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Original Research Article

Retrospective Estimation of Prevalence of Dengue Viral Infection among Clinically Suspected Patients Attending a Tertiary Care Hospital

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Abstract

Aim: To estimate prevalence of dengue viral Infection among suspected patients attending a tertiary care center.

Materials and Methods: Retrospective study to observe prevalence of dengue infection, conducted at the Department of Medicine, Government Medical College, Bettiah, Bihar, India. Patients clinically suspected of having dengue infection and advised for dengue investigation for establishing the diagnosis were enrolled in the study, irrespective of their age or sex, over one-year period.

Results: Total 220 samples were tested during one year of study period out of which 45 (20.45%) showed laboratory evidence of dengue; either for NS1 Ag or IgM Ab or for both. Maximum samples were received during monsoon and post-monsoon period i.e., August to November. Dengue sero-positivity was found to be highest in post monsoon period i.e., October to November. Total 152 males and 68 females were tested for dengue sero-positivity; out of these 41 males and 8 females showed evidence of dengue infection being positive for NS-1Ag /IgM Ab or for both (Figure 1).

Conclusions: For estimation of true burden of dengue in India and its geographical mapping to control further disease transmission; laboratory-based active surveillance systems are required along with passive surveillance and control programs.

Keywords: Dengue virus infections, Immunoglobulin M antibodies, Mosquito borne diseases, Non-structural protein antigen.

Introduction

Dengue virus infection is fastest spreading, mosquito borne viral disease in the world with an estimated 3.9 billion people at risk of infection. [1-2]

It is caused by dengue virus (DEN- 1 to DEN-4 serotypes) belonging to the family Flaviviridae, may present with wide variety of clinical illnesses ranging from mildly symptomatic dengue fever (DF) to

more life-threatening dengue shock syndrome (DSS) and dengue hemorrhagic fever (DHF). [3, 4]

Principle vectors of transmission for Dengue infection are arthropods of the Aedes genre, especially Aedesaegyptiand Aedesalbopictus. In tropical areas, maximum transmission of disease occurs in the months of rainfall [5] owing to increased breeding of vectors in various water collection sites like old tires, coolers, old earthenware pots, coconut shells etc. [6] Density of mosquito population will be high (3-4 female mosquitoes per house) during the rainy season as compared the dry season (1-2 female mosquitoes per house). [7]

Dengue is notifiable disease in India, but real number of cases could not be identified many times due to the under-reporting or misdiagnosis of cases. [8-9]

The purpose of the present study is to estimate prevalence of dengue viral infection among suspected patients attending a tertiary care center.

Material & Methods:

The present study is a retrospective study to observe prevalence of dengue infection, conducted at the Department of Medicine, Government Medical College, Bettiah, Bihar, India. Patients clinically suspected of having dengue infection and advised for dengue investigation for establishing the diagnosis were enrolled in the study, irrespective of their age or sex, over one-year period.

Blood samples (3 ml) from suspected patients, were collected in a plain vial with aseptic precautions. Serum was separated and was analyzed for Dengue virus specific IgM antibodies and NS1 antigen by immuno-chromatographic method (dengue day 1 test, J. Mitra and Co. PVT. LTD.) As per manufactures protocol. No intervention was done for the present study. Total 220 samples were tested for dengue sero-positivity. Data was recorded and analyzed.

Results:

Total 220 samples were tested during one year of study period out of which 45 (20.45%) showed laboratory evidence of dengue; either for NS1 Ag or IgM Ab or for both (Table 1).

Table 1: Number of positive samples

No. of samples	NS1 Ag + IgM Ab -	IgM Ab + NS1 Ag -	NS1 Ag + IgM Ab +	Total positives
220	26	11	8	45 (20.45%)

Maximum samples were received during monsoon and post-monsoon period i.e., August to November. Dengue sero-positivity was found to be highest in post monsoon period i.e., October to November (Table 2)

Table 2: Month-wise distribution

Month	Total samples tested	Positive for dengue (NS1Ag/IgM Ab)	Positivity rate (%)
January	7	1	14.2
February	7	0	0
March	4	0	0
April	5	0	0
May	9	1	11.11
June	16	4	25
July	13	1	7.59

August	35	4	11.4
September	28	3	10.71
October	32	11	34.37
November	49	18	36.73
December	15	2	13.3
Total	220	45	20.45

Total 152 males and 68 females were tested for dengue sero-positivity; out of these 41 males and 8 females showed evidence of dengue infection being positive for NS-1Ag /IgM Ab or for both (Figure 1).

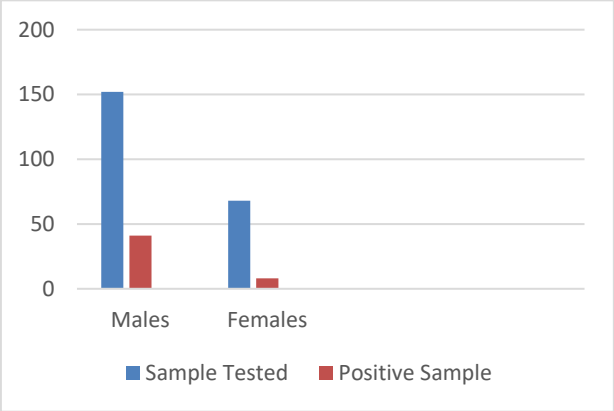

Figure 1: Gender-wise distribution of samples.

Discussion:

The diagnostic method used is an important factor that could have influenced the reported seroprevalence of dengue virus infection in available studies. Compared to the study of antibody titers, dengue virus isolation or PCR tests are much more specific and reliable [10]. Molecular detection by PCR was not carried out in this study due to cost limitations. However, dengue NS1 antigenaemia has proven to be a useful test for early diagnosis of dengue virus infection and in combination with anti-dengue IgM antibody tests, it can increase the diagnostic efficiency for dengue infection especially in the first few days of illness [10]. On the other hand, the anti-dengue IgG antibody test is not specific for dengue virus infection due to frequent cross reactions with other flaviviruses31. Although anti-dengue IgM is more specific for dengue compared to IgG, there is also residual cross-reactivity.31In many communities in Nigeria, several flaviviruses co-circulate with dengue viruses including yellow fever, West Nile, Usutu, Wesselsbron, Uganda S, Zika, Dakar Bat, Potiskum and Banzi and cannot be quite reliably differentiated from dengue using only antibody assays [11-15].

This seasonality trend may be due to favorable environmental factors when infected vector mosquitoes are abundant due to presence of ample stagnant water sources for mosquito breeding following heavy rainfall, high humidity lengthens their lifespan and increased temperatures shorten the virus extrinsic incubation period. [16-17]

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. [18] The early diagnosis of Dengue is of great

importance to arrest the progression of Dengue related complications.

Moreover, seasonality of transmission of dengue infection is more during cooler months with an increase in prevalence soon after monsoon. It may be because, this season is favourable for high breeding of vector mosquitoes. An adult form of *Aedes aegypti* has an average survival of 15 days. During the monsoon season, survival period extends, and the risk of viral transmission is greater. During post monsoon period, the low temperature and stagnant water puddles serve as favourable breeding grounds for these vectors, resulting in an increase in dengue cases in post monsoon months. An unchecked construction activities and poor sanitation facilities in our area also provided breeding sites for dengue vectors [19-20].

In the present study males were more affected than females (6.16:1) and these results were consistent with the recently done studies done by Rao et al, Swain et al, Murhekar et al, Shastri et al. [21-24] This may be explained by the difference in the nature of occupation, travel exposure and health seeking behaviour. More males may be reporting to the hospital for illness, as compared to females. However, in one study done by Dar et al, females were more affected than males. [25,26]

Conclusion:

For estimation of true burden of dengue in India and its geographical mapping to control further disease transmission; laboratory-based active surveillance systems are required along with passive surveillance and control programs.

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