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Epidemiological Trends and Clinical Manifestations of Dengue Cases Admitted in a Tertiary Care Hospital, Sullia, Karnataka

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ABSTRACT

Background: Dengue is an important public health issue worldwide. There is an increase in number of cases recently and it is considered to be associated with climatic conditions. The present work was done to study the epidemiological trends in dengue and its clinical manifestations.

Materials and Methods: The study was conducted in a tertiary care teaching hospital in rural part of South Canara district of Karnataka. The data was collected using a semi structured pretested questionnaire from January 2016 to December 2018 and presented as frequencies and percentages.

Results: 31.10% of the total 1993 suspected samples processed were positive for dengue over a period of three years. Among the positive cases, there was a male preponderance and seen commonly in the 20-49 years age group. There was a positive relationship of the disease incidence with environmental factors. Fever was the most common complaint followed by myalgia and headache. Petechiae was the most common form of bleeding manifestation. More than 90% of the diagnosed cases belonged to dengue fever. ARDS was seen in 1.98% as a complication.

Conclusion: Dengue cases are on a rise and are associated with climatic conditions. Continuous surveillance of the cases and mosquito control measures are essential to control this vector borne disease.

Key Words: Dengue, Epidemiological trends, Clinical Manifestations

BACKGROUND

Dengue, an important arthropod borne disease transmitted by Aedes aegypti mosquito, is a major public health issue in India[1]. This viral infection has grown 30 folds from the time it was initially reported. It has now expanded and diversified globally[2] causing human sufferings and massive socio-economic losses[3]. It is estimated that 50-100 million dengue cases occur globally each year and is also responsible for 20,000 annual deaths[4, 5, 6].

Since the mid 1990's, the dengue epidemics have become more frequent in urban areas of India and it has now spread to new regions where it was actually non- existent[7]. The epidemiology of dengue was first reported in Chennai in 1780 and the first outbreak occurred in Kolkata in 1963, following which several outbreaks have been reported in various parts of India[8, 9]. In addition to the increased number of cases and severity of disease, there has also been a major change in the geographical range of the disease.

The rise in cases of dengue in India can be associated with unplanned urbanization, changes in ecological factors, changes in host – pathogen interaction and population immunological factors. Temperature and precipitation are important factors which are required to create and maintain breeding

sites and consequently a strong determinant of vector distribution. People sometimes tend to store water in unprotected reservoirs near their households which attracts the anthrophilic mosquito thus increasing the risk of transmission[8].

Dengue disease has a seasonal pattern i.e., the cases peak after monsoon but in the southern states and states of western part of India, the transmission is perennial[10]. During the year 2017 highest number of cases of dengue was seen in Tamil Nadu, Kerala, Karnataka and Punjab[11].

In the first few days of illness, dengue patients present with fever and also with non specific signs and symptoms like headache, malaise, nausea, vomiting, abdominal pain and rash. Retroorbital pain and arthralgia are mostly found in Dengue fever (DF) patients. The bleeding manifestations may either be petechia which is the most common and other signs like epistaxis, gum bleeding, hematemesis, or melena may also be present. Identifying the cause of fever is usually a challenge to any physician and these signs and symptoms help in identifying the disease early which is sometimes missed by the treating physician in a busy outpatient or primary care unit[12].

The changes that have occurred with regards to magnitude of dengue and its distribution in a certain area will provide us essential data to the planning and implementation of services for the prevention, control and treatment of disease as well as setting priorities among the services. Thus the objective of this article was to study the epidemiological trends in dengue and its clinical manifestations among those who were diagnosed at this tertiary care centre.

The study area, Sullia taluk is situated in Dakshina Kannada district of Karnataka. The latitude / longitude coordinates for Sullia are:12.5581° N, 75.3908° E surrounded by evergreen mountains of Western ghats range and is situated in the East of Mangalore on NH-275 with a total population of 1, 45,227. The houses are in the midst of a plantation of coconut, arecanuts, rubber or a mixture of them.

The objective of this article was to study the epidemiological trends in dengue and its clinical manifestations among those who were diagnosed at this tertiary care centre.

MATERIALS AND METHODS

The study was conducted in Sullia taluk of Karnataka between January 2016 and December 2018. A semi-structured pretested questionnaire was used to collect the data from all patients who tested positive for dengue. Demographic and clinical details of the patient having dengue were collected. Data regarding the climatic condition of Sullia was recorded for every month during the study period i.e temperature, rainfall and humidity[13]. Patients with a positive NS1 antigen or positive IgM antibody or both positive were considered as a case of dengue. Due to lack of facility for genotypic study, serotypic classification could not be done.

Approval from the institutional ethical committee was obtained before the start of the study. Informed consent was taken in patient's language prior to obtaining detailed history from each of them. Blood samples were collected as per the WHO guidelines[14,15]. Blood samples thus collected were centrifuged at 1100 to 1300 rpm at room temperature. The serum was separated and was subjected to Dengue NS1, Dengue IgM antibody and Dengue IgG antibody ELISA (J. Mitra & Co. Pvt. Ltd.).

The data was then entered into Microsoft Office Excel 2007 and IBM SPSS version 17 was used for analysis. The observations are presented as frequencies and percentages.

RESULTS

Of the total 1993 blood samples processed for examination, 620 (31.10%) were positive for dengue. 58.06% of the positive samples were from males and 41.93% were from females as seen in Table 1. It can be seen that during the year 2016, there were 336 cases, which accounted for 54.19% of the total cases diagnosed during the three years. There was a decline in the cases in the year 2017 and again there was an increase in the number of cases in 2018 to 33.06%. In the year 2017, only 12.74% of the cases were seen in the hospital as seen in Figure 1.

Table 2 shows the age and gender distribution of the confirmed cases. Of the total 360 male cases diagnosed, the highest cases were in the age group of 20-49 years which accounted for 58.33% of the cases among males and 33.87% of all cases.

Table 1: Year wise distribution of dengue cases

Duration	Blood samples processed	Samples tested positive (%)	Positive samples		Positivity rate	
			Male (%)	Female (%)	Male (%)	Female (%)
Jan 2016 – Dec 2016	949	336 (35.40)	185 (55.05)	151 (44.94)	31.51	41.71
Jan 2017 – Dec 2017	342	79 (23.09)	52 (65.82)	27 (34.17)	23.74	21.95
Jan 2018 – Dec 2018	702	205 (29.20)	123 (60)	82 (40)	31.21	26.62
Total	1993	620 (31.10)	360 (58.06)	260 (41.93)	30	32.78

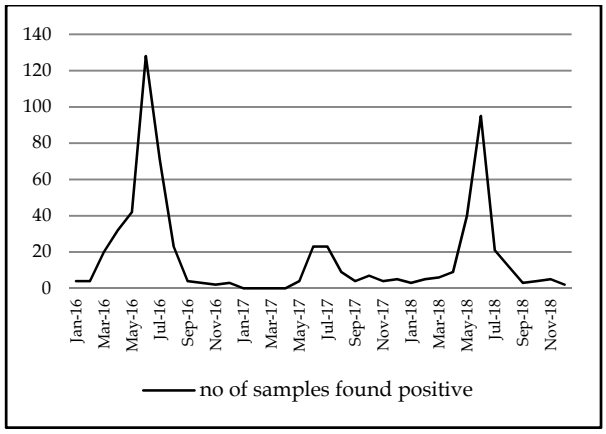

Figure 1: Dengue cases during the study period

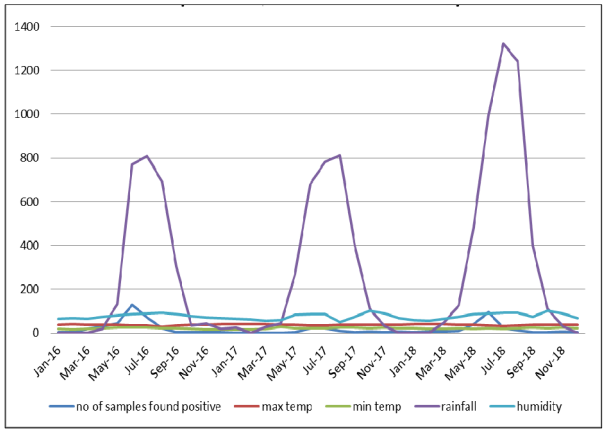

Figure 2: Relationship of dengue cases with temperature, rainfall and humidity

Table 2: Age and sex distribution of dengue cases

Age distribution	Dengue positive cases			Positivity rate	
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)
0 – 4 Years	6 (0.96)	5 (0.80)	11 (1.77)	21.42	16.12
5 – 9 Years	9 (1.45)	7 (1.12)	16 (2.58)	25	25.92
10 – 19 Years	43 (6.93)	37 (5.96)	80 (12.90)	28.10	38.14
20 – 29 Years	67 (10.80)	59 (9.51)	126 (20.32)	30.04	38.56
30 – 39 Years	69 (11.12)	57 (9.19)	126 (20.32)	34.15	32.75
40 – 49 Years	74 (11.93)	49 (7.90)	123 (19.83)	30.96	33.56
50 – 59 Years	47 (7.58)	24 (3.87)	71 (11.45)	31.12	32.87
60 – 69 Years	36 (5.80)	16 (2.58)	52 (8.38)	28.34	29.62
70 – 79 Years	6 (0.96)	5 (0.80)	11 (1.77)	22.22	15.62
≥ 80 Years	3 (0.48)	1 (0.16)	4 (0.64)	21.42	16.66
Total	360 (58.06)	260 (41.93)	620 (100)	30	32.78

Of the 260 cases in females, the maximum number of cases was also in the 20-49 years age group which accounted for 63.46% of cases among females and 26.61% of all cases. There were only a few cases in the extremes of the age groups.

Figure 2 shows that the relationship of confirmed cases of dengue with the environmental factors. It was clearly seen that there was a relationship of dengue outbreak with rainfall. There was a gradual rise in number of cases from the end of May and the maximum number of cases reported during the months of July and August. There was a decline in the number of cases from the end of September.

Table 3 shows the geographical distribution of cases. It is evident that the maximum number of positive cases (35.69%) residing in Sulliataluk were from urban part of Sullia. The maximum number of cases in rural area was from Aranthodu, Thodikana and Jalsoor villages which are in the periurban belt.

NS1 antigen was positive in 59.07% of the cases and 29.86% showed IgM positivity (Table 4). Fever was the most common complaint followed by myalgia and headache in 71.94% and 48.18% of the cases respectively. 46% of the cases had vomiting and 35.47% had abdominal pain. Among the bleeding manifestations, petechiae was the commonest which accounted for 20.79%. Other bleeding manifestations like gum bleeding, epistaxis and hematuria were seen in less than 3% of the population. ARDS was seen as a complication in 1.98% of the cases and pleural effusion in 1.65% of the cases. Less than 0.5% had renal failure or multiorgan failure as seen in Table 5.

More than 90% of the diagnosed cases were dengue fever as seen in Table 6. Very few cases presented as dengue hemorrhagic fever or dengue shock syndrome. Only 2 cases were reportedly confirmed to have died because of dengue over three years.

DISCUSSION

Dengue is an important emerging disease of the tropical and subtropical regions, transmitted by mosquitoes to humans. It is important because of both the morbidity pattern and mortality associated with it. Reappearance of dengue over the past few decades has made it an important public health issue globally[16].

In the present study, out of 1993 suspected dengue cases, 620 cases were positive for dengue. The proportion of cases with dengue disease, thus accounted for 31.10%.

Table 3: Geographical distribution of dengue cases admitted in the hospital

Area of residence	Cases in 2016	Cases in 2017	Cases in 2018	Total cases
Patients from SulliaTaluk				
Thodikana	33	0	5	38
Aivernadu	0	1	10	11
Amaramudnoor	3	2	13	18
Sullia town	116	9	36	161
Guthigaru	3	2	9	14
Jalsoor	6	7	15	28
Aranthodu	27	12	8	47
Markanja	0	0	5	5
Aletti	7	1	8	16
Bellare	0	3	16	19
Ajjavara	17	1	4	22
Peraje	0	0	4	4
Devachalla	2	2	5	9
Mandekolu	0	1	4	5
Kallugundi	6	2	0	8
Chembu	5	0	2	7
Ubaradka	7	1	4	12
Sonageri	6	0	1	7
Kurunjibhag	0	0	4	4
Subramanya	0	0	7	7
Nellurkembraje	0	0	3	3
Madapady	0	0	3	3
Kanakamajalu	0	0	3	3
Patients from other areas of Karnataka and Adjacent Kerala				
Koynadu	21	0	0	21
Sampaje	17	4	10	31
Puttur	6	1	7	14
Madikeri	47	4	4	55
Somwarpet	1	3	0	4
Virajpet	0	0	2	2
Periyapatna	1	10	3	14
Kushalnagara	0	7	3	10
Hassan	1	2	1	4
Somwarpet	0	4	2	6
Kasaragod	4	0	4	8

Table 4: Pattern of positivity among the Dengue cases

Type of test	Dengue cases
NS1 TEST	358 (59.07%)
IgM	181 (29.86%)

Table 5: Symptoms and complications among those admitted with dengue

Symptoms	No. of cases (%)
Fever	604 (99.66)
Myalgia	436 (71.94)
Headache	292 (48.18)
Vomiting	279 (46.03)
Abdominal pain	215 (35.47)
Skin rash / petechiae	126 (20.79)
Breathlessness	91 (15.01)
Altered sensorium	21 (3.46)
Gum bleeding	16 (2.64)
Hematuria	7 (1.15)
Epistaxis	8 (1.32)
Diarrhoea	2 (0.33)
Complications	
ARDS	12 (1.98)
Pleural effusion	10 (1.65)
Renal failure	3 (0.49)
Multi organ failure	3 (0.49)

Almost similar seroprevalences were reported in studies done by Ukey PM[17] and Saini S[18] in Central India (31.3%) and Western Maharashtra (30.6%). Lesser seroprevalence was seen in studies done by Smitha Deshkar[19], Sood S[20] and Rao MS[21] in Central India (24.49%), Rajasthan (18.99%) and Andhra Pradesh (17.7%).

The age group which was affected the most in the present study was 20-49 years which accounted for 60.48% of the cases. A study conducted by Kumar A[22] et al in Udupi, Karnataka showed that the maximum number of cases (57.3%) were in the age group of 15-44 years. Ukey PM et al[17] reported highest seropositivity (43.90%) in children aged less than 10 years followed by 15-30 years (31.71%). Rao MS[21] et al also observed maximum seropositivity (35.84%) in the age group of 0- 10 years, followed by 22.66% in the age group of 11-20 years. The proportion of seropositivity and their presence in a particular age group may vary from hospital to hospital and it may depend on various factors like the rate of admission to that hospital, the hospital speciality, the treating physicians, the facilities available etc.

It was observed that males (58.06%) were more commonly affected than females (41.93%) in the present study. The ratio of male: female positivity was found to be 1.38:1. The higher seropositivity in males might be because of outdoor activities or increased exposure at work places. It can also be because of lower health care seeking behavior in females and their habit of care seeking from traditional practitioners which go unnoticed from public surveillance system. Almost similar figures were obtained in studies done by Kumar A[22] (1.82:1) and Karoli R[23] (1.38:1) in Karnataka and Northern India. Halsted SB[24] in his article mentions that the immune responses in the form of cytokines are more competent in females than males thus making them more immune than males.

The geographical distribution of dengue cases studied from this hospital data would give us an idea about the proportion of cases in the study area and where the maximum efforts are to be put to minimize the disease prevalence. The seropositivity was found to be higher in urban areas when compared to rural areas. The reason behind this could be the higher density of aedesaegypti in urban areas when compared to rural areas, higher density of the houses in urban areas and short flying distances needed for the mosquito. It could also be seen from the present study that there is an increase in number of cases in rural areas when compared to previous years and also that there is new cases occurring in areas where dengue was not previously reported. This could be because of the spread of peri-urbanisation in these areas.

Table 6: Category of dengue and outcome of patients with dengue

Year	DF (%)	DHF (%)	DSS (%)	Cases	Deaths (%)
Jan 2016 – Dec 2016	325 (96.72)	8 (2.38)	3 (0.89)	336	0 (0)
Jan 2017 – Dec 2017	74 (93.67)	3(3.79)	2 (2.53)	79	1 (1.26)
Jan 2018 – Dec 2018	191 (93.17)	7 (3.41)	7 (3.41)	205	1 (0.48)

DF= Dengue fever, DHF=Dengue hemorrhagic fever, DSS=Dengue shock syndrome

Dengue outbreaks were most commonly seen in the months of June and July in the present study. This is in contrast to a study done in Chennai by Gunasekaran P et al[25] where it was reported that higher positivity was seen during the months of September and October. This difference may be because of the pattern of rainfall in different parts of the country. During the rainy season, the survival of the mosquito is longer and the chance of transmission of the virus is also greater[26]. The post monsoon stagnant water pool also acts as a breeding ground which favours the increase in disease prevalence.

The most common clinical features in dengue disease was fever (99.66%), followed by myalgia (71.94%) and headache (48.18%). Petechiae or skin rashes were found in 20% of the patients and bleeding manifestations seen in 5.11%. Similar findings were reported by Turbadkar D et al[27] in a study done at Mumbai. Fever was the major presenting complaint in their study, followed by icterus, myalgia and headache. More than 90% of the diagnosed cases every year were classified as dengue fever and less than 5% of them were either dengue hemorrhagic fevers or dengue shock syndrome. The results are similar to the study done in Karnataka[19].

CONCLUSION

The present study provides data about the epidemiological trends of dengue over a period of three years. It can be concluded that the dengue cases are more commonly seen during the monsoon but there are also a few cases that occur during other seasons. Most of the cases were either from urban or periurban areas. Fever, headache, myalgia, vomiting and abdominal pain were the commonest complaints and petechiae was the most common bleeding manifestation. To conclude, it is evident that there is an increase in the number of dengue cases in the study area and intervention is necessary to bring down the morbidity associated with this disease.

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