our study constipation was not reported by the author but diarrhoea was presenting compliant in 13.9% subjects. Bleeding diathesis were reported in frequency of 3-6.2%.(Kumar *et al*, 2015)

Our study performed special investigation to arrive at the final and conclusive diagnosis. NS1 antigen, IgM ELISA, Dengue IgG were performed and diagnosis was further supported by absence of positive Widal for malaria. This is one of the strength of our study. Not many studies have acquired such planned laboratory approach for final diagnosis.(Kumar *et al*, 2015; Singh *et al*,2015;Muruganathan *et al* 2014) We also further reported the diagnosis in form of DF, DHF I, II and III and DSS.

Ashwini Kumar *et al* reported that in their study of the total 466 cases, admitted to the hospital between 2002 and 2008, 391 (83.9%) had Dengue fever, 41 (8.8%) had Dengue hemorrhagic fever, and 34 (7.3%) had Dengue shock syndrome. (Kumar *et al*, 2015)

Daniel *et al* reported Of the 250 serologically confirmed cases, 166 (66.4%) conformed to Dengue fever and 84 (33.6%) to DHF/DSS as per WHO case definition. (Daiel *et al*, 2005)

Outcome of our study was reported as either discharged or referred. Referral of subjects from tertiary care set up to higher facility essentially indicates the severity of the case. Yet no death was reported in our study. Daiel *et al* reported that in their study Three out of 78 patients (3.8%) in the  $< 30$ - year age group and 5 out of 112 patients (4.5%) in the 30-50-year age group died. Daiel *et al*, Kumar *et al* reported deaths among 11 cases (2.4%).(Kumar *et al*, 2015)

Significant association was noted between Outcome and premedication with indicating significantly higher rate of discharge in subjects with premedication thus it can be extrapolated that premedications can reduce the severity of Dengue disease and help prevent complications thus also decreases length of hospital stay. Significant association was noted in higher grade of Dengue disease (DHF II, DHF III and DSS) with referral.

Though this was a study with small sample size, we have followed a stringent protocol to establish a diagnosis of Dengue disease and then classified it systematically. Our outcome was limited by transfer of subjects to higher centre but we followed up them and no deaths were reported any of the subjects. In the light of these credentials of our study we conclude that Dengue disease in West Bengal is more common in third and fourth decade of life with housewives and skilled worker more are at risk so are low socioeconomic status subjects and rural residents. Fever followed by headache are most common symptoms and conjunctival congestion and rash are most common presentation in these subjects. Nearly 70% subjects presenting with Dengue disease are DF while 25% subjects are DHF and DSS is present in 2.5%. Favourable significant association of outcome is present with premedication while that of higher grade of Dengue disease with referral.

**Conflict of interest:** Author declare that they have no conflict of interest.

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