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Seroprevalence of Dengue in Rural Tertiary Care Hospital at Puducherry-A Retrospective Study

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A B S T R A C T

Dengue is a mosquito borne viral infection associated with Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS). A changing frequency was seen on the epidemiology of dengue across India. This study is a report on the prevalence of dengue in a tertiary care hospital, Puducherry, India. This study was conducted from februry 2014 to February 2015 at Sri Manakula Vinayagar Medical College and Hospital, Puducherry. Patients with a suspected dengue infection were screened by ELISA (Dengue IgM Microlisa). The study includes 704 patients of both sexes and of all ages. From the total study population, 98 cases (13.9%) were dengue positive, with 58 males and 40 females. Seroprevalence was high in the 31-45 age group. Timely diagnosis would help for the better management of patients as if there is no specific antiviral therapy available for dengue. Controlling the vector *Aedes aegypti*, would be helpful to contain the spread of dengue.

Introduction

Dengue is caused by Dengue virus (DENV), a mosquito-borne flavivirus. DENV is a single stranded RNA virus of the family Flaviviridae, genus Flavivirus. DENV causes a wide range of diseases in humans, from a self limited Dengue Fever (DF) to a life-threatening syndrome called Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS). There are four antigenically different serotypes of the virus: DENV-1, DENV-2, DENV-3 and DENV-4. A serotype is a group of viruses classified together based on their surface antigens. These four serotypes are different strains of dengue virus that have 60-80% homology between each other. Infection induces lifelong protection against the infecting

serotype, but it gives only a short time cross protective immunity against the other types. The first infection most often cause a minor disease, but secondary infections have been reported to cause severe diseases (DHF or DSS) in both children and adults. In the early 1900s, spread of dengue was explosive and accompanied the movement of people across continents because of the slave trade and the two World Wars. India was one of the major country affected (Cecilia *et al*., 2004). Presently, about 40% of the world's population is at risk and there are 50–100 million cases every year. An estimated 500 000 people with severe dengue require hospitalization each year and about 2.5% of those affected die (WHO, 2014). In the last few years, dengue has re-emerged in the United States of America and has made inroads into Europe (Alves *et al*., 2013). In India, dengue is widespread and endemic in most major cities (NVBDCP. 2014).

Materials and Methods

This hospital based retrospective study was carried out at department of Microbiology, Sri Manakula Vinayagar Medical College and Hospital, a tertiary care hospital, at Puducherry. Patients admitted to the wards with clinically suspected dengue/DHF/DSS during February 2015 to February 2016 were included in this study. Patients with manifestations like headache, retro orbital pain, myalgia, arthralgia, rash, hemorrhagic manifestations, and leucopenia as described by WHO were considered as suspected case. A total no of 704 patients were screened for dengue by ELISA (Dengue IgM Microlisa). ELISA test was done as per the manufacturer's protocol. Patients irrespective of all ages from puducherry region and also from the neighboring districts were included in this study.

Results and Discussion

Out of 704 patients screened for dengue fever, 98 cases (13.9%) were found to be positive. Among them 58 (16.8%) were male and 40 (11.2%) were female (Table 1). Highest rate of infection is found in the month of November and December, however the infection rate started increasing from the month of July and declined by the month of January (Table 2). People in the age group 31 to 45 (21.5%) had a higher prevalence (Table.2) when compared to other age groups.

Dengue is one of the seasonal outbreak diseases posing a global threat. Dengue infection and outbreak was already reported from various parts of the India (Table.3). It was reported earlier in Nagpur in 1965 (Rodrigues *et al*., 1972). In Maharashtra, the dengue outbreak was reported from Parbhani (Mehendale *et al*., 1991) and Dhule (Padbidri *et al*., 1996). Outbreak of dengue was also reported from other states of India, like Bangalore (George *et al*., 1975) Punjab (Kaur *et al*., 1997) and Delhi (Gupta *et al*., 2005). Our current study clearly shows that, among the total patients tested, 13.9% of the people were positive for dengue fever. Adult in the age groups of 31 to 45 years were found to be more infected than other age groups. It was also noted that number of positive cases started increasing from monsoon season to post monsoon season, because that season is considered as favorable for breeding of the vector, i.e., *Aedes aegypti*.

Table.1 Age and sex distribution of patients tested for dengue serology

Age	Sex	Total	Positive	
<15 N=130	M	67	9	13(10%)
	F	60	4	
16<>30 N=213	M	99	21	33(15.5%)
	F	114	12	
31<>45 N=163	M	74	17	35(21.5%)
	F	89	18	
46<>60 N=117	M	59	8	14(12%)
	F	58	6	
60> N=81	M	47	3	3(3.7%)
	F	34	0	
TOTAL N=704	M	346	58(16.8%)	98(13.9%)
	F	358	40(11.2%)	

Table.2 Month wise distribution of cases tested for dengue seropositivity

Month	Total	Positive
Feb-15	86	2
Mar-15	26	5
Apr-15	0	0
May-15	4	1
Jun-15	3	0
Jul-15	66	8
Aug-15	33	7
Sep-15	72	8
Oct-15	41	11
Nov-15	91	16
Dec-15	147	25
Jan-16	109	14
Feb-16	26	1
Total	704	98

Table.3 Seroprevalence of dengue in different studies across the country

Period/ Year	Region	Author/ Study	Prevalence
Apr-may 1994	Dhule	Padbidri et.al., 1996	15.4%
Sep-nov 2003(outbreak)	Delhi	Gupta et.al., 2005	58.3%
July 2003 (outbreak)	Kanyakumari	Paramasivan et.al., 2006	20%
2010 (outbreak)	Delhi	Nishat et.al., 2010	38.9%
Sep2011-nov 2012	Ahemedabad	Lata R. Patel et.al., 2013	16.3%
2011-2013	North india	Om prakash et.al.,2015	22%
2012-2013	Andhra	Srinivas et.al.,2013	53.2%
2014-2015	Rajasthan	Kumar et.al.,2015	3.55%
2014-2015	Madurai	Jhansi et.al.,2015	20.3%

Many dengue cases were reported during the post monsoon season, i.e., from September to November in various studies reported in India (George *et al*., 1975, Kaur *et al*., 1997). In our study the maximum number of cases was seen in the month of December, a post monsoon period in Tamilnadu and Puducherry. This result is concordant with other studies and found to be lasting till the end of winter season. Infection rate of dengue at this tertiary care hospital is 13.9%. This may be considered as quite high. Majority of the people attending the hospital were from rural areas. Poor sanitation, improper drainage system, habitats near water logging or stagnant area and near the trees where the mosquitoes breed may be the reason for this high prevalence rate.

In conclusion, dengue is a rapidly emerging viral disease increasingly reported from many countries particularly south Asian countries like India with seasonal outbreaks of epidemics with a high morbidity and mortality in some places. Control of the vector population is a key to the success of containing the disease. Early diagnosis and appropriate treatment with platelet transfusion where indicated will reduce the mortality rate. Sustained implementation of vector control measures by the government and the community and creating awareness among the people about the disease epidemiology will go a long way in achieving the goal of containing the disease and prevent the outbreaks.

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