

# Retrospective Analysis of Dengue Fever Outbreak in 2017 – An Observational Study from General Hospital, Thiruvananthapuram

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## ABSTRACT

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**Background:** Dengue epidemics are a serious public health concern world over. Similar epidemics are reported from various parts of India also. The recent outbreak in Kerala in 2017 had high morbidity. The present study is aimed to evaluate the epidemiological features, clinical profile, laboratory features and outcome in dengue patients.

**Materials and Methods:** It is a hospital based observational study where retrospective data analysis of patients with dengue during the peak epidemic period (from May 2017 to July 2017) was done.

**Results:** Of the 578 patients 277 (47.9%) were males and 301 (52.1%) were females.

Mean age of the patients was 37.28 ± 15.765. Out of 578 patients, 515 (89.1%) had thrombocytopenia and 522 (90.3%) had raised liver enzymes. Mean haematocrit was 41.44 ± 4.18 in males and 37.55 ± 4.28 in females. Among all patients 225 (38.9%) developed any kind of bleeding manifestations. Out of 578 patients, 510 (88.2%) had either NS1Ag or IgM positivity. Of the total MICU admission, 40 had severe dengue with co morbidities.

**Conclusion:** In our study significant number of patients had thrombocytopenia and raised liver enzymes but complications and mortality were less. Early recognition of warning signs, prompt intervention, supportive treatment and monitoring can save lives.

**Keywords:** Dengue fever, Epidemic, Clinical features

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## INTRODUCTION

Dengue is a major public health problem globally<sup>1,2</sup> causing nearly 50 million infections annually. It affects mainly tropical and subtropical regions. In India the first case of dengue fever was reported from Madras (Chennai) in 1946, and first major epidemic was reported from Kolkata in 1963-64. The disease then spread towards other parts of the country. After nearly three decades another major outbreak was reported from Delhi in 1996.

Epidemic re-emerged in Delhi in 2003 and persisted for four years with all four serotypes of dengue virus making Delhi hyper endemic area of dengue. The disease is now being reported from all parts of the country.

In Kerala dengue fever cases are increasing for the past few years. Now dengue has emerged into epidemic proportions. Last year (2017) we had an outbreak of

dengue which lasted for more than 6 months. Total number of dengue fever cases in Trivandrum district was 8955, compared to 2071 cases in 2016 and 994 cases in 2015. The epidemic resulted in serious medical as well as socioeconomic consequences<sup>3</sup> and created panic among public. It is the commonest mosquito transmitted arboviral disease. *Aedes aegypti* mosquito is the main vector transmitting dengue virus and to a lesser extent by *Aedes albopictus*. Dengue virus belongs to Flaviviridae family with four different serotypes DEN-1, DEN-2, DEN-3 and

DEN-4 Recovery from infection by one serotype gives lifelong immunity to that serotype. But cross immunity to other serotypes is partial and temporary.

Various studies have been reported from different parts of India about various aspects dengue. But studies reported from Kerala are few. General Hospital Thiruvananthapuram being a major referral centre, received large number of dengue patients in both outpatient

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department(OPD) as well as for in patient care . So this study was conducted to analyse the epidemiological features, clinical profile, laboratory features and outcome of last outbreak.

## MATERIALS AND METHODS

The study was conducted in General Hospital Thiruvananthapuram, which is a tertiary care hospital under Health services Department, Government of Kerala. The epidemic was noticed from 2017 January to the end of September 2017, with maximum number of cases reported in June. Total number of cases admitted in medical wards and MICU during this period were analysed with respect to age and sex distribution. From these 578 cases during the peak period of epidemic (From May 2017 to July 2017) were selected and studied in detail. Epidemiological features, clinical profile, laboratory features and outcome were analysed.

After getting permission from scientific committee and ethical committee case records were collected and relevant information entered into case reporting form.

### Inclusion criteria

Patients admitted in medical wards and MICU above 13 years of age having probable dengue ie. fever, headache, myalgia with or without bleeding manifestation and thrombocytopenia.

### Data Entry and Analysis

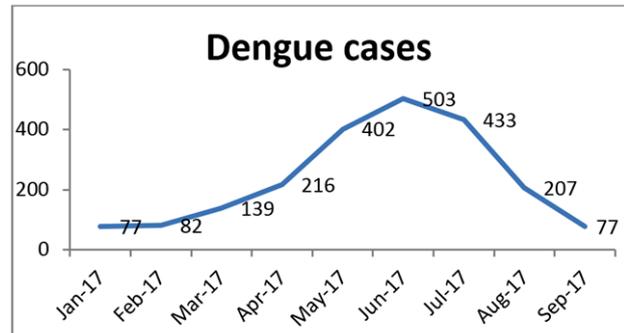
Data was coded and entered in MS excel and analysed in SPSS version 20 software.

## RESULTS

During the epidemic period, from January 2017 to September 2017 around 2136 patients were admitted in General Hospital Thiruvananthapuram. There were 1056 males and 1080 females. Total number of cases per month during the epidemic period was shown in graph 1 Number of dengue cases started rising from January peaked in June and decreased towards September (Graph 1).

Out of this 578 case records during the peak period (from May 2017 to July 2017) were selected and studied in detail. The following results obtained.

Of the total 578, lowest age was 13 years highest age was 80 yrs, and mean age  $37.28 \pm 15.765$ . Males were 277 (47.9%) and females were 301 (52.1%).



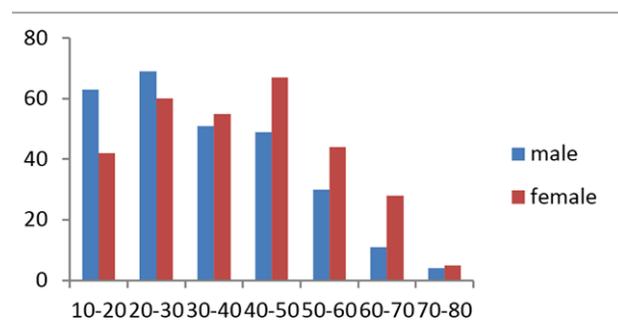
Graph 1. Monthly distribution of inpatient cases during the epidemic of dengue

Mean age among males were  $34.62 \pm 15.090$  and that among females is  $39.71 \pm 16.005$ . The difference in mean age between males and female were found to be statistically significant with a 't' value 3.925 and 'p' value 0.001.

Out of 578 patients 431(74.6%) were from Thiruvananthapuram Corporation area and 147(25.4%) patients were from adjacent areas of the district.

In the age group 10-20, out of the total 105, 63(60%) were males and in the age group 20-40, of the total 235, 120(51.1%) were males. Where as in the age group 40-60, out of the total 190, 111(58.4%) were females and in the age above 60 years, of the total 48, 33(68.8%) were females. The difference in proportion was statistically significant with a Chi square value 15.476 and p value 0.001 (Graph 2).

Most important symptom was fever, among 563(97.4%), followed by myalgia 441 (76.3%), headache 387 (67%), vomiting 265 (45.8%), nausea 23 (40%), abdominal pain 174 (30.1%), retro orbital pain 93 (16.1%). Most common clinical manifestations were rash 275 (47.5%), hepatomegaly in 101 (17.5%), conjunctival congestion 77 (13.3%), mucosal petechiae in 28 (4.8%) and splenomegaly in 24 (4.2%). Commonest bleeding manifestation noted was malena, among 185 (32%) patients. Followed by menorrhagia in 39 (6.7%)



Graph 2. Age group and gender distribution of study subjects

Symptoms & clinical manifestations	Number	Percentage (%)
Fever	563	97.4
Myalgia	441	76.4
Headache	387	67
Rash	303	52.4
Vomiting	265	45.8
Nausea	231	40
Malena	185	32
Abdominal pain	174	30.1
Retro orbital pain	93	16.1
Cough	71	12.3
Diarrhoea	65	11.3
Menorrhagia	39	6.7
Dyspnoea	34	5.9
Chest pain	22	3.8
Haemoptysis	11	2.9
Rash	275	47.5
Hepatomegaly	101	17.5
Conjunctival congestion	77	13.3
Mucosal petechiae	28	4.8
Splenomegaly	24	4.2
Hypotension	10	1.7
Pleural effusion	9	1.6
Ascites	6	1.0

patients, haemoptysis 11 (2.9%), epistaxis 3(0.5%), mucosal petechiae in 28 (4.8%) patients. So out of the total 578, 225 (38.9%) had any of the bleeding manifestations.

On admission 505 patients (87.4%) had thrombocytopenia (mean platelet count  $83487.89 \pm 53530.4$ ) (table 2). Of these, 261 (45.2%) had platelet count between 50,000-100,000/cumm., 174 (30.1%) patients had platelet count less than 50,000/cumm. Two patients had platelet count less than 10000/cumm. Platelet count further decreased during hospital stay, 567(98.1%) developed thrombocytopenia (mean platelet count  $58576.99 \pm 36415.28$ ). Platelet dropped to less than 50,000/cumin in 274(47.4%) of patients. Out of these 7 (1.2%) had platelet count was less than 10000/cumm. Leucopenia noted in 256 patients 44.3%. Haematocrit value was raised in two males and three females. Mean haematocrit values among males were  $41.44 \pm 4.188$  and females  $37.55 \pm 4.281$ .

Alteration of liver function, as elevated SGOT was noted in 522(89.3%) patients. Out of these 19 (3.3%) had SGOT more than 500.12(2.1%). SGPT was raised in 448 (77.2%) of patients, of them 14 (3.1%) had SGPT more than 500mg%. But elevated alkaline phos-

Lab feature	Number	Percentage (%)
Thrombocytopenia	563	97.4
(at the time of admission)	505	87.4
Thrombocytopenia(during hospital stay)	567	98.1
Leucopenia	252	43.6
Raised SGOT	522	90.3
Raised SGPT	448	77.1
Raised ALP	6	1
Hypoproteinemia	292	50.5
Hypoalbuminemia	406	70.2
Hyperbilirubinemia	23	4.0
Elevated B. urea	15	2.6
Elevated Creatinine	15	2.6
NS-1 positivity	299	51.7
IgM positivity	274	47.4
IgG positivity	74	12.8

phatase was noted in 6 (1%) patients only. Hyperbilirubinemia was seen in 6 (1%), highest value being 3.5mg%. Hypoproteinemia noted in 297(51.4%), and hypoalbuminemia in 408 (70.6%). Altered renal function noted in 15(2.6%) patients.

Diagnosis of dengue fever was made by positive NS-1 Ag test in 299 (51.7%) patients and positive IgM in 274(47.4%) patients. Out of 578 cases, NS-1 and IgG was positive was noted in 26 (4.5%) patients and IgM and IgG positive in 21 (3.6%) patients. Cross positivity with Leptospirosis noted in 22 patients.

Of the 578 patients 40(6.9%) who developed severe dengue and 13(2.2%) patient who had comorbidities required MICU admission. So a total of 53(9.1%) patients were treated in MICU.

Patients admitted in MICU (53) and medical wards (525) were compared to find out whether there was any difference in important clinical manifestations, laboratory finding, complications, using Chi-square test. The results were significant and are given in table 3.

About hospital stay, 90 (15.6%) had less than 3 days, 424 (73.3%) had 3-7 days stay and 64(11.1%) had more than 7 days stay. Mean hospital stay was  $5.34 \pm 1.864$ .

Complications were present only among 8 (1.3%) of the patients. Hypotension was present in 10 (1.7%) patients. Acute kidney injury (AKI) was seen in 3 patients, acute respiratory distress syndrome (ARDS) among 2 patients, Sepsis in three patients.

**Table 3. Distribution of symptoms, clinical manifestations and laboratory findings according to place of admission (ward or MICU)**

Category		Ward(525)	MICU(53)	28(52.8%)	Chi-square	“p” value
Hypotension	Present	2(0.4)	8(15.1)	10	61.297	0.001
	Absent	523(99.6)	45(84.9)	568		
Pleural effusion	Present	2(0.4)	7(13.2)	9	51.669	0.001
	Absent	523(99.6)	46(86.8)	569		
Ascites	Present	2(0.4)	7(13.2)	9	51.669	0.001
	Absent	524(99.8)	48(90.6)	569		
Hepatomegaly	Present	79(15)	22(41.5)	101	23.376	0.001
	Absent	446(85)	31(58.5)	477		
Splenomegaly	Present	17(3.2)	7(13.2)	24	12.022	0.001
	Absent	508(96.8)	46(86.8)	554		
Platelet count during hospital stay	<50000	230(43.8)	44(83.0)	274	29.684	0.001
	>50000	295(56.2)	9(17.0)	304		
	>500	13(2.5)	7(13.2)	20		
SGOT	<500	512(97.5)	46(86.8)	558	16.596	0.001
	>500	10(1.9)	4(7.5)	14		
SGPT	<500	515(97.5)	49(92.5)	564	6.485	0.011
	<3 days	81(15.4)	9(17)	90		
Hospital stay	3-7days	399(76.4)	25(47.2)	424	37.879	0.001
	>7days	45(8.6)	19(35.8)	64		
Complication	Present	1(0.2)	7(13.2)	8	59.762	0.001
	Absent	524(99.8)	46(86.8)	570		
Outcome	Abnormal	3(0.6)	10(18.9)	13	73.301	0.001
	Normal	522(99.4)	43(81.1)	565		

When outcome was analysed, only 11(1.9%) were referred to Medical College, Trivandrum and 2 (0.3%) patients expired.

## DISCUSSION

Dengue is the most common mosquito borne viral disease in Kerala which has grown into epidemic proportions in recent years. Increase in growth of vector mosquitoes favouring virus transmission could be the reason. Climatic changes involving rainfall, temperature, humidity, poorly planned developmental activities, inadequate waste disposal and increased urbanisation, increase in global travel and trade all play a role in this. Dengue fever could be a mild self-limiting illness to life threatening dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Modified classification by WHO in 2009 and 2012 include dengue with or without warning signs and severe dengue. Warning signs include refractory vomiting, severe abdominal pain, rise in hematocrit (>20%),

bleeding manifestations, lethargy, platelet count<50,000/cumm.

The epidemic extended from January to September, maximum cases were<sup>4</sup> reported from May to July with peaking of cases in June. Climatic conditions like rainfall, temperature and humidity played important role in abundant growth of mosquitoes and spread of disease during this period. *Aedes aegypti* usually breed in man made containers filled with clean water. The mosquito bites during early morning and evening hours.

In our study males are more affected in 13-30 year age groups and females are more affected in rest of the age groups. This could be due to the domestic breeding of vector mosquito and to some extent the fact that Kerala women are going out for work as men. Similar pattern was observed in 2012 study by<sup>5</sup> Nandini Chatterjee et al from Kolkata. But male preponderance was reported in majority of studies from India and South East Asia, like the study by

7Divendu Bhushan et al from Bihar 2016

Though dengue was considered as a disease of younger age group, recent studies revealed increase in number of cases in older age group as well. In our study too, there was increase number of cases in 30-60 age group and this was prominent among females. **(Graph 2)** Regarding age distribution males were maximally affected in 13–30 group whereas females are maximally affected in 40–50 group. **(Graph 2)**

Majority of cases were from Thiruvananthapuram corporation area, rest of the cases were from adjacent areas of the district, which are equally urbanised.

The course of dengue fever is divided into initial febrile phase which lasts for 1-3 days, critical phase for next 4-5 days, and last recovery phase for 4-5 days. In the initial febrile phase diagnosis of dengue fever made by NS-1Ag test. IgM ELISA test is used for diagnosis after 5 days of fever. Serotype analysis of dengue done in State Public Health Laboratory revealed 25 cases were

DEN- 1,10 cases DEN- 2, 4 cases DEN- 3 and 1 case was of DEN- 4.

Classical features of dengue like fever, myalgia, headache, vomiting abdominal pain were observed in our study subjects (**table 1**). Fever was the commonest symptom, followed by myalgia and headache. Similar results noted in study from<sup>9</sup> Guwahati (P.C.Bhattacharya et al). Retro orbital pain the characteristic feature of dengue was seen less number of patients only. Vomiting (45.8%) and abdominal pain (30.1%) were predominant symptoms. Out of these, 30 patients had refractory vomiting and severe abdominal pain requiring MICU admission. Malena was the most common bleeding manifestation noted followed by menorrhagia and haemoptysis. But epistaxis was the commonest bleeding manifestation noted in the study by<sup>10</sup> M U Rabbani et al from Aligarh U.P.

It was observed in our study there is no correlation between platelet count and bleeding manifestations.<sup>5</sup> Though significant number of patients had thrombocytopenia (87%), bleeding manifestations were present in 38.9% of patients only. And no life threatening bleeding manifestation was reported. This could be due to the fact that bleeding in dengue is multifactorial; these are thrombocytopenia, platelet function normalities, hepatic involvement resulting in prolonged prothrombin time and increased fibrinogen consumption.

But there are studies which showed percentage of bleeding higher than that of<sup>6</sup> thrombocytopenia.

Dengue fever shows liver involvement ranging from asymptomatic transaminase elevation to<sup>7</sup> acute liver failure on the other extreme. This study showed similar results. SGOT was raised in 87% of patients and SGPT in 75% of patients. The reason for SGOT elevation more than SGPT could be the extra hepatic sources of SGOT like heart, muscle, erythrocytes and damaged monocytes. But raised ALP and hyperbilirubinemia noted in insignificant numbers (1% only) of patients. Hypoalbuminemia and hypoproteinemia was seen in significant number of patients. Acute liver failure was seen in 2 patients one of them resolved.

Elevated haematocrit due to haemoconcentration which is an important feature of severe dengue fever was noted in insignificant number of patients only. Prompt fluid administration and supportive treatment could be the reasons.

Hypotension was recorded in 10 (1.7%) patients who were corrected by judicious fluid therapy except one case.

Renal involvement in dengue is less common which was noted in our study also.<sup>8</sup> AKI was reported in three patients (0.5%). All of them had co morbidities like T2DM, CKD. ARDS was present in two patients; one of them needed ventilatory support. CNS involvement was also not observed in our patients.<sup>11</sup> Cardiac involvement also was not significant, sinus bradycardia being the commonest ECG finding noted.

Mean hospital stay was 5 days with 11 referrals 2 mortalities. Both the patients had multiple co morbidities.

Limitations of our study are this is a retrospective data based analysis. Majority of the patients studied were from southern and western parts of the district.

## CONCLUSION

In the study of 2017 outbreak males and females were equally affected. Younger age group was affected among males but in females 40-50 year age group were more affected than younger age. Out of the 578 patients studied in detail, significant number of patients had thrombocytopenia and raised SGOT/SGPT. But bleeding manifestations were less. Complications like severe dengue, DSS were less. References were minimum. Two patients with co morbidities died in our study. Early recognition of warning signs, timely referral prompt intervention, and supportive treatment do have a role in limiting morbidity and mortality. But increased number of patients affected stress the need for effective vector control measures to reduce the chances of another outbreak.

## END NOTE

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**Conflict of Interest:** None declared

**Editor's Remarks:** This article is a retrospective analysis of case studies from a referral centre and provides valuable insight into the clinical presentations of the disease.

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