Demographic, Environmental and Clinical Profile of Dengue Fever in Diphu Medical College and Hospital, a Tertiary Care Hospital of Diphu - A Record Based Study

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Abstract:

Background and objectives: Dengue is a mosquito-borne viral disease which is endemic in several countries in the tropical and subtropical regions of the world. Diphu, the capital of Karbi Anglong is not an endemic region for dengue infection. It experienced its 1st major dengue outbreak in the month of September to November 2022. We conducted a study on this outbreak to understand the clinical profile, demographic and environmental conditions of dengue cases.

Methods: All cases registered under Diphu Medical College and Hospital from 25th September to 25th November 2022 were studied. Records from Medical records department (MRD) and bed tickets from Medicine (Dengue ward) were analysed. Home visits were made for 10% of the total cases, where clustering of cases was observed to study the environmental factors related to dengue. A preformed proforma was used for the collection of data. Descriptive statistics were used to analyse the data.

Results: 419 cases of Dengue were reported in Diphu. Of these, majority were male(55.1%) and in the age group of 11-20 years (34.8%). All cases had fever, nausea, malaise, joint pain while headache was reported in 98.1%, vomiting in 92.3%, diarrhea in 3.8% and bleeding in 1.9% cases. Thrombocytopenia was seen in majority of cases (76.8%), other abnormalities recorded were deranged liver and renal function. No fatalities were reported. Majority of cases were from urban areas and peak was at mid-November. Regarding Environmental risk factors related to dengue, all had artificial water holding container surrounding home, 1% had water tank without cover. No household practiced cleaning and drying of breeding area once in a week.

Conclusion: We reported the first ever outbreak of Dengue in Diphu, Karbi Anglong. Vector surveillance and control policies need to be initiated with a plan for rapid diagnosis and treatment of cases and also to prevent future outbreaks.

Keywords: Clinical profile, dengue, demography, Diphu Medical college and Hospital, environment, outbreak.

Introduction

Dengue is a mosquito-borne viral disease which is endemic in several countries in the tropical and subtropical regions of the world. [1] The dengue virus (DENV) is an RNAvirus belonging to the genus flavivirus, and there are four serologically and genetically distinct serotypes, DENV1–4. [2] The transmission of the virus occurs through the bite of infected Aedes aegypti and Aedes albopictus female mosquitoes which feed both indoors and outdoors during the daytime. The mosquitoes breed in standing water, therefore, lack of proper sanitation also contribute to the spread of these mosquitoes. [3] The cases of dengue show an upsurge in the rainy season mostly due to stagnant water. Earlier it was believed that dengue is limited to urban areas due to its vector characteristics, but

in recent times there has been a change in vector characteristics and epidemiology with an increase in the number of dengue cases from the rural areas. [4] Although dengue infection has been known to be endemic in India for over two centuries mostly as a benign and self-limited disease there has been a change in disease course in recent years with increasing frequency of outbreaks and a more severe form of infection presenting as Dengue hemorrhagic fever. [5]

In India, the first epidemic of clinical dengue-like illness was recorded in Madras (now Chennai) in the year 1780 and the first virologically proved epidemic of Dengue fever occurred in in 1963–1964 in Kolkata and the Eastern coast. [6] In the northeastern part of India, serological survey during 1963 revealed dengue activity in Lohit district of Arunachal Pradesh and Darrang district of Assam. [7] The state of Assam reported 5024 cases of Dengue in 2017, 166 cases in 2018, 196 in 2019, 33 in 2020, 103 cases in 2021 and a rise in cases with 1826 cases in 2022 according to data published by the National Centre for Vector borne diseases control. [8] Diphu, the capital of Karbi Anglong (a district in Assam), is not an endemic region for dengue infection. It experienced its 1st major dengue outbreaking 2022, in the month of September, October and November 2022.

We conducted a study on this outbreak with the following objectives:

1. To study the clinical profile of Dengue cases
2. To assess the demographic and environmental conditions of Dengue cases.

Materials and Methods:

Study Design: Record based retrospective study

Study Population: All cases registered under Diphu Medical College and Hospital(tertiary care hospital) from 25th of September 2022 to 30th of November 2022 were studied.

Data Collection Procedure: Since it is a record based study records from Medical records department (MRD) and bed tickets from Medicine (Dengue ward) were taken into account to get the Demographic, clinical and laboratory details of the Dengue patients admitted. Home visits were made for 10% of the total cases, preferably in the area where clustering of cases was observed to assess the environmental risk factors related to dengue. A preformed proforma was used for the collection of data.

Inclusion Criteria:

1. All patients who were admitted to the hospital(Medicine dengue ward) were included in the study. All were confirmed dengue cases and were classified as per WHO guidelines 2009

2. The cases were confirmed based on the presence of NS1 antigen and/or IgM antibody demonstration serological test by ELISA(Enzyme-linked immunosorbent assay)

Exclusion Criteria:

1. Co-infection with other confirmed cases of enteric fever, malaria, typhus, Chikungunya etc. was excluded from the study.

All cases admitted during the above mentioned period and fulfilling the inclusion criteria were analyzed

Statistical Analysis: All data was entered into Microsoft excel sheet and analyzed using descriptive statistics.

Ethical Considerations: Permission from the Head of the Institution along with approval from the institutional ethical committee was taken before the start of the study.

Results

During the outbreak, a total 419 cases of Dengue were reported in Diphu. All the cases were positive for NS-1 antigen.

Of these, majority (55.1%) were male, and mean age of cases was 31.63±14.1. Maximum cases were in the age group of 11-20 years (34.8%) followed by 21-30 year age group (28.4%). Only 3.8% were in the age group of >60 years and no case reported ≤10 years of age (Table 1). Mean duration of hospitalization was 3.23±1.7 days.

About Demographic distribution, majority 98.6% cases were from urban areas while only 1.4% cases from rural areas.

Regarding clinical profile, all cases had fever, nausea, malaise and joint pain while headache was reported among 98.1% and vomiting among 92.3%, abdominal pain in 71.2% and diarrhea among 3.8%. 1.9% cases complained of rash and bleeding. None of the cases had active bleeding, convulsion and coma. No fatalities were reported.

Regarding clinical findings, 5.2% patients had a systolic blood pressure of below 110mm Hg while 19.63% patients had a diastolic blood pressure of below 80mm Hg. None of the cases had features of shock.

About laboratory findings, 9.5% (40) patients had thrombocytopenia (platelet count below 1.5 lakhs/mm^3). Of these 27.5% (11) cases had severe thrombocytopenia with counts below 50000/mm3 while 35% (14) patients had counts between 50,000-1lakh/mm3 and 37.5% (15) patients had mild thrombocytopenia. None of the cases had raised hematocrit. 10.5% (44) cases had deranged liver function tests while 0.7% (3) patients had deranged kidney function. (Table 2)

To assess the Environmental risk factors, we have visited 50 households of cases during Index period. All had artificial water holding container surrounding home, 1% had water tank without cover, 80% had Swampy area surrounding home. No household practiced cleaning and drying of breeding area once in a week. 84% and 68% households had Bamboo fences around the house and construction sites nearby respectively (Table 3).

Outbreak of Dengue mainly occurred in the months of September to November of 2022. Figure 1 shows the weekly distribution of the cases. The highest number of cases were reported from the 1st week of November to almost last week of November with peak at mid-November. (Figure 1)

Table 1: showing age distribution of cases (n = 419)

Age of the patients (in years)	Number	Percentage
0-10	0	0%
11-20	146	34.8%
21-30	119	28.4%
31-40	66	15.8%
41-50	48	11.5%
51-60	24	5.7%
60 years	16	3.8%

Table 2: showing demographic and clinical profile of the cases (n = 419)

Variables		Number	Percentage
Age	≤ 14 years	48	11.5 %
	> 14 years	371	88.5%
Sex	Male	231	55.1%
	Female	188	44.9%
Location	Rural	14	3.3 %
	Urban	405	96.7%
Clinical Profile	Fever	419	100%
	Nausea	419	100%
	Malaise	419	100%
	Joint pain	419	100%
	Headache	411	98.1%
	Vomiting	387	92.3%
	Abdominal pain	299	71.1%
	Weakness	248	59.2%
	Eye pain	64	15.4%
	Diarrhea	16	3.8%
	Rash	8	1.9%
	Bleeding	8	1.9%
Thrombocytopenia		322	76.8%
Abnormal liver function test		355	84.7%
Abnormal renal function test		24	5.7%

Table 3: showing Environmental risk factor surrounding household of cases (n = 50 household)

| Environmental risk factors	Number	Percentages
Presence of artificial water holding container surrounding home	50	100
Presence of water tank without cover	5	10
Presence of Swampy area surrounding home	40	80
Practices of cleaning and drying of breeding places area once in a week	0	0
Presence of the construction sites nearby	26	52
Presence of Bamboo fences around the house	29	58
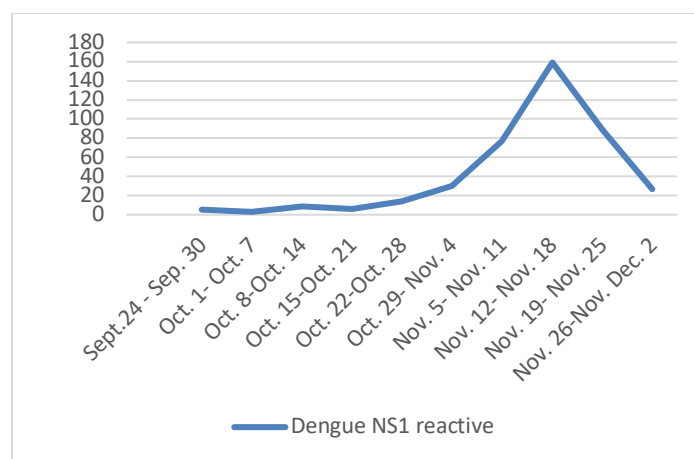
Figure 1: Showing Week wise distribution of the Dengue NS1 reactive cases – September to November 2022 (n = 419)

Discussion:

Although dengue outbreaks are becoming common in different parts of India including the north eastern region, this is the first outbreak of dengue in Karbi Anglong District of Assam.

Majority of the cases of Dengue are reported during the monsoon and post monsoon seasons, in accordance with the reported patterns of dengue transmission. [9] In our case, all the cases occurred between the months of September to November with peak at mid-November. In a study by Varte et al from Mizoram, the cases spanned from July to November with the majority of cases occurring between September and November. [10] However there have been instances of outbreaks occurring during dry summer months as was reported in Rajasthan in 1985(April, May), in Maharashtra in 1989 (March – May), Tamil Nadu in 1998(January to March). [11,12]

In our study, the disease was slightly commoner in males with a male to female ratio of 1.2:1. This was similar to a study by Dinkar and Singh where a higher number of male cases were noted with a male to female ratio of 2.7:1. [13] However other studies have showed no difference in the gender distribution of dengue cases. [14]

In regards to age distribution, 11.5% of our cases were ≤ 14 years while the remaining 88.5% were above 14 years of age. In the study by Varte et al.[10] 12.17% cases were ≤ 14 years while 87.83% cases were above 14 years of age. Majority of our cases fell in the age group of 11-20 years (34.8%) followed by 21-30 years age group (28.4%). In the study by Dinkar and Singh [13], 20-30 year age group was the most affected while D. Savargaonkar et al.[15] reported the most commonly affected age group to be 11-30 years. Various other studies [5,16,17] have reported the commonest age groups to be 11-20 and 15-24 years .In a study by

Goswami et al, [18] majority of cases were in 21-30 year age group followed by 11-20 years.

Majority of our cases were from urban areas (96.7%) while only 3.3% were from rural areas. Majority of outbreaks in the past have suggested dengue to be an urban disease as the mosquitoes flourish in congested urban and semi urban areas mostly during the rainy season. Outbreaks of dengue in different parts of India like Delhi, Chandigarh, Puducherry, Karnataka, Kolkata,, Amalner in Maharashtra, Vellore and Chennai in Tamil Nadu, Ludhiana in Punjab, Jalore and Ajmer in Rajasthan, Lucknow, and in West Bengal occurred in urban areas. [19,20,21,22] However, in recent times, dengue is spreading progressively to rural areas rapidly as observed from Haryana in 1996, Tamil Nadu, Maharashtra, and Varanasi. [13,14,20,23].

Clinical complaints of the patients varied from fever, nausea, vomiting, malaise, headache to abdominal pain, diarrhea, eye pain. While fever, nausea, malaise, joint pain and headache were the commonest complaints seen in almost all the cases, vomiting was seen in 92.3% cases, abdominal pain in 71.1% cases and eye pain in 64% cases. Fever, headache, nausea, vomiting, backache, muscle pain, joint pain, retroorbital pain, abdominal discomfort, rash, itching, bleeding manifestations, loose stool, altered behavior, ascites, pleual effusion, dizziness have all been described as manifestations in dengue positive cases in different studies. [10,13,18] There were no cases of dengue hemorrhagic fever in our study.

76.8% of our cases had thrombocytopenia while severe thrombocytopenia was seen in 21% cases. Dinkar et al. [13] found thrombocytopenia in 99.1% of their cases. About 84.7% cases had deranged liver function while 5.7% of cases had deranged kidney function while. Dinkar et al. [13] found liver dysfunction in 59% cases and kidney function abnormalities in 2.8% cases.

A meta-analysis done with 233 studies by Ganeshkumar et al.[24] showed that the case fatality ratio was 2.6%, a study from Mizoram in North east India by Varte et al. [10] also showed a mortality of 1.59%. However in the outbreak in Karbi Anglong which we studied, no deaths were reported.

In a study done by Swain Subhashisa et al. [25] in 2017 reported that about environmental risk factors of Dengue, 78.6% cases had swampy areas surrounding the home, 55.5% had mosquito breeding sites. This is similar to our study findings. We found that 80% had Swampy area surrounding home. 84% and 68% households had Bamboo fences around the house and construction sites nearby respectively. No household practiced cleaning and drying of breeding areas once in a week.

Conclusion

We reported the first ever outbreak of Dengue in Diphu, Karbi Anglong. Majority of our cases were from urban areas and affected male young adults. Peak of outbreak was in mid-November i.e. post monsoon. There were no deaths reported and no instances of dengue hemorrhagic fever or dengue shock syndrome in our outbreak. Vector surveillance and control policies need to be initiated with a plan for rapid diagnosis and treatment of cases and also to prevent future outbreaks.

There is a need to create awarenessat community level regarding the recognition of signs and symptoms of Dengue, its complication and need to seek early treatment to prevent complications and mortality.

We also should give emphasis on creation of awareness among all age groups with special reference to the productive age group as the majority of the affected group were male young adult about the protective measures like wearing of long sleeve and light Colo clothes, using mosquito repellents while staying at home and also going out to prevent mosquito bite.

Regarding the risk factors at environment level, we can conclude that majority of the houses had favorable environmental conditions for breeding of mosquitos. There is a need to create awareness among people to minimize mosquito breeding sites and also to practice dry day once in a week.

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