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A STUDY ON SEROPREVALENCE OF DENGUE VIRUS INFECTION AMONG PATIENT VISITING A TERTIARY CARE HOSPITAL

Medical Microbiology

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ABSTRACT

Dengue fever is a deadly arboviral disease which is caused by Flaviviridae family .The infection is transmitted by bite of infected female Aedes aegypti during day time. Early diagnosis of Dengue is essential to prevent the complications.The study was done in a tertiary care hospital to have an insight about the seroprevalence after monsoon during the months from July to December. The seropositivity was found to be 11.9% with the maximum number of cases in the 21-40 years age group (47.3%). The number of cases were recorded highest in the month of October 29.3% of cases. The study highlights the importance of mosquito control after monsoon to break the transmission of Dengue.

KEYWORDS

Dengue, IgM, MAC-ELISA

INTRODUCTION

Dengue fever is a deadly arboviral disease caused by any of the five serotypes DENV1, DENV2, DENV 3, DENV 4 and DENV 5 which are placed in the Family Flaviviridae and genus Flavivirus (Murray et al., 2013(1); Mustafa et al., 2015(2). Infection with any one serotype provides life long immunity to the particular serotype but are at risk of infection to the other serotypes (Mustafa et al., 2015(2).The infection is transmitted by the bite of an infected female mosquito- Aedes aegypti during daytime. Dengue can present as classic Dengue fever, Dengue hemorrhagic fever (DHF) and Dengue shock syndrome (DSS). Classic Dengue fever is characterized by sudden onset of high fever, retro orbital pain, myalgia, arthralgia and rash it occurs mostly in adults. DHF occurs mostly in children less than 15 years of age and caused by increased capillary permeability and plasma leakage leading to thrombocytopenia, bleeding and hemoconcentration and shock (termed Dengue shock syndrome) (Hadinegoro, 2012)(6&7). The Dengue virus causes significant morbidity and mortality in many parts of the world, including India, where it was first isolated in Calcutta, West Bengal during 1945(3). The first major outbreak associated with haemorrhagic manifestation occurred in Calcutta in 1963. According to World Health Organization (WHO)(4) twofifths of world's population (i.e. 2500 million peoples) are now at risk for dengue, and annually approximately 50 million new cases of dengue fever (DF) occur worldwide with 500,000 cases of dengue hemorrhagic fever (DHF) or hemorrhagic fever (DHF) requiring hospitalization every year and mortality rate of 2.5%. There is an increase of global prevalence of dengue fever in recent decades particularly in Americans, WesternPacific and associated illness, more serious manifestations in South-East-Asia. (5) The largest Dengue outbreak in India which occurred in 1996, was due to DENV-2. (8)This was later replaced by DENV-3, as the dominant serotype in 2003. (9) The subsequent outbreaks witnessed a mixed type of infection with DENV-1, 2 and 3. (10,11) . The present study was done in a tertiary care hospital in South India and gives an insight into the seroprevalence of dengue fever and its relation to seasonal variations.

MATERIALS AND METHODS

Study Design And Period

This is cross sectional study done in Department of Microbiology , Government Thiruvannamalai Medical College &Hospital between July 2021 and December 2021 for a period of six months.

Inclusion Criteria

All the patients in any age group presenting with fever, headache, rash, retro-orbital pain , myalgia and other symptoms suspicious of Dengue fever attended outpatient, inpatient departments and emergency services.

Exclusion Criteria

Fever confirmed due to non-infectious causes or other known infective causes such as Hepatitis and Typhoid.

Blood Collection And Processing

About 5 ml of blood was collected under strict aseptic precautions. Sera were separated after centrifuging at 1000 rpm for 2 minutes and were subjected to ELISA testing of IgM antibodies by the JMitra kit (MAC - ELISA Test).

Precautions

Specimens should be free of microbial contamination and may be stored at 2-8°C for one week, or frozen at -20°C or lower. Repeated freezing and thawing should be avoided. Hemolyzed and hyperlipemic samples may give erroneous results.

Procedure

Dengue IgM Microlisa test is an enzyme immunoassay based on "MAC Capture ELISA". Anti-human IgM antibodies are coated onto microtiter wells. Serum samples and controls are added to the microtiter wells and incubated. Antibodies to Dengue, will bind to the anti- human IgM antibodies adsorbed onto the surface of the wells followed by washing to remove unbound material. Horseradish peroxidase (HRPO) conjugated Dengue antigen (DEN1-4) is added to each well. This dengue antigen conjugate will bind to dengue specific IgM antibodies which is complex with anti-human IgM antibodies. Finally substrate solution containing chromogen and hydrogen peroxide is added to the wells. A blue colour develops according to the amount of dengue antibodies present in the sample. The colour reaction is stopped by a stop solution. The enzyme substrate reaction is ready by ELISA reader for absorbance at a wavelength of 450 nm. The sensitivity was found to be 100% and specificity was found to be 99.88%.

RESULTS AND DISCUSSION

Dengue is an important and life threatening arboviral infection in tropical countries with an estimated 390 million infection and 96 million symptomatic infections occurring annually (Bhatt et al., 2013(12). The early diagnosis of Dengue is of great importance to arrest the progression of Dengue related complications.

The total number of 1908 patients whose serum were tested in Microbiology laboratory for the period of six months. Total samples 1908 out of which 981 (51%) were males and 927 (49%) were females (Fig. 1).

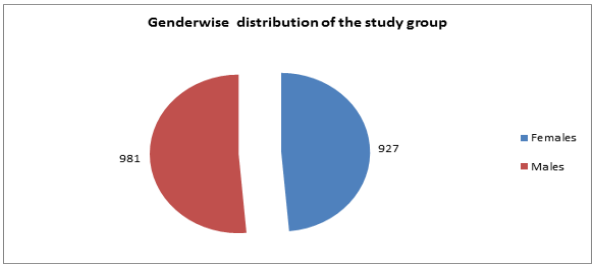

Fig.1 Shows distribution of male and female among the study group

The seropositivity for Dengue IgM by ELISA was 228 (11.9%) out of which 135 (59%) were males and 93 (41%) were females (Fig. 2).

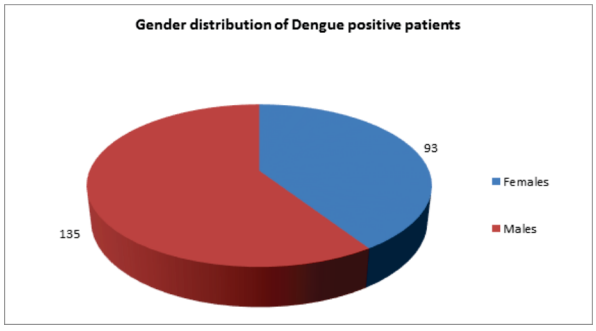

Fig.2 Shows distribution of male and female among dengue positive cases

The total number of patients whose serum were tested in Microbiology laboratory on suspicion of Dengue, for the period of six months was 1908 out of which 981(51%) were males and 927 (49%) were females.

Fig: 1 shows increased prevalence in the male gender in many studies, but a study by Kalaivani et al., (2016) reports equal prevalence. Our study also supports this finding showing an increased prevalence towards the male gender. This is due to the fact that males are involved in more outdoor activities compared to females.

The seropositivity of Dengue in our study was 11.9% out of which 135 (59%) were males and 93(41%) were females. Gopal et al., (2016) reported a seroprevalence of 50%, S. Dhivya Lakshmi et al.,(2018) reported a seroprevalence of 33.64%, , Gupta et al., reported a positivity of 29.09%, Kalaivani et al., (2016) reported a 62% seroprevalence which is very higher compared to our study.

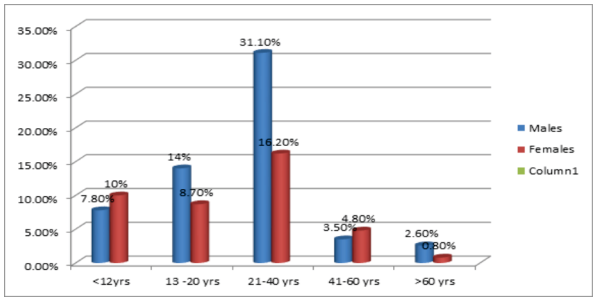

Fig.3 Age wise distribution of dengue positive patients Prevalence of Dengue

Madan et al., (2018) reported 26.47% in the 21-30 years age group followed by 21.56% in 11-20 years. Sujatha et al., (2016) recorded maximum prevalence in the age group 21- 30 years (55.09%) followed by 11-20 years (27.54%). Bhat et al., (2013) reported an increased prevalence in adults > 15 years (Mishra et al., 2016). Patankar et al., (2014) reported 51% in the age group of 18-35 years followed the age group 5-17 years age group (20%). Mahesh Kumar et al., (2015) reported high prevalence in the 10-20 years age group (31.58%).

But our study showed high prevalence of seropositivity in the 21-40 years age group-47.3% followed by 22.7 % in the 13-20 years age group (Fig. 3). The high incidence of seropositivity in the 13-40 years shows that the children and young adults were exposed to mosquito bites due to their habits of involving in brisk outdoor activities.

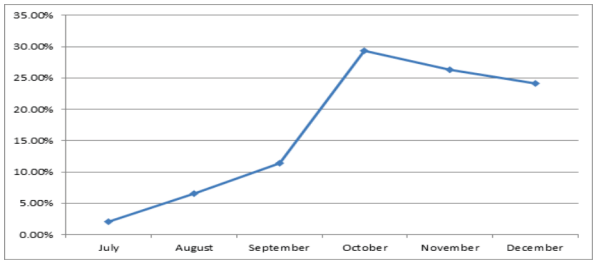

Fig.4 A graph that shows the prevalence of dengue infection in relation to months of the year 2021

The highest number of cases were recorded in November followed by October and December according to Mahesh Kumar et al., (2015). Sujatha et al., (2016) recorded maximum cases in October and November. Bhat et al., (2013) also reported increased prevalence of dengue in the season after rainfall (KSB et al., 2014). Patankar et al., (2014) reported increased positivity in October. But Nissi Mathew et al., (2017) reported increased prevalence in August which is different from other studies.

Though these studies highlight the fact that the prevalence of dengue increases in the after monsoon, our study also shows that there is an increased prevalence in after monsoon (July-2.1%, August-6.5%, September 11.4%, October-29.3%, November-26.3%, December-24.1%). So there is a dire need to take precautionary measures to control mosquitoes after monsoon.

The antibody response to dengue viral infection varies. When there is a primary infection with dengue, IgM antibody is the first antibody to rise by 3-5 days after the illness, peaks by the 10th day and declines by 2-3 months.

Dengue has become a threat even in the current era. There are a lot of challenges in the control of Dengue. The vector Aedes mosquito has invaded new territories due to climatic changes and there is lack of suitable diagnostic facilities. The serologic testing of Dengue is not reliable as there is the problem of cross reactivity. Though Dengue is a notifiable disease, the number of cases reported is underestimated due to the lack of proper diagnostic tools.

There are no licensed vaccines for Dengue. Even when a vaccine is available it should cover all the serotypes of Dengue virus.

Vector control is the only measure to control the spread of Dengue but there is the problem of insecticide resistance. Personal protective measures to avoid mosquito bites should be undertaken to break the transmission of Dengue.

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