Original Research Article

Clinico-Demographic Profile and Seroprevalence of Dengue at a Tertiary Care Hospital- Study from Maharashtra

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ABSTRACT

Introduction: Dengue is currently regarded globally as the most important mosquito borne viral diseases presenting with varied symptomatology. Epidemiology and clinical presentation of dengue infection differs significantly across geographical areas in India and there is a need to systematically collect data from various regions and study the nature and course of dengue infections.
Aim &Objectives- To determine sero-prevalence, demographic profile and clinical profile of dengue
Methodology: This Prospective study was carried in department of Microbiology. Patients presented with febrile illness of 2 to 7 days along with clinical features of dengue like illness were investigated. Blood samples were collected for detection of NS1Ag, IgM and IgG antibody, using Immunochromatography (ICT) based rapid Dengue test. The platelet count was recorded in dengue parameter-positive Cases.
Results: Out of total 471 blood samples 102 were positive for dengue. Seroprevalence of Dengue was 21.65%. 72.54% of dengue patients were from urban area and 27.45% were from rural area. The most common presenting symptoms of dengue were fever with body ache (44.12%), rash was observed in 8 cases (7.84%).89(87.25%) patients had primary infection. IgG was positive in7cases, suggesting secondary or past infection.
Conclusions: This study showed a significant prevalence of dengue infection among suspected dengue patients. The ease, speed and dependability of ICT make it an excellent tool in diagnosing this potentially fatal, epidemic prone infection.

Key words- Dengue, Seroprevalence, clinic-demographic profile, Maharashtra.

INTRODUCTION

Dengue virus is a flavi virus found largely in areas of tropics and subtropics. Dengue is currently regarded globally as the most important mosquito borne viral diseases presenting with varied symptomatology. [1] There are four distinct antigenically related serotypes of dengue virus-DEN1, DEN2, DEN3 and DEN4. Dengue is transmitted, primarily by Aedes aegypti mosquitoes.

Dengue is an enveloped virus with a single-stranded, positive sense RNA genome, encoding for 3 structural (C, prM and E) and 7 non-structural proteins (NS1, NS2A, NS2B, NS, NS4A, NS4B and NS5). Dengue virus causes a spectrum of illness ranging from in apparent, self-limiting Classical dengue fever (DF) to life threatening Dengue haemorrhagic fever (DHF) and Dengue shock syndrome (DSS).

Dengue has been increasing worldwide over the last few decades and

today ranks as the most important vector-borne disease, with about 2.5 billion people in 200 countries at risk. World Health Organization (WHO) has conferred it as a notifiable disease and since 2005 dengue is considered as a public health emergency of international concern. [2-4]

During the last decade, more frequent and severe epidemics of dengue have hit several Indian cities leading to significant mortality and morbidity. The dengue infection has caused epidemics in India which are cyclical and are becoming more frequent. Also the dengue infection is undergoing geographical expansion into rural areas. [5]

Study published by Doke et al [6] has mentioned that epidemiology and clinical presentation of dengue infection differs significantly across geographical areas in India and there is a need to systematically collect data from various regions and study the nature and course of dengue infections. Laboratory diagnosis methods for confirming of dengue virus infection may involve detection of virus, viral nucleic acid, antigen or antibodies, or combination of these techniques. [7] Dengue is endemic to the Indian sub-continent. Dengue is associated with explosive urban epidemics and has become a major public health problem in India. [8] This study was done at a tertiary care Centre in Western Maharashtra, to study Clinico-demographic profile and Seroprevalence of Dengue

MATERIALS AND METHODS

This Prospective study was carried out at department of Microbiology, of a tertiary care hospital and Medical college, over a period of 2 months (15 June2016 – 15August 2016). The study was approved by the ethical committee of Institute.

Patients presented with febrile illness of 2 to 7 days along with clinical features of dengue like illness i.e. nausea and/or vomiting, rash, myalgia and/or arthralgia were investigated. Detailed clinical history was taken. Blood samples were collected for Complete Blood Count

and for detection ofNS1Ag, IgM and IgG antibody, using Immunochromatography based rapid Dengue test (Dengue Day 1 test- J Mitra and Co. Pvt. Ltd, New Delhi, India) Platelet count is the only non-dengue parameter that can support the diagnosis of the dengue shock syndrome (DSS) and dengue hemorrhagic fever (DHF).The platelet count was recorded in dengue parameter-positive Cases.

Observations and Results -

Table 1-Seroprevalence of Dengue

Total no of patients	Dengue positive patients	%
471	102	21.65

During study period total 471 blood samples were tested for dengue infection. Out Of these 102 samples were positive for dengue. Seroprevalence of Dengue was 21.65%

Table 2: Distribution of patients according to sex

Sex	No of patients	%
Males	63	61.76
Females	39	38.23
Total	102	100

Out of 102 dengue patients 63 (61.76 %) were male patients and 39 (38.23 %) were female patients.

Table 3- Geographical distribution of dengue cases

Area	No of Patients	%
Urban	74	72.54
Rural	28	27.45
Total	102	100

Out of 102 dengue patients, 74(72.54%) patients were from urban area and 28(27.45%) from rural area.

Table 4-Age wise distribution of cases

Age group	No of patients	%
1st day- 10 yrs.	10	9.8
11 - 20 yrs.	22	21.56
21 – 30 yrs.	27	26.47
31 – 40 yrs.	18	17.64
41– 50 yrs.	11	10.78
51 – 60 yrs.	5	4.9
61 – 70 yrs.	3	2.9
71 – 80 yrs.	6	5.88
Total	102	100

In our study dengue infection was observed more in the age group 21 to 30 years followed by 11 to 20 years and 31 to 40 years.

Table 5-Clinical profile of dengue patients (n-102)

Clinical presentation	No of Patients	%
Fever + myalgia	12	11.76
Fever + rash	08	7.84
Fever + headache	39	38.23
Fever+ nausea	36	35.29
Fever + vomiting	27	26.47
Fever + arthralgia	18	17.64
Fever + bodyache	45	44.12
Fever + itching	15	14.7

The most common symptoms of dengue were fever, body ache, headache, nausea and vomiting. Out of 102 dengue cases fever with rash was observed in 8 cases.

Table 6-Serology results of rapid dengue tests

Test results	No. of patients	%
NS1/NS1+IgM/IgM Positive	89	87.25
IgG Positive	O7	6.86
IgG + IgM Positive	06	5.88
Total	102	

Out of 102 dengue cases, NS1/NS1+IgM/IgM were positive for 89(87.25%) patients, suggesting primary infection.
IgM and IgG positive was seen in 6(5.88%) patients, suggesting late primary or early secondary infection.
IgG was positive in7 (6.86%) cases, suggesting secondary or past infection.

Table7- dengue positive patients with thrombocytopenia (dengue positive patients-n-102)

Platelet count/mm^3	No of patients	%
<1,00,000	24	23.52
<50,000	8	7.84
<20,000	4	3.92
<10,000	0	0

Out of all dengue cases thrombocytopenia (<1, 00,000/mm^3) was observed in 36 cases. In 4 patients platelet count was< 20,000/mm^3

DISCUSSION

The incidence of dengue has grown dramatically around the world in recent decades. Before 1970, only 9 countries had experienced severe dengue epidemics. The disease is now endemic in more than 100 countries in the WHO regions of Africa, the Americas, the Eastern Mediterranean, South-East Asia and the Western Pacific. India is among the countries reporting regular outbreaks of Dengue infections. In 2015, Delhi, India, recorded its worst outbreak since 2006 with over 15 000 cases. Disease is prevalent throughout India in most of urban cities/towns. Maximum cases have been reported from Kerala, Tamilnadu, Karnataka, Orissa, Delhi, Maharashtra and Gujarat. This study was done to know the seroprevalence of dengue during 15th June 2016 to 15th August 2016.

Prevalence of Dengue (Table1)

Total 471 blood samples of the patients suspected of having dengue infection were tested in the laboratory by rapid immunochromatography tests for NS1 Ag, IgG and IgM. Out of these 102 samples were positive for dengue. Seroprevalence of Dengue was 21.65%. 11.92% prevalence was reported by P. Jyoti and B Metri (2015).[9] 18.99% prevalence was observed over period of 2008 to2011 by Smita Sood in Rajasthan. [10] Low prevalence 3.55% was reported by Mahesh kumar et al. [8] A study from central; India reported 31.3% prevalence rate. [11]

Sex wise distribution of dengue cases (Table2)

Out of 102 dengue patients 63 (61.76 %) were male patients and39 (38.23 %) were female patients. Similar observation was published by Mahesh kumar et al, in their study out of total positive dengue cases, 62.63% were males and 37.37% females. [8] Many studies have observed higher prevalence of dengue infection among males than females. [2,4,9,10] S. Fayaz Ahammad et al reported 46.6%male &53.4 female dengue patients. [4] Study by Kale A V et al reported 63.33%were males &36.66% were females. [2]

Geographical distribution of dengue cases (Table3)

In our study, out of 102 dengue patients, 74(72.54%) patients were from urban area and 28(27.45%) were from rural area. In study report published by S. Fayaz Ahammad et al. (2016), 109 cases (75%) were from rural area where as 25 cases (25%) were from urban area. [4] As our hospital is located in city area, many of our patients were from urban area. According to their report the rural broaden of dengue infection is comparatively a recent phenomenon which is supposed to be linked with the shortage of water in rural areas, designing of schemes for water supply to the rural areas and development of newer water transport system in the rural places.

Age wise distribution of cases (Table4)

In our study most of the dengue patients were from age group 21 to 30 years (26.47%) followed by 11 to20 years (21.56%) and 31 to 40 years (17.64%). Mahesh Kumar et al in their study observed maximum dengue cases in age group 10to20yrs (31.58%) and 21to 30 yrs. (15.78%). [8] Study report by Kale et al (2014), commonest age group affected was (34%) was between11-15 years. [2] Some Indian studies have reported that dengue infection is more common in children. [12,13]

Clinical profile of dengue patients (Table5)

All dengue positive patients in our study had fever of 2to 7 days. The most common presenting symptoms of dengue were fever with body ache (44.12%), headache (38.23%), nausea (35.29%) and vomiting (26.47%). Out of 102 dengue cases fever with rash was observed in 8 cases (7.84%).

Similar clinical presentation was observed by Mahesh Kumar et al, fever was present in almost all cases (n=380) followed by, headache (n=274), joint pain (n=2432), myalgia (n=144), retro-orbital pain (n=141), backache (n=95), skin rash (n=80). [8]

Serology results of rapid dengue tests (Table6)

Out of 102 dengue cases, NS1/NS1+IgM/IgM were positive for 89(87.25%) patients, suggesting primary infection. IgM and IgG positive was seen in 6 patients, suggesting late primary or early secondary infection. IgG was positive in7cases, suggesting secondary or past infection.

Mahesh kumar et al reported that, Out of the 380 dengue positive cases, 136(35.79%) were NS-1 positive, 117(30.79%) were IgM positive, 38(10%) were IgG positive, 71(18.68%) were IgG/IgM positive, 14(3.68%) were IgG NS-1/IgMNS-1 positive and 4(1.05%) were IgGIgMNS-1 positive. [8]

Though among methods used for diagnosis of dengue the virus isolation, molecular methods are more specific tests, facilities are not available in all institutes. Serological tests are most commonly used in most of the laboratories. Dengue virus specific IgM antibodies tend to appear as early as 3 days after infection and remains in circulation for 30 to 60 days. IgG antibodies arise at about 7 days, they reach a peak at 2-3 weeks and persists for life long. [13]

NS1 detection has been a promising test to diagnose dengue in its early febrile stage. The NS1 protein was found to be highly conserved in all dengue serotypes, circulating in high levels during the first few days of illness. It correlates with the development of Dengue Fever. There is no cross reaction of the dengue NS1 protein with those of other related *flavi viruses.* [14,15]

Number of dengue positive patients with thrombocytopenia (Table 7)

Out of all dengue cases thrombocytopenia (<1, 00,000/mm^3) was observed in 36 cases. In 4 patients platelet count was $< 20,000$/mm$^{3.}$ One of the WHO diagnostic criteria for DHF is Thrombocytopenia: <1 lakh/mm^3. P Jyoti and Basawaraj reported thrombocytopenia in 51.5% patient. [9] Kale A V et al observed thrombocytopenia in 56% patients, platelet count $<40,000$ in33.33% and $<20,000$ in 6.67% cases. [2]

Platelet count less than 1, 00,000/ml was noticed in 220 cases (68.75%), report published by R D Kulkarni et al. [16]

This study was done from 15th June to 15th August 2016, which is the monsoon period and maximum dengue infection cases were detected in July and early August. Virus activity is high during monsoon and post monsoon period which coincides with increased vector breeding.

This study thus emphasizes the need for continuous sero epidemiological surveillance for the timely formulation and implementation of effective dengue control programs.

CONCLUSIONS

Dengue fever is an acute febrile Arbo-viral disease affecting the tropical and subtropical regions of the world. Dengue is endemic to the Indian sub-continent and it is associated with explosive urban epidemics. Dengue is a notifiable disease and has become a major public health problem in India. It is important to study the exact prevalence of dengue.

The accurate early and efficient diagnosis of the disease is important for clinical care, surveillance, pathogenesis studies and vaccine research. As just based on clinical presentation we cannot diagnose Dengue infection, efficient laboratory diagnosis is an important tool to support Epidemiological Surveillance Programs.

There is no specific treatment for dengue/ severe dengue, but early detection and access to proper medical care lowers fatality rates.Dengue is usually a short lasting and self-limiting disease. However, severe infections can be lethal, especially if it is a secondary infection. Public awareness and control of vector are important factors to be taken into consideration in order to control dengue...

The limitation of the present study was that enzyme linked immunosorbent assay (ELISA) for qualitative or quantitative detection could not be used. ELISA has higher sensitivity than ICT-based tests. [17] Titre of IgM and IgG antibody could have helped us to identify primary and secondary infection. Molecular technique study will help us to know the serotype of Dengue virus which is prevalent in our area.

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