Original Article

Is dengue emerging as a major public health problem in southern region of Gujarat?

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ABSTRACT

Background: India is one of the countries in the South-East Asia region regularly reporting Dengue fever (DF)/Dengue haemorrhagic fever (DHF) outbreaks. Diagnosis of dengue infection is easily and best accomplished by demonstration of specific IgM antibodies in blood. As effective control and preventive programmes depend upon improved surveillance data,

Objective: This study was done to report the seroprevalence of Dengue virus infection in an area around South Gujarat, India.

Methodology: The laboratory records of clinically suspected 5526 Dengue patients from January 2010 to December 2013 were analysed retrospectively for seasonal variations, and results of IgM anti dengue antibodies, tested by Dengue Monoclonal Antibody (IgM) Capture Enzyme Linked Immune Sorbent Assay (MAC ELISA). Secondary analysis of data of Dengue patients was done after obtaining the data from hospital.

Results: 5526 serum samples were tested for dengue (IgM) MAC ELISA out of which 1128 samples were positive. Majority were males (65.69%), having sex ratio of 1.91:1 and in the age group of 16-30 years. Seasonal trend showed that infection peaked in October and slowly tapered by December.

Conclusion: Dengue cases were more during September to December in the post monsoon season which is useful to plan special preventive strategies. The overall significant increase in dengue IgM seropositivity among suspected cases in last 3 years indicates an increase in dengue virus activity which raising the question whether dengue is emerging/re-emerging as a major health problem in South Gujarat.

Key words: Dengue, MAC ELISA, South Gujarat.

INTRODUCTION

Dengue is an important mosquito born disease in the world in terms of morbidity and mortality [1]. Approximately 2.5 billion people, living mainly in urban areas are estimated to be at risk of acquiring dengue infection [2]. As dengue is being a sporadic illness, epidemics of dengue have now become a regular occurrence in world wide. Dengue is caused by four flavivirus serotypes (DEN-1, DEN-2, DEN-3 and DEN-4). The clinical features of dengue virus infection range from non-apparent infection through dengue fever (DF) and the more severe dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS) [3-5]. Unfortunately, the incidence of dengue fever (DF) and dengue hemorrhagic fever (DHF) has increased thirty-fold globally over the last few decades. Laboratory diagnosis of a recent dengue viral infection may be done by detection of the virus in patient's blood, either by virus isolation in susceptible cell culture or by detection of viral RNA by reverse transcription-polymerase chain reaction (RT-PCR) based techniques [6, 7]. However these methods prove to be laborious, time consuming and require specialised laboratory infrastructure facilities. These procedures prove to be successful only when performed within a few days following the onset of illness [8]. Dengue virus specific IgM antibody tends to appear early during the course of disease and allows for provisional diagnosis of dengue to be made from single serum sample. Detection of dengue IgM specific antibodies is an easier method of diagnosing DF as compare to other serological methods like

haemagglutination inhibition, neutralization and complement fixation test.

In India, unplanned urbanization and migration of population from rural to urban areas with lack of proper sanitation facilities are important factors resulting in increased burden of dengue in recent times [9]. In the last decade, dengue has been reported from all over the India. Outbreaks and deaths have been reported from northern states of Haryana, Punjab and Uttar Pradesh; southern states of Andhra Pradesh, Tamil Nadu and Karnataka; western states of Gujarat and Rajasthan; and eastern state of West Bengal. In fact, the case fatality rate has been above 1% over the last 10 years [10]. Globally dengue and DHF are endemic in South East Asia, South America, Africa and Pacific Islands. A major outbreak associated with hemorrhagic manifestations occurred in Calcutta in 2004 [11]. Since there is no vaccine available for the DF, the prevention and control of the disease mainly depends upon the epidemiological surveillance that provides reliable estimate of the disease and thereby helping to implement effective vector control measures. So, we performed this retrospective study to know the trend of dengue from the year 2010 to 2013 in a tertiary care hospital. This would help us to implement control measures and preventive programmes for dengue. This is a benchmark study for trend of dengue in South Gujarat region.

MATERIAL AND METHODS

Patient enrolment

This was a cross-sectional study. Patients presented with the sign and symptoms of fever, headache and joint pain who attended the OPD in New Civil Hospital Surat, the primary health care centres and the community health care centres of South Gujarat region were enrolled in the study. WHO criteria were followed for inclusion or exclusion of a case of dengue infection and their categorization as DF/DHF [4]. Samples were collected from clinically suspected patients and sent for the IgM Elisa test to Microbiology department of New Civil Hospital Surat.

Methods

A total number of 5526 acute phase blood samples were collected from clinically suspected cases of dengue virus infection, coming to the various outpatient departments, emergency services and admitted patients in our Hospital, over the period from year 2010- 2013 . All the samples were tested for the presence of anti-dengue IgM using MAC ELISA, developed and commercialized by NIV (National Institute of Virology), Pune, and recommended by National Vector Borne Disease control programme. Testing and interpretation of results were done as per the literature provided.

Data Collection

A specially designed, semi-structured questionnaire form was used to collect the data on the demographic factors like age, sex, and residence, in addition to the data on the history of the illness, the possible risk factors and the results of the investigations. Blood samples (5-8 ml) were drawn from all the patients as a part of the routine laboratory work and the sera were separated and obtained for the processing for the *Dengue* IgM.

Ethical Considerations

The data which were collected for the purpose of the current research were a part of the diagnostic technique. So an ethical consideration was not necessary.

RESULTS

During the four year study period i.e. from 2010 to 2013, 5526 serum samples were analyzed. Out of these, 1128 samples (20.41%) were positive for dengue virus infection. Seasonal trend showed that there were few positive cases from January to August every year; the infection started spreading in September, peaked in October and slowly tapered by December as shown in Table-1/ Figure-1. The most affected age group was 16-30 years of age (55.23%), followed by 31-45 years group (21.54%) as shown in Table-2. Out of the total 1128 positive cases, 741 were males (65.69%) and 387 were females (34.31%). Male patients showed more prevalence of this disease as shown in Table-3.

DISCUSSION

Dengue is an important emerging disease of the tropical and sub-tropical regions today. It is clear that since last decade, dengue have been occurring regularly with periodic surges in a number of cases [12]. In this study, 20.41% patients were serologically positive for dengue infection. Upon analyzing the year-wise distribution of dengue cases, an unsteady increase in the number of dengue patients over the past 3 years was noted. This may be partially attributed to the rapid unplanned urbanization with unchecked construction activities and poor sanitation facilities contributing fertile breeding grounds for

Table 1: Distribution of Dengue case according to month from 2010 – 2013

MONTH	2010		2011		2012		2013	
	NO. OF SAMPLES TESTED	IgM POSITIVE	NO. OF SAMPLES TESTED	IgM POSITIVE	NO. OF SAMPLES TESTED	IgM POSITIVE	NO. OF SAMPLES TESTED	IgM POSITIVE
JAN	48	20	35	8	36	4	41	4
FEB	75	1	19	3	27	0	41	1
MAR	43	4	23	3	37	0	54	0
APR	75	6	31	2	34	0	89	6
MAY	26	5	23	4	27	0	52	4
JUNE	50	14	31	0	57	1	54	4
JULY	115	21	62	10	81	6	140	29
AUG	224	48	143	7	142	25	269	54
SEPT	325	80	227	6	203	31	301	84
OCT	277	115	150	14	298	86	365	108
NOV	165	53	109	14	289	64	225	74
DEC	95	42	47	6	82	11	164	46
TOTAL	**1518**	**409 (26%)**	**900**	**77 (8.5%)**	**1313**	**228 (17%)**	**1795**	**414 (23%)**

Table 2: Distribution of positive cases according to age (2010-2013)

Age (in yrs)	No. of cases (%, n=1128)
0-15	176 (15.61%)
16-30	623 (55.23%)
31-45	243 (21.54%)
46-60	65 (5.76%)
>61	21 (1.86%)

Table 3: Distribution of positive cases according to sex (2010-2013)

Year	Male	Female	Total
2010	279	130	409
2011	54	23	77
2012	149	79	228
2013	259	155	414
Total (%, n=1128)	741 (65.69%)	387 (34.31%)	1128 (100%)

mosquitoes; it is also true that an increase in the alertness among medical fraternity following the initial epidemic and the availability of diagnostic tools in the hospital have contributed to the increased detection of cases. To identify the seasonal variation of the disease, analysis of the data on monthly basis were done. A gradual increase in cases was noticed from August with a peak in September and October, during all the four years of the study. The correlation between occurrence of dengue and monsoon season is clearly evident in this study and is further supported by similar findings from Kerala [13], Ludhiana [14] and Karachi [15]. It may be because this season is very favourable for high breeding of the vector, that is, *Aedes aegypti*. Presence of some dengue IgM positive cases even during dry months as seen in this study could probably be reflective of the year-round activity of the mosquito vector. Even minimal collections of water sources (like stagnating water within indoor plants) can favours breeding of the vector thereby helping in the maintenance of the vector population throughout the year. The year-round occurrence of dengue infection, with peak in rainy season was concordant with reported patterns of dengue transmission [16]. This seasonal outbreak of disease transmission is very important at local level for effective control measures and that preventive measures against dengue infection should come into full swing during water stagnation periods after the initial bouts of rainfall and at the end of monsoon. The proportion of dengue sero-positive cases for age group 16-30 years of age was highest (55.23%) followed by age group 31-45 years (21.54%) and 0-15 years(15.61%) . Similar results were also noted in one study by Ashwini Kumar et al [17]. However in several international studies, dengue has been reported to

mainly a paediatric public health problem [18-19]. Dengue infection occurred in most active age groups i.e. children and adults, who were out of the house most of the times during play or at work. It is a very significant finding because true endemicity of dengue is reached when the adult infection declines and only the new entrants into the population, that is, the children, are affected more by the disease. Males were found to be more affected than females in our study. Lower disease incidence in women may be a statistical artefact related to lower reporting and care-seeking for women.

This scenario on the dengue status over the four year period reported from this region may be no different from other parts of India, the climatic and demographic features being the same and so is the risk. From the high incidence of dengue IgM sero-positivity, it appears that dengue could probably be fast emerging as a major health concern in this part of India. In absence of specific treatment for dengue fever, management is mainly supportive, further there are no vaccines currently available in market thus early diagnosis and vector control is the only method by which dengue can be controlled. Rapid immunochromatograpic test to detect NS1 antigen and IgM antibodies should be available at primary and rural health centres, so that cases can be diagnosed early and thus properly managed.

CONCLUSION

Dengue cases were more during September to December in the post monsoon season which is useful to plan special preventive strategies. The study draws attention toward the male, young adult age group. The overall significant increase in dengue IgM seropositivity among suspected cases in last 3 years indicates an increase in dengue virus activity which raising the question whether dengue is emerging/re-emerging as a major health problem in South Gujarat. This study results indicate that dengue infection is not going to wane away but is going to stay and will play havoc if immediate control measures are not taken. The need of the hour is long-term vector control strategy; so that the outbreaks can be prevented and this will simultaneously solve the problem of other mosquito borne diseases like chikungunya, Japanese encephalitis, malaria and filaria.

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