

Prevalence of Dengue in Patna District in Bihar

Sunil Kumar¹, K. Pandey², G. C. Sahoo³, Kalyani⁴, P. Das⁵

Abstract: *BACKGROUND: Dengue virus is a single stranded RNA virus of family Flaviviridae. It is transmitted by Aedes mosquito, particularly Aedes aegypti. It is distributed worldwide but epidemic is more prevalent in tropics and subtropics. Dengue is usually a flue like illness but may cause life threatening complications like dengue hemorrhagic fever and dengue shock syndrome. Four serotypes of dengue virus are prevalent worldwide (DEN-1, DEN-2, DEN-3, and DEN-4). OBJECTIVES: To study the diagnosis of dengue by antigen and antibody detection test and to detect the prevalence rate of dengue by age wise and sex wise distribution. METHODS: A prospective study of 526 patients was done based on clinical criteria of dengue. RESULT: Among 526 serum samples, 84 samples were found positive by NS1 Ag MICROELISA, IgM MICROELISA & IgG MICROELISA tests, of various samples. CONCLUSION: prevalence of dengue in Patna district of Bihar is estimated on the basis of serological investigations in this study.*

Keywords: Dengue, Aedes aegypti, Dengue NS1 MICROELISA, IgM MICROELISA.

1. Introduction

Dengue fever, also called break bone fever is a viral fever caused by a single stranded RNA virus of family flaviviridae. The principal vector is a mosquito, Aedes aegypti. The other species that can transmit are Aedes albopictus, Aedes polynesiensis and Aedes scutellaris. This mosquito usually bites in day time and breeds in fresh stagnant or stored water.. In India it is more commonly found in Maharashtra, Delhi, Gujrat, and other states of north and central region. There are four DENV serotypes DENV-1, DENV-2, DENV-3 & DENV-4. These viruses are closely related to each other antigenically, and cross reactivity occurs in serological tests¹. Dengue is endemic in more than 100 countries and it infects about 50 to 100 million people each year worldwide². Among these cases about 500,000 cases are of dengue hemorrhagic fever and dengue shock syndrome. The death rate is about 30000 per year; it is mostly among children and due to complication of dengue fever i.e. dengue hemorrhagic fever and dengue shock syndrome³. The incidence has increased in recent time in Patna it is becoming more prevalent since last 4 or 5 years.

Infection with DENV causes a spectrum of clinical illness, ranging from in apparent infection to mild nonspecific viral syndrome to classical DENV fever to severe and fatal hemorrhagic disease. The incubation period is usually from 4-6 days, ranging from 3-14 days after the mosquito bite⁴. The clinical symptom varies as sudden onset of fever (often biphasic), severe headache, chills, and generalized pains in the muscles and joints. The illness usually lasts for 5-7 days, after which recovery is usually complete, although convalescence may be prolonged. Early diagnosis plays an important role in treatment of disease. The measure diagnostic methods available are, ELISA for NS1 (Non structural protein1) Antigen, MAC ELISA (IgM capture enzyme-linked immunosorbent assay), RNA detection by reverse transcriptase PCR (RT-PCR), and viral culture. Although the viral isolation by cell culture and subsequent detection by immunofluorescence is the gold standard diagnostic procedure⁵, but the last two methods are not used for routine diagnostic procedure, as these are costly, have low sensitivity and cumbersome. The mainstay of diagnosis is NS1 antigen MICROELISA and MAC ELISA tests for early diagnosis of dengue. The

NS1 Antigen MICROELISA is used as a day one diagnostic tool and now it is considered as gold standard method of diagnosis. NS1 (non-structural protein 1) is the highly conserved glycoprotein and it is formed both as a membrane-associated as well as in secretary forms⁶.

2. Material and Methods

The present study was conducted in the Department of Virology, RMRI Agamkuan Patna. Blood samples were collected from patients who came to the RMRI virology lab from, RMRI OPD, different hospitals such as SGGSH Patna, CHILD CARE CENTRE Patna, and medical college as NMCH Patna. Total numbers of 526 patients were studied between the periods of September to December 2014. Patients were presented with high grade fever, nausea/ vomiting, headache, joint pain, body ache, macula-papular rashes, petechiae, with or without bleeding manifestations. Patients of all age groups and both sexes were selected in the study.

Detailed history was taken and 5 ml of venous blood was drawn aseptically from each patient. Serum was separated from the blood samples by centrifugation at 1500 rpm for 15 minutes and stored at -20 °C. The antigen and antibody were detected by NS1 Ag MICROLISA, IgM and IgG antibodies detection by ELISA and the results were compared. The materials used for sample collection, processing and tests are as follows:

Materials:

1. Syringes (5 ml)
2. Blood samples
3. Micropipettes
4. Incubator
5. ELISA Kits of J. Mitra & Co. Pvt. Ltd. for NS1 Antigen, Dengue IgM & IgG Microlisa.

Reagents present in Kits:

1. Coated Micro wells
2. Sample diluents
3. Enzyme conjugate Conc. (50X)
4. Wash buffer conc. (25X)
5. TMB substrate

6. TMB diluents
7. Positive & negative control
8. Calibrator
9. Stop solution
10. Plate sealers
11. Clamp & rod

3. Results

There were total 526 patient's serum samples were tested by NS1 Ag MICROELISA, IgM, and IgG immunochromatography as well as MICROELISA test and the results were compared. Among the total 526 samples of clinically suspected dengue patients, 68 samples were positive for NS1Ag MICROELISA test. 14 samples were positive for NSI Ag MICROELISA as well as IgM MICROELISA test. 24 samples were positive for IgM antibody, 10 samples were positive for IgG antibody, 02 samples were positive for both NS1& IgM and 02 samples were positive for both IgM& IgG. Among patients who are positive for NS1 Ag MICROELISA, only 51 patients were positive by ICT, it means diagnosis of dengue is correlated in 51 patients by both methods. Among IgM positive cases 17 were positive by ICT methods and among IgG positive cases 06 were positive by ICT methods.

Sex wise distribution of dengue cases: - Among 68 NS1 positive patients, 50 patients were male and 18 were female. Among 24 IgM positive patients 15 were male and 09 were female and among 10 IgG positive cases 06 were male and 04 were female.

Age wise distribution of dengue cases: - Among 84 dengue positive patients, 11 patients were up to 10 years of age, 49 were between 11 to 30years, 18 were between 31 to 50 years, 05 were between 51 to 70 years, and 01 was above 70 years of age.

High grade fever, headache, nausea/vomiting, body ache were the common clinical features among the 68 confirmed cases of dengue. Retro-orbital pain was the major complain in 43 patients. Body ache and joint pain were the main complains of 50 patients. Pain usually started after 1 or 2 days of fever, it involves joints, limbs and then whole body.

4. Discussion

Diagnosis of dengue is mainly done on the basis of clinical history and examination. The early laboratory diagnosis helps the clinician to prevent the development of complication of dengue such as DHF (dengue haemorrhagic fever) and (DSS (dengue shock syndrome) etc.

NS1Ag circulates among all serotypes of the dengue virus and its level is high during initial days of illness⁷. Serum level of NS1Ag varies from 0.04 -2.0µg/ml in acute phase, to about 0.04µg/ml in convalescent phase serum sample⁸.

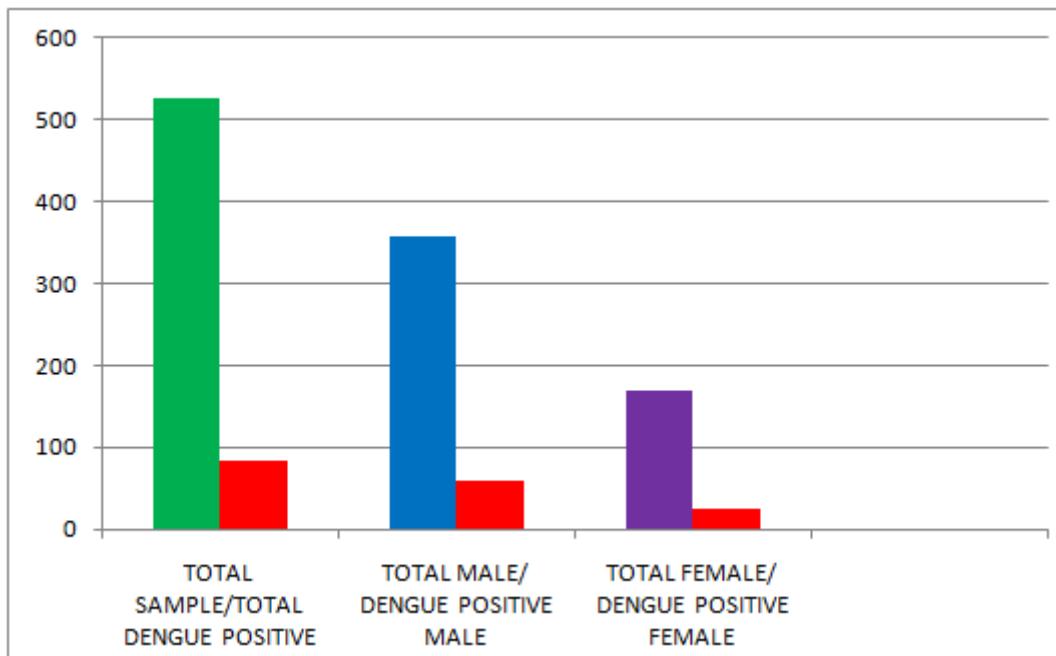
The dengue IgM antibody takes 03 to 05 days to appear in the patient's serum and dengue IgG takes about 10 to 14 days to appear. Sex wise distribution of dengue infection shows that males have more predilections for dengue infection. Similarly age between 11 to 30 years is more commonly affected by dengue infection.

5. Conclusion

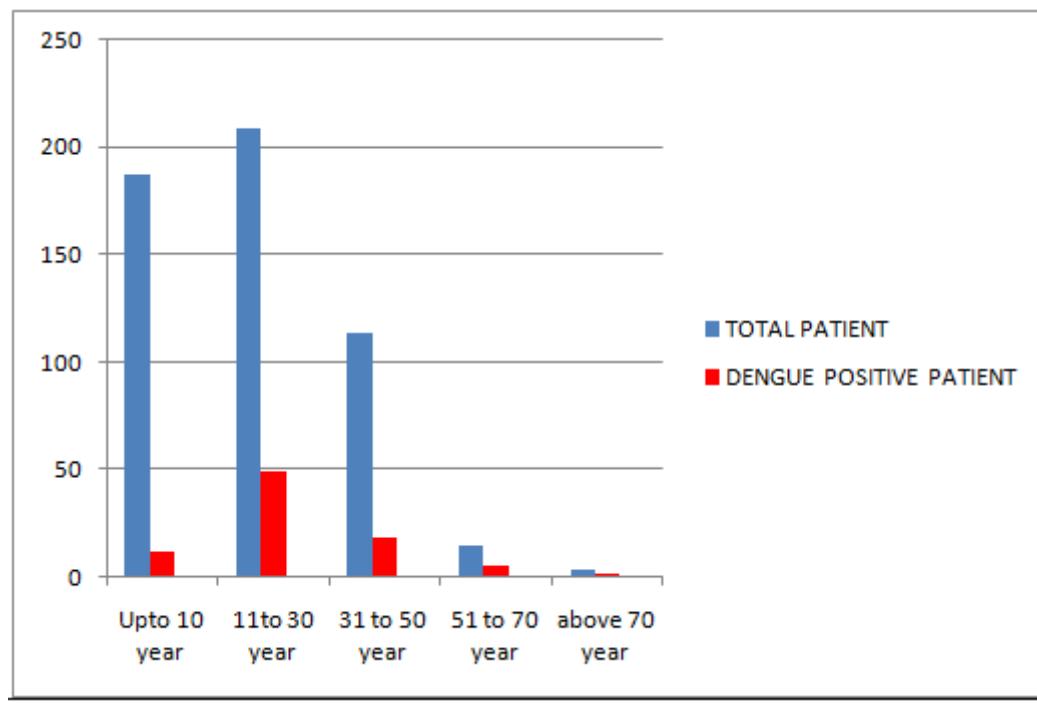
Prevalence and severity of dengue infection can be reduced by prevention of mosquito bite, early serological investigation, clinical diagnosis and treatment.

References

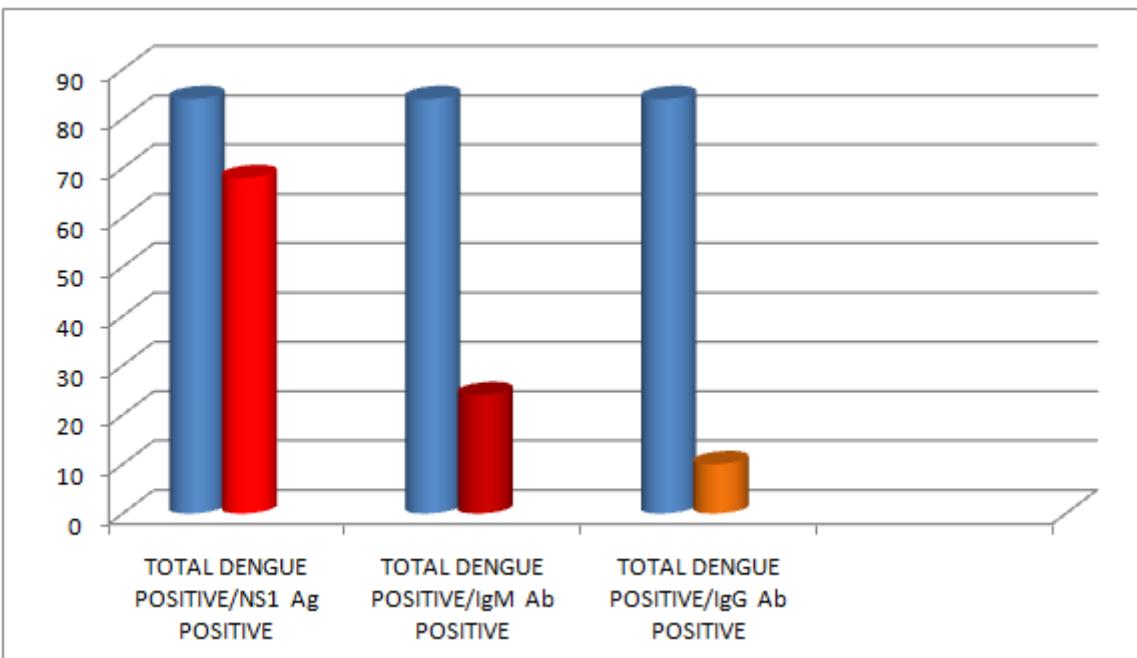
- [1] Topley & Wilson's, "Microbiology and Microbial infections" 10th edition, John T.Roehrig and Duane J. Gubler. 5624-5625.
- [2] Smith AW, Chen LH, Massad E, Wilson ME. Threat of dengue to blood safety in dengue-endemic countries. Emerging infectious diseases 2009; 15:8-11.
- [3] Guzman MG, Kouri G. Dengue: an update. Lancet Infect Dis 2002; 2: 33-42.
- [4] Topley & Wilson's, "Microbiology and Microbial infections" 10th edition, John T.Roehrig and Duane J. Gubler. 5624-5625.
- [5] Chakravarti A, Kumaria R, Batra VV, Verma V. Improved detection of dengue virus serotypes from serum samples- Evaluation of single-tube multiplex RT-PCR with cell culture. Dengue bulletin 2006; 30: 133-40.
- [6] Dussart P, Labear B, Lagathu G, Louis P, Nunes MRT, Rodrigues SG,et al. Evaluation of an Enzyme Immunoassay for detection of dengue virus NS1 antigen I human serum. Clin vaccine Immunol 2006; 13: 1185-9.
- [7] Bessof K, Delorey M, Sun W, Hunsperger E. Comparison of Two Commercially Available Dengue Virus (DENV) NS1 captures Enzyme-Linked Immunosorbant Assay Using a single clinical sample for Diagnosis of Acute DENV infection. Clin Vaccine Immunol 2008; 15:1513-8.
- [8] Alcon S, Talarmin A, Debruyne M, Falconar A, Duebel V, Flamand M. Enzume-Linked Immunosorbent Assay Specific to Dengue virus type-1 Nonstructural protein NS1 Reveals circulation of the Antigen in the blood during the Acute Phase of Disease in patients Experiencing primary or secondary infections. J Clin Microbiol 2002; 40: 376-81.



Sex Wise Prevalence of Dengue Positive Cases



Age Wise Prevalence of Dengue Positive Cases



Prevalence of Serological Marker



Dengue NS1 Ag Microelisa Kit

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