Sero-Prevalence of Dengue in A Sub-Urban Region

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ABSTRACT

Introduction: Dengue has become endemic in India with outbreaks occurring almost every year. Detection of dengue specific IgM and IgG antibodies forms an important tool in diagnosis and prevalence studies. Our goal was to screen patients for dengue antibodies to establish the sero-prevalence.
Material and Methods: The study was conducted in a tertiary care teaching institute from Jan-Dec. 2008. Blood samples of 103 clinically suspected cases of dengue were collected from various OPDs and IPDs. Detection of IgM and IgG antibodies was done by enzyme immunoassay (EIA) based on an immunocapture principle.
Results: Of the total samples 76.69% were positive for dengue antibodies with dominance of paediatric population. Maximum samples (74.68%) were positive for IgG antibodies followed by a combination of IgM + IgG antibodies (18.98%) and least for IgM antibodies (6.32%).
Conclusion: Though less specific compared to NS1 antigen assay IgM / IgG antibody detection still forms mainstay of diagnosis of dengue in peripheral and resource poor settings.

Keywords: Dengue infection (DI), IgM / IgG antibodies.

INTRODUCTION

Dengue is a fatal viral infection with wide clinical spectrum. Uneventful primary infections are the commonest though it can culminate into dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).[1] The etiological agent is four serotypes of dengue virus (DV) namely DEN-1, DEN-2, DEN-3 and DEN-4 belonging to genus Flavivirus and family Flaviviridae. The primary vectors for its spread are infected *Aedes aegypti* and *Aedes albopictus* mosquito species.
Dengue is almost endemic throughout India. In tropical areas the vector is active year around and dengue occurs throughout the year. Diagnosis of dengue infection (DI) may be made by RT-PCR or by the isolation of virus from the blood in cell cultures.[2] These gold standard tests for identification of DI are not within the reach of peripheral and even most tertiary care laboratories. Of late, non-structural protein 1 (NS1) antigen detection is available for diagnosis of DI.[3] Serologic diagnosis depends on the demonstration of fourfold or greater rise (or fall) in antibody titres.[2] Detection of dengue specific IgM/IgG antibody has been the mainstay of diagnosis of DI.
We undertook the current study to evaluate the serologic and demographic profile of dengue patients in our suburban area.

MATERIAL AND METHODS

The study was conducted in the Department of Microbiology at a tertiary care teaching hospital from January 2008 to December 2008 after obtaining institutional ethical clearance and informed consent from the selected subjects. A total number of 103 blood samples were collected from clinically suspected cases of dengue virus infection, coming to various OPDs, IPDs and emergency services in our hospital. Patients having fever, headache, myalgia of 4-5 days or more were referred by the physicians and samples were collected after informing patients. Sera were separated and subjected to detection of dengue specific IgM/IgG antibodies by using enzyme immunoassay (EIA) based on an immunocapture principle. The test kits used were ImmunoComb® II-Dengue IgM and IgG BiSpot manufactured by ORGENICS Ltd., Yavne, Israel.
The tests were performed strictly as per the manufacturer's instructions. This being an investigational study, rigid statistical parameters were not considered.

STATISTICAL ANALYSIS

Descriptive statistics were used to generate results. Tables were made with the help of Microsoft excel.

RESULTS

Of the 103 serum samples tested, 79 samples (76.69%) were positive while 24(23.30%) were negative for dengue antibodies (Table 1). Of the positive samples 53 (67.08%) belonged to the paediatric age group (less than 12 years) and half of it i.e. 26 samples (32.91%) were from adult population (Table 2). Amongst the positive cases 59 samples (74.68%) had IgG antibody, 15 samples (18.98%) had both IgM and IgG antibodies while 5 samples (6.32%) had only IgM antibody (Table-3). The ratio of male to female cases was the same.

DISCUSSION

Effective and accurate diagnosis of dengue is of primary importance for clinical care, early detection of severe cases, case confirmation and differential diagnosis.[4] Dengue can be diagnosed by serological tests such as dengue specific NS1 antigen and IgM and IgG antibodies. As per the guidelines of WHO,[4] NS1 antigen can be detected up to 9 days after the onset of illness.50 % of the patients are sero-positive for IgM antibodies by days 3-5 after the onset of illness increasing to 80% by day 5 and 99% by day 10. IgM levels peak about 2 weeks after the onset of symptoms and then decline generally to undetectable level after 2-3 months. Low titre of anti-dengue serum IgG is generally detectable at the end of the week of illness increasing gradually thereafter with serum IgG still detectable after several months and probably even for the life.[4]

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Duration	Total	Positive	Negative
Jan-Dec 2008	103	79(76.69%)	24 (23.30%)

Table-1: Distribution of total samples

	Paediatric Group	Adult Group	Total
Males	28	11	39
Females	25	15	40
Total	53(67.08%)	26(32.91%)	79

Table-2: Age-wise and sex-wise distribution of positive cases

Positivity	IgM	IgG	IgM + IgG	Total
Males	2	30	7	39
Females	3	29	8	40
Total	5 (6.32%)	59(74.68%)	15 (18.98%)	79

Table-3: Antibody-wise distribution of positive cases

Our study focused on evaluation of DI by detection of IgM / IgG antibodies. The high rate of seropositivity (76.69%) that we detected underlines the fact that this suburban area is probably endemic for dengue. We found that paediatric population was double the adult population in sero positivity. IgM positive cases (6.32%) indicated primary infection in the earlier stages, IgM + IgG positive cases (18.98%) indicated late primary or secondary infection. Maximum cases (74.68%) however were IgG positive indicating later stages of infection or old cases. With 18 out of 35 states in India now being considered endemic for dengue and the spread of the disease from urban to suburban and rural areas the actual number of cases may count in millions.[5] Explosive dengue epidemics are being reported every year from more than 100 endemic countries spanning South-East Asia, Western Pacific, Africa, the Americas and the East Mediterranean.[6]
A study has reported that NS1 test followed by NS1 + IgM and IgG test would provide all the information required for a dengue patient.[7] Another study substantiates that NS1 Ag assay alone and when used in combination with IgM ELISA has the ability to improve diagnostic algorithm.[8] Apart from NS1 antigen, IgM, IgG detection, thrombocytopenia can also serve as a significant parameter in detection of DI.[9] Thus NS1 antigen assay proves to be a favourite for diagnosis of DI.
Indian healthcare system is resource poor. High end technological support is available in only a few elite locations. Most tertiary care teaching hospitals lack in viral culture set-up and ELISAs for NS1 antigen detection. Though companies are providing ICT based tests for NS1 antigen detection they are not as sensitive as ELISA. Thus detection of dengue specific antibodies forms the primary tool for diagnosis in rural and semi urban areas. This is what formed the mainstay of our study. Due to unavailability we could not include NS1 detection in test panel. Nonetheless epidemiology can be well outlined by antibody detection.

CONCLUSION

To conclude we say that IgM / IgG antibody detection comes after NS1 antigen assay. But dengue often breaks out in resource poor settings. So a laboratory has to provide reasonable diagnosis without hi-end technical support. Here antibody detection based assays might prove to be an excellent tool.

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