Original Research Article

Estimation of prevalence of dengue viral infection among clinically suspected patients attending a tertiary care centre in Uttar Pradesh, India

Amit Kumar[1], Rachana Kanaujia[2]*, Malay Bajpai[3]

[1]Department of Microbiology, Rama Medical College Hospital and Research Centre, Hapur, Uttar Pradesh, India
[2]Department of Microbiology, Homi Bhabha Cancer Hospital, Varanasi, Uttar Pradesh, India
[3]Department of Pathology, Santosh Medical College and Hospital, Ghaziabad, Uttar Pradesh, India

*Correspondence:
Dr. Rachana Kanaujia,
E-mail: rachanakanaujia@yahoo.com

ABSTRACT

Background: Dengue virus infection is fastest spreading, mosquito borne viral disease in the world with an estimated 3.9 billion people at risk of infection. 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. The purpose of the present study was to estimate prevalence of dengue viral Infection among suspected patients attending a tertiary care centre.
Methods: Blood samples from suspected patients were collected over a period of 1 year and were analysed for dengue virus specific IgM antibodies and NS1 antigen by immuno-chromatographic method.
Results: Total 196 samples were tested out of which 43 (21.43%) showed laboratory evidence of dengue. Maximum samples were received during monsoon and post-monsoon period. Dengue sero-positivity was found to be highest in post monsoon period i.e., October-November. Maximum dengue positivity rate was found in the age group of 16-45 years.
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]

Dengue is endemic in almost all states of India, with variations in risk influenced by rain fall, temperature, transport; rapid and unplanned urbanization.[5-7]

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.[8-10]

The purpose of the present study is to estimate prevalence of dengue viral infection among suspected patients attending a tertiary care centre from January to December 2019.

METHODS

The present study is a retrospective study to observe prevalence of dengue infection, conducted at the Microbiology department of Rama Medical College, Hospital and Research Centre, Hapur, Uttar Pradesh, 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 (January 2019 to December 2019).

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 196 samples were tested for dengue sero-positivity. Data was recorded and analysed.

RESULTS

Total 196 samples were tested during one year of study period (January 2019 to December 2019); out of which 43 (21.43%) 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
196	23	14	6	43 (21.43%)

Table 2: Month-wise distribution.

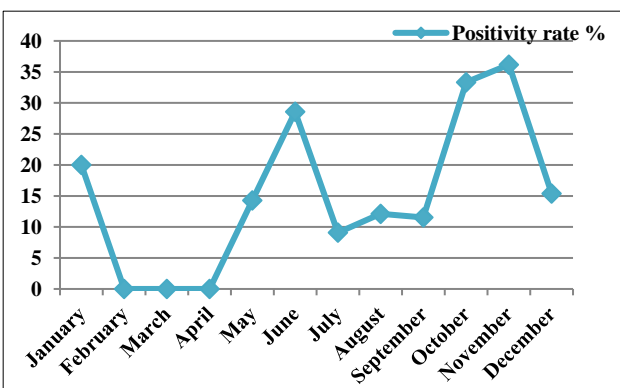| Month	Total samples tested	Positive for dengue (NS1Ag/IgM Ab)	Positivity rate (%)
January	5	1	20
February	5	0	0
March	2	0	0
April	3	0	0
May	7	1	14.29
June	14	4	28.57
July	11	1	9.09
August	33	4	12.12
September	26	3	11.54
October	30	10	33.33
November	47	17	36.17
December	13	2	15.38
Total	196	43	21.43

Figure 1: Month-wise positivity rate percentage.

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) (Figure 1).
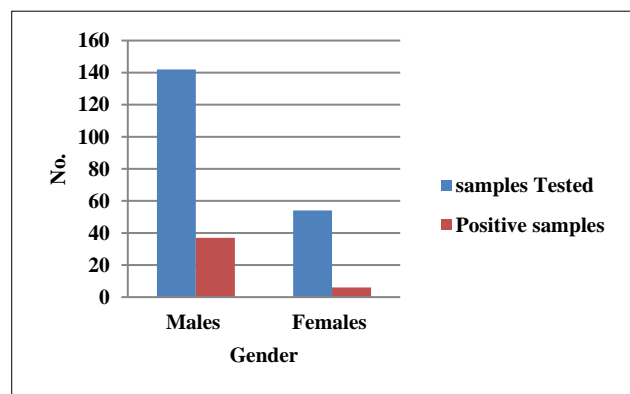

Figure 2: Gender-wise distribution of samples.

Total 142 males and 54 females were tested for dengue sero-positivity; out of these 37 males and 6 females showed evidences of dengue infection being positive for NS-1Ag /IgM Ab or for both (Figure 2).

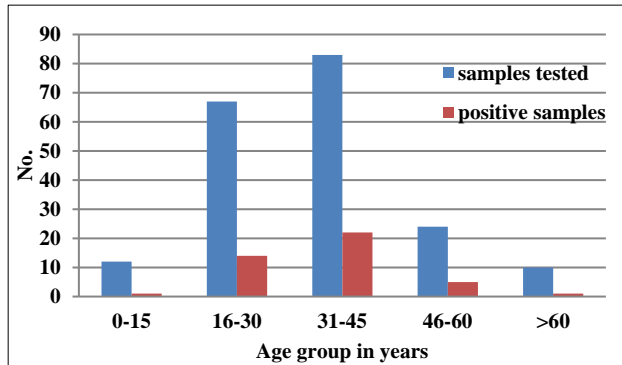Maximum dengue positivity rate was found in the age group of 16-45 years (Figure 3).

Figure 3: Age-wise distribution of samples.

DISCUSSION

Dengue is currently the most important mosquito-borne, human viral disease in terms of both morbidity and mortality. It is a major public health concern in many tropical and sub-tropical regions around the world.[11]

Since the mid-1990s, epidemics of dengue have become more frequent in India, especially in urban zones, and have spread to new regions, where dengue was historically non-existent.[12]

India became endemic for dengue due to sustained transmission during the inter-epidemic periods and recurring dengue epidemics resulted in the establishment of hyperendemic areas.[13,14]

In the present study total 196 serum samples of suspected dengue infection were tested for presence of dengue NS1Ag, IgM Ab; out of which 43 (21.43%) were positive for dengue specific NS1 Ag or IgM Ab or for both.

Most of the samples 161 (82.14%) were received during monsoon and post monsoon period June- November) with high positivity 27 (62.79%) for Dengue during post monsoon period October-November). Similar results were found in studies done by Gupta et al, Jain et al, Shastri et al.[15-17] 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.[7,12]

Dengue affects both the sexes of all age groups. 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.[6-8,17] 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.[18] These findings indicate the importance of working place and travel on dengue prevalence, which needs further exploration.

The present study revealed that the adolescents and adults of age group (16-45 years) were more affected. This result is supported by studies done by Murhekar et al, Rao et al, Swain et al, Murhekar et al, Gupta et al, Shastri et al.[5-8,15,17] Whereas, in studies done by Jain et al, Dar et al children of age group less than 15 were affected more.[16,18]

This study had certain limitations also. The study period was brief and entirely from tertiary care centre, only symptomatic and presenting to the health care system were included in the study.

CONCLUSION

Dengue is endemic in India. For estimation of true burden of dengue in India and its geographical mapping to control further disease transmission; early recognition, prompt management, vector surveillance and control strategies must be intensified.

Along with passive surveillance and control programs; laboratory-based active surveillance systems are required.

Properly designed and well conducted, large, population-based studies are needed to identify the population at increased risk, to plan and implement effective public health prevention and control measures.

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