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Original Research Article

A Retrospective Observational Study to Assess the Prevalence of Dengue Viral Infection among Clinically Suspected Patients

Kumari Preeti Ranjana[1], Sujit Kumar[2], Aravind Kumar[3]

[1]Tutor, Department of Microbiology, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India.

[2]Assistant Professor, Department of Medicine, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

[3]Associate Professor, Department of Microbiology, Vardhman Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

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Corresponding author: Dr Sujit Kumar
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Abstract

Aim: To estimate prevalence of dengue viral infection among suspected patients attending a tertiary care center in Bihar State.

Material & Method: Total 230 samples were tested for dengue sero-positivity. Data was recorded and analyzed. The present study is a retrospective study to observe prevalence of dengue infection, conducted at the Vardhman Institute of Medical sciences, Pawapuri, Nalanda, 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 230 samples were tested during a period of one year. Out of which 55 (23.91%) showed laboratory evidence of dengue; either for NS1 Ag or IgM Ab or for both.

Conclusion: The present study confirms that dengue is mainly a disease of rainy season and also identifies certain vulnerable groups for effective planning of interventions.

Keywords: Dengue, IgM, NS1, Seasonal variation.

Background

Dengue is an acute arboviral infection with potentially fatal complications. Dengue is an endemic disease worldwide. According to estimates of the World Health Organization (WHO), around two fifths of the world's population in tropical and subtropical countries are at constant risk of contracting this infection. [1] Dengue is endemic in many parts of India and recently in the last few years many places have even experienced epidemics [2-4]. Dengue virus infection is fastest spreading, mosquito borne viral disease in the world with an estimated 3.9 billion people at risk of infection [5-6].

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) [4, 7].

Principle vectors of transmission for Dengue infection are arthropods of the Aedes genre, especially *Aedes aegypti* and *Aedes albopictus*. In tropical areas, maximum transmission of disease occurs in the months of rainfall[8] owing to increased breeding of vectors in various water collection sites like old tires, coolers, old earthenware pots, coconut shells etc [9] 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) [10].

Diagnostic techniques like isolation of virus by cell culture and nucleic acid detection by reverse transcriptase polymerase chain reaction are time consuming and require costly laboratory setups. Hence in resource limited settings, detection of NS1 antigen and IgM/ IgG antibodies specific to virus remains as important diagnostic parameters [11].

Thus, we aim to estimate prevalence of dengue viral infection among suspected patients attending a tertiary care center in Bihar State.

Material & Method

Total 230 samples were tested for dengue sero-positivity. Data was recorded and analyzed. The present study is a retrospective study to observe prevalence of dengue infection, conducted at the Vardhman Institute of Medical sciences, Pawapuri, Nalanda, 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 as per manufactures protocol. No intervention was done for the present study.

Statistical analysis

Data was analyzed using WHO Epi info software version 3.5.4. Observations were presented as frequency and percentage distribution. Relevant descriptive statistics like frequency and percentage were calculated for presentation of data.

Results

Total 230 samples were tested during a period of one year. Out of which 55 (23.91%) showed laboratory evidence of dengue; either for NS1 Ag or IgM Ab or for both (Table 1).

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 which was 10.9 and 6.52 respectively (Table 2).

Total 168 males and 62 females were tested for dengue sero-positivity; out of these 47 males and 8 females showed evidences of dengue infection being positive for NS-1Ag /IgM Ab or for both (Table 3).

Table 1: Number of positive samples

No. of samples	NS1 Ag + IgM Ab -	IgM Ab + NS1 Ag -	NS1 Ag + IgM Ab +	Total positives
230	31	17	7	55 (23.91%)

Table 2: Month-wise distribution

Month	Total samples tested	Positive for dengue (NS1Ag/IgM Ab)	Positivity rate (%)
January	5	1	0.43
February	4	0	0
March	3	0	0
April	3	0	0
May	9	1	0.43
June	19	5	2.17
July	14	1	0.43
August	38	5	2.17
September	25	4	1.74
October	39	15	6.52
November	55	25	10.9
December	16	3	1.3
Total	230	55	23.9

Table 3: Gender-wise distribution of samples

Gender	Total	Sero-Positivity
Males	142	47
Females	54	8
Total	230	55

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 [12]. The early diagnosis of Dengue is of great importance to arrest the progression of Dengue related complications. In the present study, overall seropositivity was 14.33%, this finding is in correlation with other studies conducted by Goswami *et al*,[13] Garg A *et al*,[14] Panamanian R. *et al* [15] and Manisha Patankaret *et al* [16].

Rate of positivity was highest in age group < 15 years i.e. 30.33% followed by 16-30 years i.e. 20.4% similar to findings of several Indian[17-20] and international studies [21-22].

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 [23].

India became endemic for dengue due to sustained transmission during the inter-epidemic periods and recurring dengue epidemics resulted in the establishment of hyper endemic areas [24-25].

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* [26-28]. 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 [29, 30].

Early laboratory diagnosis of dengue fever among patients with acute febrile illness is essential to prevent dengue related

complications. Creating awareness among the public regarding mosquitoes causing dengue fever and its control measures and personal protective measures is essential for preventing epidemics of dengue and related mortality.

Conclusion

The present study found seroprevalence of dengue infection to be critical in the study setting and identifies pediatric group being most vulnerable for infection and also identifies monsoon season as the most favorable season for transmission of disease. Need to strengthen integrated vector control measures during rainy season with special attention to personal protection measures among children.

References

1. World Health Organization. Comprehensive Guidelines for Prevention and Control of Dengue and Dengue Hemorrhagic Fever. New Delhi;2011.
2. George S, Soman RS. "Studies on dengue in Bangalore City: Isolation of virus from man and mosquitoes". Indian J Med Res. 1975; 63:396–401.
3. Kaur H, Prabhakar H, Mathew P, Marshalla R, Arya M. "Dengue haemorrhagic fever outbreak in October-November 1996 in Ludhiana, Panjab, India". Indian J Med Res. 1997; 106:1–3.
4. Gupta E, Dar L, Narang P, Srivastava VK, Broor S. Serodiagnosis of dengue during an outbreak at a tertiary care hospital in Delhi. Indian J Med Res. 2005; 121:36–8.
5. Jing Q, Wang M. Dengue epidemiology. Glob Heal J. 2019; 3(2): 37-45.
6. Dengue and severe dengue. Available at: https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue. Accessed on 11th July 2020.
7. Singh DSP, Nayak DM, Singh DM, Sharma DRK, Singh DS. Clinical profile of dengue fever patients in tertiary care hospital of North India. Pediatr Rev Int J Pediatr Res. 2019;6(3):129-33.
8. Huber K, Loan LL, Hoang TH, Teen TK, Roahain F and Failloux AB. Aedes aegypti in South Vietnam ecology, genetic structure vectorial competence and resistance to insecticides. Southeast Asian J Trop Med Public Health 2003;34(1):81-86.
9. Mandell, Doughlas and Bennett's principle and practice of infectious diseases, 7th edition, Churchill Livingstone Elsevier, Philadelphia. 2010; 2:2133-56.
10. Normile D. Surprising new dengue virus throws a spanner in disease control efforts. Science. 2013; 342:415.
11. Tricou V, Hang TV, Quynh NV, Nguyen CV, Tran HT, Farrar J, et. al. Comparison of two dengue NS1 rapid tests for sensitivity, specificity and relationship to viraemia and antibody responses. BMC Infect Dis. 2010; 10:142.
12. Bhatt S, Gething PW, Brady OJ, et al. The global distribution and burden of dengue. Nature 2013;496(7446):504-7.
13. Goswami L, Chowdhury R, Rasul ES. Seroprevalence of dengue infection in a tertiary care hospital in Assam. IJMDS 2018;7(1):1582-5.
14. Garg A, Garg J, Rao YK, et al. Prevalence of dengue among clinically suspected febrile episodes at a teaching hospital in North India. J Infect Dis Immunity 2011; 3:85-9.
15. Paramasivan R, Thenmozhi V, Hiriyan J, et al. Serological & entomological investigations of an outbreak of dengue fever in certain rural areas of Kanyakumari district, Tamil Nadu. Indian J Med Res 2006;123(5):697-701.
16. Patankar M, Patel B, Gandhi V, et al. Seroprevalence of dengue in Gujarat, Western India: a study at a tertiary care

hospital. Int J Med Sci Public Health 2014;3(1):16-8.
17. Deshkar ST. Raut SS, Khadse RK. Dengue infection in central India: A 5 years study at a tertiary care hospital. Int J Res Med Sci. 2017; 5:2483-9.
18. Biradar A, Kauser Y, Itagi I, Jamadar NA. Dengue infection: Its prevalence with seasonal variations. Indian J Microbiol Res 2016; 3(2):89-92.
19. Pruthvi D, Shashikala P, Shenoy V. Evaluation of platelet count in dengue fever along with seasonal variation of dengue infection. J Blood Disorders Transf 2012;3(4):1-4.
20. Garg A, Garg J, Rao YK, Upadhyay GC and Sakhuja S. Prevalence of dengue among clinically suspected febrile episodes at a teaching hospital in North India. Journal of Infectious Diseases and Immunity 2011;3(5):85-89.
21. Shah GS, Islam S, Das BK. Clinical and laboratory profile of dengue infection in children. Kathmandu University Med. J. 2006; 13:40–4.
22. Anderson KB, Chunsutiwwat S, Nisalak A, Mameen P, Libarty D, Rothman AL. Burden of symptomatic dengue infection in children at primary school in Thailand: a prospective study. Lancet. 2007; 369:1452–59.
23. Mutheneni SR, Morse AP, Caminade C, Upadhyayula SM. Dengue burden in India: Recent trends and importance of climatic parameters. Emerg Microbes Infect. 2017;6(8):1-10.
24. Chaturvedi UC, Nagar R. Dengue and dengue haemorrhagic fever: Indian perspective. J Biosci. 2008;33(4):429-441.
25. Sharma RS, Kumari R, Srivastava PK, Barua K, Chauhan LS. Emergence of dengue problem in India - a public health challenge. J Commun Dis. 2014;46(2):17-45.
26. Gupta E, Dar L, Kapoor G, Broor S. The changing epidemiology of dengue in Delhi, India. Virol J. 2006; 3:2003-7.
27. Jain S, Dixit G, Kohli V. Trend and epidemiological profile of dengue fever/dengue haemorrhagic fever in Ahmedabad City, Gujarat, India. Healthline, J Indian Associat Prevent Social Med. 2019;10(1):62-7.
28. Shastri J, Williamson M, Vaidya N, Agrawal S, Shrivastav O. Nine-year trends of dengue virus infection in Mumbai, Western India. J Lab Physicians. 2017;9(04):296-302.
29. Swain S, Bhatt M, Pati S, Soares Magalhaes RJ. Distribution of and associated factors for dengue burden in the state of Odisha, India during 2010-2016. Infect Dis Poverty. 2019;8(1):1-10.
30. Mutheneni SR, Morse AP, Caminade C, Upadhyayula SM. Dengue burden in India: Recent trends and importance of climatic parameters. Emerg Microbes Infect. 2017;6(8):1-10.