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Virology

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

Nazish Ayubi[1], Nidhi Prasad[2*], Vidyut Prakash[3], Keshav K. Bimal[4], Rakesh Kumar[5], Shailesh Kumar[6], Anima Xess [7], Amit Mishra[8]

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

Abstract	Original Research Article

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

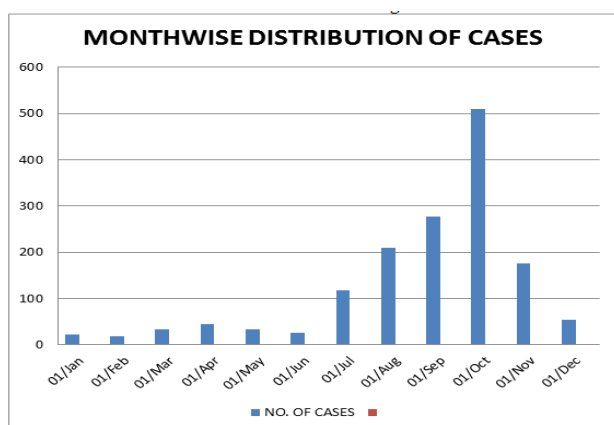| MONTH	NO. OF CASES	PERCENTAGE
NOV-18	176	11.5
DEC-18	53	3.5
JAN-19	21	1.4
FEB-19	18	1
MAR-19	33	2
APR-19	45	3
MAY-19	34	2
JUN-19	26	1.6
JUL-19	118	8
AUG-19	210	14
SEP-19	278	18
OCT-19	510	34
TOTAL	1522	100

Fig-1: Month wise distribution of cases tested for dengue

Of the1522 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

Total samples Tested	NS1/IgM/IgG Positive	Negative
1522	344	1178

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

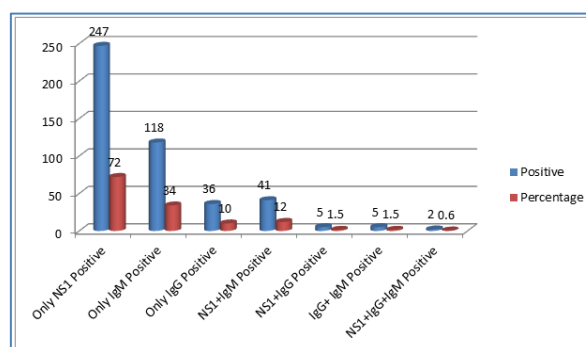| Result	Positive	Percentage
Only NS1 positive	247	72%
Only IgM positive	118	34%
Only IgG positive	36	10%
NS1+IgM positive	41	12%
NS1+IgG positive	5	1.5%
IgG+IgM positive	5	1.5%
NS1+IgG+IgM positive	2	.6%

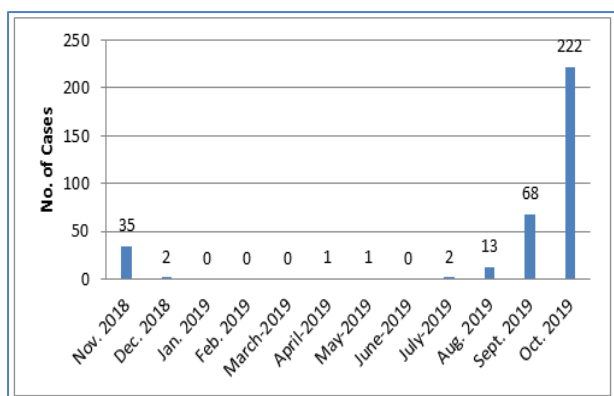**Fig-2: Test Results of Dengue NS1, IgM, IgG results (n=344)**

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

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)

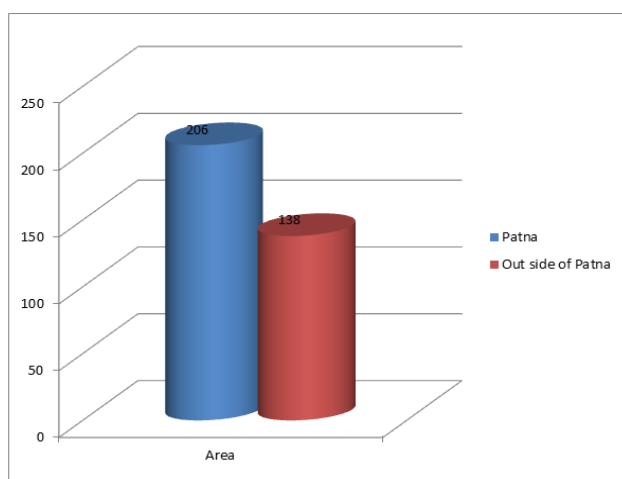| Patna	Outside Patna
206	138

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

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)

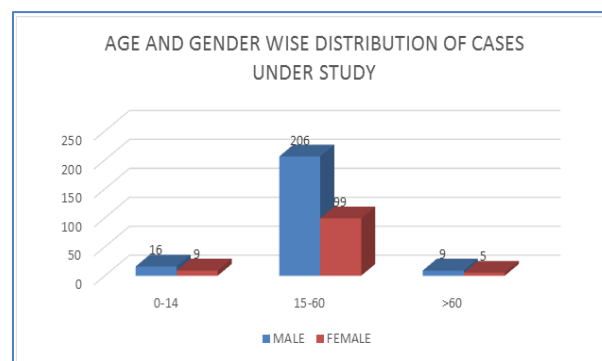| AGE (YEARS)	MALE	FEMALE
O TO 14	16	9
15 TO 60	206	99
>60	9	5
TOTAL	231	113

Fig-5: Age and gender 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.

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