www.jmscr.igmpublication.org
Impact Factor (SJIF): 6.379
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v6i3.90

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Research Article

Prevalence of Dengue in Mumbai, Maharashtra

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Abstract
Background: *Dengue, a mosquito borne viral infection, caused by a positive stranded RNA (Ribonucleic Acid) virus of the Flaviviridae family with four distinct serotypes (Dengue Virus 1 to 4) is a major cause of morbidity throughout the tropical and subtropical regions of the world.*
Objective: *The study was aimed at determining the prevalence of the disease in Mumbai, Maharashtra.*
Materials and Methods: *In this study, 2968 patients with Pyrexia of unknown origin (PUO) were included .Rapid Card test and Enzyme Linked Immunosorbent Assay (ELISA) were used for testing serum of patients.*
Results: *Of 2968, 521 were clinically suspected cases of dengue. Of 521 patients, 228 were confirmed to have dengue. The prevalence was 7.8% in this study.*
Conclusion: *Dengue fever continues to be a major public health problem. The study showed that 7.8 % of study population has dengue disease. The study highlights that preventive measures against dengue infection should be taken during the monsoon and post monsoon months.*
Keywords: *Prevalence, Dengue fever, Mumbai, Pyrexia of unknown origin (PUO).*

Introduction

The Dengue disease is now endemic in more than 100 countries in Africa, USA, the eastern Mediterranean, Southeast Asia, and the Western Pacific. Around 2.5 billion people; two fifths of the world's population is now at risk. Dengue viruses (DV) cause an estimated 50 to 100 million illnesses annually, including half a million life threatening infections requiring hospitalization, resulting in approximately 12,500 to 25,000 deaths.

Although dengue has a global distribution, 75% of the current global disease burden is borne by the World Health Organization (WHO) South- East Asia region together with Western Pacific region. The South East Asia region is currently experiencing an upsurge in reported cases of dengue in a number of countries, including India, Sri Lanka and Thailand.[1] India is one of the seven identified countries in the South-East Asia region regularly reporting incidence of dengue fever (DF) / dengue hemorrhagic fever (DHF)

outbreaks and may soon transform into a major niche for dengue infection in the near future.[2]

In Maharashtra state, dengue outbreaks are being reported since 1965. In 1991 the dengue outbreak was reported from Parbhani [3] and Dhule.[4]

In 2006, the sero prevalence of dengue fever in Central India was studied by Ukey et al. (2010)[5] and they suggested that dengue infection is no more an urban area infection, but it is extending it arms to rural areas as well. Dengue viruses are disseminated in nature simply by a man-mosquito-man cycle. The domestic mosquito A. aegypti is the principal vector of the disease. Dengue outbreaks have also been attribute do A. albopictus, A. polynesiensis and other member of the A. scutellaris group. Hence, no extra human reservoir is required for the maintenance of these viruses in the environment.[6] There are two peaks of biting activity, early morning for two to three hours after daybreak and in the afternoon for several hours before dark. Female A. aegypti takes more than one blood meal during a gonotropic cycle i.e. before the eggs are laid. After a person is bitten by an infective mosquito, the virus undergoes an incubation period of three to 14 days (average, four to seven days), after which, the person may experience acute onset of fever accompanied by a variety of nonspecific signs and symptoms. [1]After an extrinsic incubation period of eight to ten days, the mosquito becomes infective and is able to transmit the infection. Once the mosquito becomes infective it remains so for life.[7] In many areas, dengue epidemic occur during the warm, humid rainy seasons, which favor abundance of mosquitoes and shorten the extrinsic incubation period.

In absence of specific treatment and vaccine for dengue fever (DF); vector control is the only method by which spread of dengue can be prevented. As effective control and preventive programmes depend upon improved surveillance data, need for continuous seroepidemiological surveillance for the timely formulation and implementation of effective dengue control programme.[8]

Materials and Methods

The present study was carried out over a period of 16 months from February 2010 to June 2011. It included patients clinically suspected of dengue admitted in the wards of a tertiary care Hospital, Mumbai.

Blood samples of the clinically suspected cases of dengue were received in the laboratory. Serum was separated from the blood samples and transferred into labelled sterile plastic vials. These samples were used to confirm the diagnosis of dengue with serological tests and later stored at-4^0C. All the serum samples were tested by 1.) Rapid card test: It is a rapid solid phase immune-chromatography test for the qualitative detection of dengue NS1 Ag and differential detection of IgM and IgG antibodies to dengue virus from patient's serum samples. 2.) ELISA: All the serum samples were tested for I) IgM and II) IgG anti-bodies by "PanBio dengue capture ELISA test".

Results

The study carried out in a tertiary care hospital, included blood samples of clinically suspected cases of dengue admitted in the wards, during a 16 month period from February 2010 to June 2011. During the study period, a total of 2,968 patients with Pyrexia of unknown origin (PUO) were admitted to the wards of the hospital. Of these, 521 were clinically suspected cases of dengue. Serum samples from the 521 patients were tested for the presence of NS1 antigen and IgM, IgG antibodies by the rapid immunochromatography card test. They were also subjected to capture ELISA for IgM and IgG antibodies. 228 cases were confirmed to be dengue positive by these methods.

Dengue is the most rapidly spreading mosquito-borne viral disease in the world. In the last 50 years (1960-2010), incidence of dengue has increased 30-fold with an expanded geographic distribution of both the viruses and the mosquito

vector to new countries and from urban to rural settings.[9] Different factors, such as population growth, uncontrolled urbanization, high densities of the domestic mosquito vector, arise in commerce and travel, and the breakdown of vector control programs, have facilitated the emergence of dengue.[10] In the present study prevalence was 7.8%. Prevalence of dengue in Maharashtra during the year 2007, 2008, 2009 was 11.1%, 5.9%, 14.5% respectively. [8] During 2010, prevalence of dengue was 4.3% as reported by Ministry of health and family welfare, New Delhi.[11]

In a study from Kanpur a high prevalence of 46.5% was reported by Garg et al.[12]

In a study by Kumar et al,[13] in outbreak of Karnataka in 2007, prevalence was very high of 47%.

Table 1: Month wise distribution of 521 clinically suspected and 228 serologically positive cases during 2010-2011

Month	Clinically Suspected Cases(=521)	Serologically Positive cases(=228)
Feb-10	4	3
Mar-10	3	3
Apr-10	3	2
May-10	2	0
Jun-10	2	0
Jul -10	29	15
Aug -10	89	45
Sep -10	121	77
Oct -10	114	43
Nov -10	62	18
Dec -10	48	9
Jan -11	7	0
Feb-11	5	1
Mar-11	2	0
Apr-11	2	1
May-11	8	4
Jun-11	20	7

Discussion

It was observed that the there was a rise in the number samples from August 2010 (89cases) to September 2010 (121cases). The month of October had a sample size of 114. However, the number of samples reduced from November 10 (62) to May 11 (8) as shown in table1. Thus, outbreak coincided mainly with the monsoon and post monsoon period of rainfall and continued till onset of winter (August-November). This shows that the presence of stagnating water after rainfall favors breeding of the mosquito vector resulting in an increased incidence of dengue. These findings also indicate that preventive measures against dengue infection should probably come into full swing during the monsoon and post monsoon months.

A retrospective study from Chennai during 2006-2008 reported a maximum cases of dengue during the monsoon period.[14] The seasonal occurrence of positive cases has shown that post monsoon period is the most affected period in Bangladesh as well.[15]Study from Brazil, Indonesia and Venezuela have also emphasized the importance of season. They have observed that dengue cases were higher during rainy season showing the importance of rain, informing prime breeding sites for A. aegypti, thus helping in the spread of DI.[16] Study of eco-epidemiological factors by Barrera et al., (2002)[17] showed that DF has a positive correlation with the relative humidity and negative relation with evaporation rate.

Conclusion

India falls in the deciduous, dry and wet climatic zone. The temperature remains high during the pre monsoon period. It is continuous rain pour for a couple of days that brings down the temperature during the monsoon period, which may also be responsible for an increase in the relative humidity and decrease in the evaporation rate thus maintaining secondary reservoirs containing rain water. Aedes mosquitoes breed in the stagnant water containers and discarded junk materials in and around houses. Environmental management is

mainstay of vector control. Majority of the clinically suspected cases (79.65%) and serologically positive cases (86.84%) were detected in the months of July to November.

Acknowledgments

Heartfelt thanks to our technical staff

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