Epidemiological Study of Dengue Fever at a Tertiary Care Center in Patna

Nazish Ayubi1, Nidhi Prasad2*, Vidhyut Prakash3, Keshav K. Bimal1, Rakesh Kumar5, Shailesh Kumar6, Anima Xess7, Amit Mishra8

1Junior Resident, Department of Microbiology, IGIMS, Patna, Bihar, India
2Assistant Professor, Department of Virology, IGIMS, Patna, Bihar, India
3Senior Resident, Department of Virology, IGIMS, Patna, Bihar, India
4Senior Resident, Department of Microbiology, IGIMS, Patna, Bihar, India
5Associate Professor, Department of Microbiology, IGIMS, Patna, Bihar, India
6Additional Professor, Department of Microbiology, IGIMS, Patna, Bihar, India
7Professor (Retd), Department of Microbiology, IGIMS, Patna, Bihar, India
8Associate Professor, Department of Medicine, IGIMS, Patna, Bihar, India

DOI: 10.36347/sjams.2020.v08i02.070 | Received: 13.02.2020 | Accepted: 21.02.2020 | Published: 29.02.2020

*Corresponding author: Nidhi Prasad

Abstract

Background: Dengue is a serious mosquito borne viral infection that occurs in humans throughout the world. Uncontrolled urbanization, expanding urban population, poverty, ineffective public health infrastructure, faster modes of transportation, globalization of trade and increased international travel have all been implicated as factors leading to the spread of dengue around the world and vary from place to place. Keeping these in mind a study was undertaken to study the epidemiology of dengue fever at IGIMS, Patna. Material and Methods: It was a prospective hospital based study from November 2018 to October 2019. All suspected case of dengue fever, which were either admitted or had visited OPD of medicine and paediatric Departments of IGIMS, Patna, with suspected Dengue fever were screened for Dengue infection in the Virology laboratory of IGIMS Patna. Results: Out of a total of 1522 cases with a clinical suspicion of dengue infection, 344 cases (22.60%) were found to be positive for either current or past Dengue infection. There was an increase in the number of cases tested for Dengue from August to November with maximum number of cases being positive in the month of October-2019 (34%). This corresponds to the monsoon season of this place. Of the 344 positive cases, 231 were male and 113 were female. Maximum seropositivity was seen in 15-60 years age group. Conclusion: Dengue is an emerging public health problem in India. High degree of suspicion, screening for Dengue in suspect cases and preventive measures during monsoon and water stagnation periods may help us in the fight against spread of dengue infection. Keywords: Dengue infection, seroprevalence, epidemiology.

INTRODUCTION

Dengue is a serious mosquito borne viral infection that occurs in humans throughout the world. The dengue virus belongs to the family Flaviviridae and genus Flavivirus. They are small (50nm) enveloped viruses with single stranded RNA genome containing three structural protein genes encoding the nucleocapsid or core protein (C), a membrane-associated protein (M), an envelope protein (E) and seven non-structural protein (NS) genes NS1, NS2a, NS2b, NS3, NS4a, NS4b, NS5. There are five distinct closely related serotypes of Dengue virus (DENV-1, DENV-2, DENV-3, DENV-4 and DENV-5). Distinct genotypes have been identified within each serotype. Currently, three sub-types exist for DENV-1, six for DENV-2, four for DENV-3 and four for DENV-4[1, 3]. It is transmitted by the bite of Aedes (Stegomyia) mosquito species such as. A. aegypti, A. albopictus etc[3]. The viruses are maintained in a mosquito-human-mosquito cycle, with periodic epidemics occurring at 3 to 5 year intervals. After an incubation period of 4 -10 days, infection in humans produce a wide spectrum of illness. Dengue infection may be asymptomatic or may cause dengue fever (DF) or dengue haemorrhagic fever (DHF) including dengue shock syndrome (DSS)[1].

Dengue infection in humans occurs during rainy season and affects over hundred million people every year with high death rate in children. Uncontrolled urbanization, expanding urban population, poverty, ineffective public health infrastructure, faster
modes of transportation, globalization of trade and increased international travel have all been implicated as factors leading to the spread of dengue around the world. Rapid urbanization is probably the single most important contributing factor resulting in spread of Dengue virus infection.

Keeping these in mind a study was undertaken to study the epidemiological of dengue fever at IGIMS, Patna

**MATERIAL AND METHODS**

It was a prospective hospital based study. The period of study was from November 2018 to October 2019. All suspected case of dengue fever, which were either admitted or had visited OPD of medicine and paediatric Departments of IGIMS, Patna, with suspected Dengue fever were considered for the study. Patient was screened for dengue through a thorough history, detailed examination and lab investigation. All samples of suspected Dengue infection received in the Virology laboratory of IGIMS Patna were tested for NS1 antigen, IgM antibody and IgG antibody. Interpretation of the test results were done as per the manufacturer’s instructions.

**RESULTS**

A total of 1522 cases, with a clinical suspicion of dengue infection, 344 cases (22.60%) were found to be positive for either current or past Dengue infection. According to the month wise distribution of cases during the study period, there was an increase in the number of cases tested for Dengue from August to November with maximum number of cases being tested in the month of October-19 (34%). This corresponds to the monsoon season of this place.

Table 1: Month wise distribution of cases tested for dengue

| MONTH | NO. OF CASES | PERCENTAGE |
|-------|--------------|------------|
| NOV-18 | 176         | 11.5       |
| DEC-18 | 53          | 3.5        |
| JAN-19 | 21          | 1.4        |
| FEB-19 | 18          | 1          |
| MAR-19 | 33          | 2          |
| APR-19 | 45          | 3          |
| MAY-19 | 34          | 2          |
| JUN-19 | 26          | 1.6        |
| JUL-19 | 118         | 8          |
| AUG-19 | 210         | 14         |
| SEP-19 | 278         | 18         |
| OCT-19 | 510         | 34         |
| TOTAL  | 1522        | 100        |

Of the 1522 samples tested, 344 (23%) tested positive for either of NS1 Antigen, IgM antibody, IgG antibody. 1178 (77%) samples tested negative (Table 2).

Table 2: Test Results of Dengue serology (n=344)

| Result                  | Positive | Percentage |
|-------------------------|----------|------------|
| Only NS1 positive       | 247      | 72%        |
| Only IgM positive       | 118      | 34%        |
| Only IgG positive       | 36       | 10%        |
| NS1+IgM positive        | 41       | 12%        |
| NS1+IgG positive        | 5        | 1.5%       |
| IgG+IgM positive        | 5        | 1.5%       |
| NS1+IgG+IgM positive    | 2        | .6%        |

Table 3: Test Results of Dengue NS1, IgM, IgG results (n=344)

| Result                  | Positive | Percentage |
|-------------------------|----------|------------|
| Only NS1 positive       | 247      | 72%        |
| Only IgM positive       | 118      | 34%        |
| Only IgG positive       | 36       | 10%        |
| NS1+IgM positive        | 41       | 12%        |
| NS1+IgG positive        | 5        | 1.5%       |
| IgG+IgM positive        | 5        | 1.5%       |
| NS1+IgG+IgM positive    | 2        | .6%        |

© 2020 Scholars Journal of Applied Medical Sciences | Published by SAS Publishers, India
Of the 344 positive cases, 206 were resident of Patna and 138 were from outside Patna.

Table-4: Area wise distribution of positive cases (n=344)

|                  | Patna | Outside Patna |
|------------------|-------|--------------|
|                  | 206   | 138          |

Of the 344 positive cases, 231 were male and 113 were female. The age of the seropositive cases were further categorized into three groups as follows, 0-14, 15-60 and >60 years. Maximum seropositivity was seen in 15-60 years age group (table 3, fig 3).

Table-3: Age and gender wise distribution of positive cases (n=344)

| AGE (YEARS) | MALE | FEMALE |
|-------------|------|--------|
| 0 TO 14     | 16   | 9      |
| 15 TO 60    | 206  | 99     |
| >60         | 9    | 5      |
| TOTAL       | 231  | 113    |

Fig-3: Monthwise distribution of positive cases (n=344)

Fig-4: Area wise distribution of positive cases (n=344)

DISCUSSION

Dengue is an emerging public health problem in India. In the present study 1522 cases, either admitted or visited in our OPD in medicine and paediatric ward of IGIMS, Patna with a clinical suspicion of dengue virus infection were analyzed during the period of November 2018 to October 2019. Amongst the suspected dengue fever 344 cases were found positive for dengue test. Majority of the cases were between 15 to 60 years. Similar finding was reported by Nisalak et al. [7] (16 to 60yrs) and Kabra et al. [9] (18 to 60 years).

In the present study the male to female ratio was 1.54:1. Similar pattern was seen in the analysis of 2016 dengue outbreak in North India by Chandrakanta et al. [14] (1.6:1) and Mittal et al. [15] (1.3:1). Male cases were more commonly affected than female cases in the studies of Neeraja et al. [5] (2:1) and Aggarwal et al. [10] (3:2) whereas Maria Guzman et al. [2] (1:1.4), Kabra et al. [9] and Ole Wichman et al. [8] (0.96:1) reported in their studies that female cases were slightly more affected than male cases. But overall, a review of reported literature shows no sex predilection for the disease. Statistical analysis revealed that there was no association between age and gender in the present study.

The study was done from November 2018 to October 2019. Analysis of the data was done for each month to identify the seasonal variance of dengue infection. In the present study, out of the 1522 suspected dengue cases, 344(23%) tested positive for NS1 or IgM or IgG. 1178 (77%) samples tested negative for both the tests in the acute phase sera of the 344 samples tested, NS1 was positive in 233 (68%) cases. Many authors like Ivani Bisardi et al. [13] (99.3%), Chua et al. [11] (91.6%), Laurent Thomas et al. [12] (67.1%) have stated that the incidence of detecting NS1 antigen is more sensitive in acute phase samples. A gradual increase in the occurrence of cases was seen from July with a peak in October which corresponds to the monsoon rainfall of this region. This results in stagnation of water, which facilitates vector breeding. Between Julys to october there were 305(89%) cases enrolled in this study. Similar studies indicating the correlation between emergence of dengue
and monsoon was reported in South India by S.C. Tewari et al. [18] and Singh J et al. [6] in Central India by PM Ukey et al. [4], in Karnataka by Aswini kumar et al. [16] and in Karachi by Khan et al. [17]. This finding indicates that preventive measures play an important role during water stagnation periods, in the fight against dengue infection.

**CONCLUSION**

Dengue is an emerging public health problem in India. High degree of suspicion, screening for Dengue in suspect cases and preventive measures during monsoon and water stagnation periods may help us in the fight against spread of dengue infection.

**REFERENCES**

1. World Health Organization. Comprehensive Guidelines for Prevention and Control of Dengue and DHF, 2011 WHO, Region of South-East Asia.
2. Maria Guzman, Scott Halstead. Effect of age on outcome of secondary dengue 2 infections. Intl Journal of Infectious Diseases. 2002;6(2):118–24.
3. Knipe D, Roizman B. Fields Virology. Fifth. Lippincott Williams and wilkins; 2005.
4. Ukey PM, Bondade SA, Paunipagar PV, Powar RM, Akulwar SL. Study of seroprevalence of dengue fever in central India. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2010 Oct;35(4):517.
5. Neeraja M, Lakshmi V, Teja VD, Umbala P, Subbalakshmi MV. Serodiagnosis of dengue virus infection in patients presenting to a tertiary care hospital. Indian journal of medical microbiology. 2006 Oct;1;24(4):280.
6. Singh J, Balakrishnan N, Bhardwaj M, Amuthadevi P, George EG, Subramani K, Soundararajan K, Appavoo NC, Jain DC, Ichhpujani RL, Bhatia R. Silent spread of dengue and dengue haemorrhagic fever to Coimbatore and Erode districts in Tamil Nadu, India, 1998: need for effective surveillance to monitor and control the disease. Epidemiology & Infection. 2000 Aug;125(1):195-200.
7. Nisalak A, Endy TP, Nimmannitya S, Kalayanarooj S, Scott RM, Burke DS, Hoke CH, Innis BL, Vaughn DW. Serotype-specific dengue virus circulation and dengue disease in Bangkok, Thailand from 1973 to 1999. The American journal of tropical medicine and hygiene. 2003 Feb 1;68(2):191-202.
8. Wichmann O, Hongsirirwon S, Bowonwatanu Wong C, Chotivanich K, Sukthana Y, Pukrittayakamee S. Risk factors and clinical features associated with severe dengue infection in adults and children during the 2001 epidemic in Chonburi, Thailand. Tropical Medicine & International Health. 2004 Sep;9(9):1022-9.
9. Kabra SK, Jain Y, Pandey RM, Singhal T, Tripathi P, Broor S, Seth P, Seth V. Dengue haemorrhagic fever in children in the 1996 Delhi epidemic. Transactions of the royal society of tropical medicine and hygiene. 1999 May;93(3):294-8.
10. Aggarwal A, Dutta AK. An epidemic of DHF and DSS in children in Delhi. Indian Pediatr. 1998; 35:727-32.
11. Chua KB, Mustafa B, Wahab AA, Khairul AH, Kumarasamy V, Mariam M, Nurhasmimi H, Rasid AK. A comparative evaluation of dengue diagnostic tests based on single-acute serum samples for laboratory confirmation of acute dengue. The Malaysian journal of pathology. 2008 Jun 1;38(6):990-8.
12. Thomas L, Verlaeten O, Cabié A, Kaidomar S, Moravie V, Martial J, Najioullah F, Plumelle Y, Fonteau C, Dussart P, Césaire R. Influence of the dengue serotype, previous dengue infection, and plasma viral load on clinical presentation and outcome during a dengue-2 and dengue-4 co-epidemic. The American journal of tropical medicine and hygiene. 2008 Jun 1;78(6):990-8.
13. Bisordi I, Rocco IM, Suzuki A, Katz G, Silveira VR, Maeda AY, Souza RP, Bassi MG, Del Tedesco EF, Freitas E, Bessa TA. Evaluation of dengue NS1 antigen detection for diagnosis in public health laboratories, São Paulo State, 2009. Revista do Instituto de Medicina Tropical de São Paulo. 2011 Dec;53(6):315-20.
14. Rashmi Kumar C, Jyotsana Agarwal G, Nagar R, Jain A. Changing clinical manifestations of dengue infection in north India.
15. Mittal H, Faridi MM, Arora SK, Patil R. Clinicothematological profile and platelet trends in children with dengue during 2010 epidemic in north India. The Indian Journal of Pediatrics. 2012 Apr 1;79(4):467-71.
16. Kumar A, Rao CR, Pandit V, Shetty S, Bammigatti C, Samarasinge CM. Clinical manifestations and trend of dengue cases admitted in a tertiary care hospital, Udupi district, Karnataka. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2010 Jul;35(3):386.
17. Khan, Hasan. "Dengue outbreak in Karachi, Pakistan, 2006:” Transactions of the Royal Society of Tropical Medicine and Hygiene. 2007:1114-1119.
18. S.C. Tewari, A. Gajanana. Dengue vector prevalence and virus infection in a rural area in south India. Tropical Medicine & International Health. 2004 Apr13;9(4):499–507.