Original Article

Trends of acute-phase dengue at a tertiary care hospital, Tirupati, Andhra Pradesh India

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Abstract

Background: The present study was designed to know the trends of acute phase dengue in the Rayalaseema region of Andhra Pradesh state.

Methods: This was a retrospective study conducted at Sri Venkateswara Institute of Medical Sciences, a tertiary care teaching hospital in Tirupati, Andhra Pradesh. Samples received for dengue NS1 testing from January 2011 to December 2015 were analysed.

Results: During the study period, 6182 serum samples were received from cases clinically suspected to have dengue fever. Of these 690 (11.2%) tested positive. Positivity was significantly higher among females compare to males (12.1% vs 10.4%; $P = 0.037$). Children (19.2%) were more affected than adults (12.2%) and elderly (3.6%) ($P < 0.001$).

Conclusion: Acute dengue infections were high in children compared to other age-groups with preponderance during post-monsoon and monsoon periods.

Keywords: Andhra Pradesh, Dengue, India, Monsoon, NS1 antigen

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INTRODUCTION

Dengue virus (DENV) a member of *Flaviviridae* family mainly spreads by bite of Aedes mosquitoes.[1] Every year, thousands of individuals are affected with the DENV infection and contribute to the burden of health care.[2] Dengue fever outbreaks continued since the 1950s, but the severity of the disease has increased during the past two decades.[3] In India, the first confirmed dengue haemorrhagic fever (DHF) outbreak occurred in 1963.[4] The DENV has intruded into almost all states of India.[5] DENV infection creates various clinical manifestations, including acute febrile illness, DHF and dengue shock syndrome.[6]

There are of four serotypes, namely, DENV-1, DENV-2, DENV-3 and DENV-4. Although the four serotypes differ genetically, 65% similarity can be observed among them.[7] Each serotype has distinctive features and can present with severe manifestations depending on its interaction with the host response.[5] Very few studies on dengue infection have been conducted in the South-Eastern Andhra Pradesh. In this context, the present retrospective study was designed to document the trends of dengue in this region.

MATERIAL AND METHODS

This is a retrospective study carried out on blood samples received from clinically suspected dengue fever

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cases. All blood samples received in the Department of Microbiology, for dengue NS1 antigen testing from January 2011 to December 2015 were included in the study. Samples were received from the Department of Medicine, SVIMS hospital, surrounding PHCs and other private hospitals. The Institutional Ethics Committee approval was obtained for the study. Approximately 2–5 ml of blood sample was received; serum was separated in a sterile test tube and tested for dengue NS1 antigen by enzyme-linked immunosorbent assay (ELISA) as per the manufacturer's protocol, using Panbio® Dengue Early ELISA (Alere Inc., Waltham, Massachusetts, (USA) kit. Serum was stored frozen at −80°C if not tested within 2 days of sample collection. NS1 antigen is a sensitive diagnostic test for the detection of DENV in acute phase of primary dengue infection, it is detectable up to 4–5 days.[8] Based on the patient's age, cases were divided into children (<18 years), adults (18–59 years) and elderly (60 years and above).

Statistical analysis

Data were entered into Microsoft Excel 2007 (Microsoft Corporation, Redmond, USA). All categorical variables were summarised as percentages. The categorical variables were compared by the Pearson's Chi-square test. The Statistical software IBM SPSS Statistics (version 20.0) for Windows (IBM Corporation, New York USA), was used for statistical analysis.

RESULTS

A total of 6182 acute-phase samples were received from clinically suspected dengue fever cases for Dengue NS1 antigen testing from January 2011 to December 2015; of these 690 (11.2%) tested positive.

Of the 6182 samples tested 3530 (57.1%) were from males and 2652 (42.9%) were from females. A Significantly higher proportion of samples tested positive for NS1Ag compared to males (12.1% vs. 10.4%.; *P* = 0.037) [Table 1].

Among the three age groups, NS1 antigen positivity was significantly higher in children (patients aged <18 years) (19.2%) compared with adults (12.2%) and the elderly (3.6%) (*P* < 0.001) [Table 1].

Year- and month-wise distribution of total suspected cases and their respective positive percentages are given in Table 2. The year 2015 had the highest number of clinically suspected dengue fever cases. The positivity (15.4%) was also significantly high in 2015 [Table 2]. Majority of dengue suspected cases (*n* = 2875) were observed during October to January, followed by June to September (*n* = 2058) [Table 2].

In this study, the 12 months of a year were divided into three periods: The pre-monsoon period (February to May), monsoon period (June to September) and post-monsoon period (October to January).[9]

Month-wise cumulative positive cases of all years are depicted in Figure 1. The total dengue positive cases in the months of October to January was the highest (*n* = 401), followed by June to September (*n* = 234).

DISCUSSION

Dengue is one of the most important arthropod-borne viral infections of humans.[10] In this 5-year study, the dengue positivity increased through the years from 5.4% (2011) to 15.4% (2015). A significantly higher proportion of females tested positive (12.2%) which was similar to observation from other studies,[11-13] In contrast to this, more positivity in males was reported in another study.[14] However, Yew *et al*.[15] did not find any significant differences in seropositivity among male and female seropositivity for dengue infection. The metabolomic approach has been used to study the reason for such discrepancy, but the is no consensus.[16] Further studies are required to assess and ascertain the impact of gender on the incidence and outcome of dengue infection. Among the three age groups, children had the highest seropositivity followed by adults and the elderly. The high positivity among children and the adolescent population was similar to previous studies.[12,17]

Table 1: Age- and gender-wise distribution

Variable	Number of cases	Number of positives (%)	Significance
Age groups (years)			
Children (<18)	663	127 (19.2)	χ^2=120.873;
Adults (18–59)	4229	516 (12.2)	*P*<0.001
Elderly (60 and above)	1290	47 (3.6)	
Gender			
Male	3530	368 (10.4)	χ^2=4.502;
Female	2652	322 (12.2)	*P*=0.037
Total	6182	690 (11.2)	

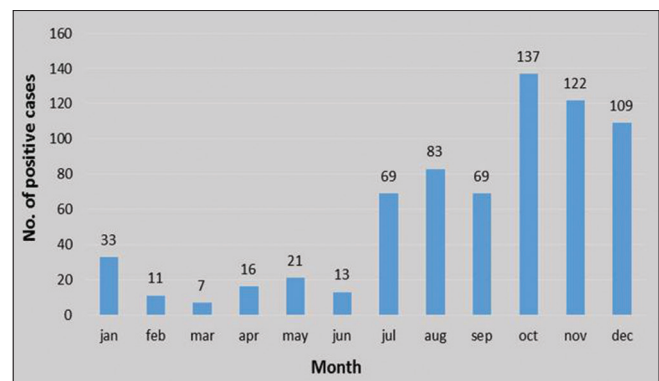**Figure 1:** Month-wise cumulative dengue positive cases of all years

Table 2: Year- and month-wise distribution of dengue cases

Month	2011		2012		2013		2014		2015	
	Total cases	% Positive	Total cases	% Positive	Total cases	% Positive	Total cases	% Positive	Total cases	% Positive
January	72	3 (4)	110	5 (5)	70	3 (4)	80	14 (18)	148	8 (5)
February	54	2 (4)	76	4 (50)	64	2 (3)	56	2 (4)	71	1 (1)
March	26	0	65	0	52	1 (2)	65	0 (0)	103	6 (6)
April	25	1 (4)	51	5 (10)	52	2 (4)	71	1 (1)	99	7 (7)
May	22	0	58	4 (7)	47	3 (6)	80	1 (1)	112	13 (12)
June	35	1 (3)	52	5 (10)	54	0	68	0	109	7 (6)
July	53	3 (6)	127	29 (23)	75	1 (1)	68	0	184	36 (20)
August	59	12 (20)	169	26 (15)	63	2 (3)	75	5 (7)	170	38 (22)
September	83	10 (12)	181	13 (7)	101	2 (2)	128	14 (11)	204	30 (15)
October	95	5 (5)	179	29 (16)	136	27 (20)	190	24 (13)	303	52 (17)
November	125	3 (2)	133	16 (12)	119	34 (29)	166	11 (7)	256	58 (23)
December	122	2 (2)	98	8 (8)	95	33 (35)	116	10 (9)	262	56 (21)
Total	771	42 (5.4)	1299	144 (11.1)	928	110 (11.9)	1163	82 (7.1)	2021	312 (15.4)

This result was different from some studies[18,19] where positivity was high in population in the age group of 21–30 years. High prevalence of dengue in children can be explained by the fact that people are aware of the risk and complications of dengue fever and therefore, parents do not want to risk their children's life and therefore seek early medical care for their children when there are more chances of detecting NS1 antigen. In contrast to this adults, most of the time delay in seeking medical advice and try to deal with it with freely available antipyretics and resort to medical help only either when the symptoms do not resolve or worsen, by then the NS1 antigen levels may become low or undetectable.

More number of positive cases were observed in the post-monsoon period followed by monsoon period and so on. Rain, humidity and temperature variations are observed in the monsoon period. The stagnant water and the climatic conditions in the preceding months are more favourable for viral vector breeding,[20] contributing to the increase in a number of cases of dengue fever. This observation is in concordance with other studies.[18,21,22] Pre-monsoon unfavourable conditions like increase in temperature and lesser availability of breeding sites lead to reduction in DENV infections during this period.

In this study, seropositivity for dengue infection increased through the 5 years. Females were more affected than males and children were affected more commonly as compared to other age groups. Dengue cases were reported throughout the year, but more cases were clustered in the post-monsoon and monsoon periods. Clinicians should have a high index of suspicion during July to December so that early diagnosis of dengue fever can be made which can be life-saving.

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Conflicts of interest
There are no conflicts of interest.

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