HOSPITAL-BASED SEROPREVALENCE AMONG SUSPECTED CASES OF DENGUE IN A TERTIARY CARE HOSPITAL

Deepali Dilip Belurkar[1], Poonam Chanderlal Sharma[2], Poorva Abhishek Sule[3]

[1]Professor and HOD, Department of Microbiology, Rajiv Gandhi Medical College, Thane.
[2]Assistant Manager, Department of Pharmacovigilance, Tata Consultancy Services, Thane.
[3]Lecturer, Department of Microbiology, Rajiv Gandhi Medical College, Thane.

ABSTRACT

BACKGROUND
Dengue has been one of the most important public health issues in tropical and subtropical regions of the world due to the spread of the vector infestation in domestic environments and the potential of dengue virus infection to cause successive epidemics in highly urbanised settings. This retrospective observational study was undertaken to determine the occurrence of dengue in clinically suspected patients in and around Thane so as to be able to formulate strategies to combat this menace.

MATERIALS AND METHODS
Blood samples were collected from 1986 clinically suspected Dengue Fever (DF) or Dengue Haemorrhagic Fever (DHF) cases attending a tertiary care health centre in a metropolitan city from September 2015 to August 2016. Sera were tested for dengue specific IgM and IgG antibodies by immunochromatographic strip.

RESULTS
Out of 1986 patients, 479 were seropositive for dengue antibodies, prevalence being 24.12%. Amongst seropositive cases, 46.35% were IgM positive. Besides these, 31.73% were also positive for both IgM and IgG while 21.92% were only IgG positive.

CONCLUSION
Dengue is becoming an emerging problem in Thane. Hence, diagnosis at an early stage is the effective strategy to control disease progression.

KEYWORDS
Dengue, Dengue Fever (DF), Dengue Haemorrhagic Fever (DHF), IgM, IgG, Prevalence.

BACKGROUND
Dengue has been one of the most important public health issues in tropical and subtropical regions of the world due to the spread of the vector infestation in domestic environments and the potential of dengue virus infection to cause successive epidemics in highly urbanised settings.[1] According to the World Health Organization (WHO), there are about 390 million cases of dengue fever worldwide, and of the total number of cases, 96 million require medical treatment. India also saw a doubling up of cases of dengue from 2014 to 2015 and the worst hit city was Delhi with over 1800 cases of the fever. 2016 was not expected to be any better and this has become a cause of concern for the country.[2] In light of the potential for continued expansion of dengue globally, it is essential to reflect on policy and strategic direction that attempts to reduce the impact of this disease.[3]

Among cities in Maharashtra, the reported number of dengue cases in 2014 in Thane was only second to Greater Mumbai.[4] Experts stated that 77% outbreak of dengue was reported from Thane, Pune and Nashik division in 2015.[5]

In Maharashtra state, the vector borne disease is no longer concentrated in urban areas and is spreading to small towns and villages, the reason being rapid urbanisation of small towns.[4] Hence, we also included patients from adjoining Thane suburban areas like Kalwa, Mumbra, Diva, etc.

Objective
This study was undertaken to determine the occurrence of dengue in clinically suspected patients in and around Thane so as to be able to formulate strategies to combat this menace.

MATERIALS AND METHODS
This retrospective, observational study was conducted in a tertiary care hospital in Thane city of Maharashtra for a period of one year from September 2015 to August 2016. Since this study used secondary data, implied consent of the patient was sought.

Inclusion Criterion
Any patient with acute febrile illness with some of the symptoms like myalgia, arthralgia, headache, retro-orbital pain, bleeding, skin rash, altered sensorium, shock or low platelet count were included in the study. Dengue

haemorrhagic fever (DHF) and Dengue shock syndrome (DSS) were defined as per WHO criteria.[6]

Sample Collection and Processing
Blood samples were collected from 1986 patients attending the tertiary care hospital who were clinically suspected to be suffering from DF or DHF. Sera were separated and tested for dengue specific IgM and IgG antibodies by immunochromatographic strip procured from SD Bioline. The kit has a sensitivity of 94.6% and specificity of 96.5%.[7]

RESULTS
Out of 1986 patients, 479 were seropositive for dengue antibodies, prevalence being 24.12%. But maximum prevalence was seen during the post-monsoon period in months of September to December 2015 i.e. 303 out of 479 cases. So period wise overall cases were statistically highly significant at 0.01% i.e., P<0.001 as seen in Table 1.

Months (2015-16)	Months in each Period	Dengue (%)			Chi Square Test	P-value	Significant at 5% Level
		-ve	+ve	Total			
September 2015 to December 2015	4	598 (66.4%)	303 (33.6%)	901 (100%)	116.192	<0.001	Yes
January 2016 to April 2016	4	370 (93.9%)	24 (6.1%)	394 (100%)			
May 2016 to August 2016	4	539 (78.0%)	152 (22.0%)	691 (100%)			
Total	12	1507 (75.9%)	479 (24.1%)	1986 (100%)			
Table 1. Prevalence of Dengue from September 2015 to August 2016							
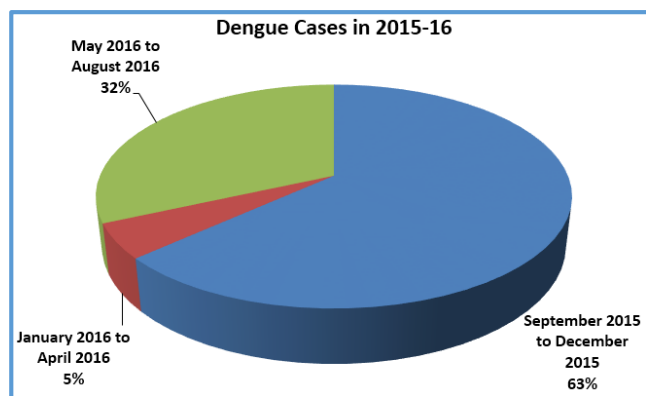
Figure 1. Prevalence of Dengue from September 2015 to August 2016
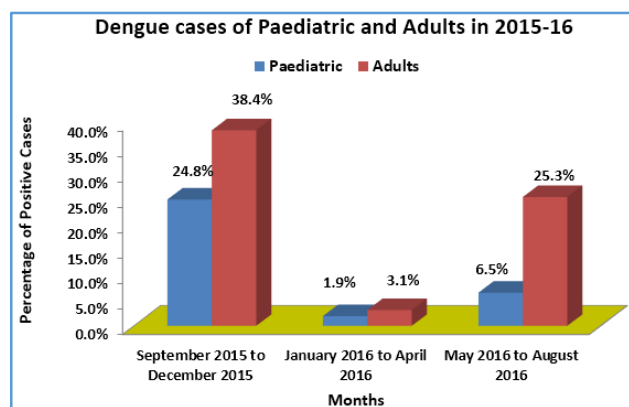
Figure 2. Prevalence of Dengue in Paediatric and Adult Group

Table 2 shows the prevalence cases of dengue in Paediatric as well as Adults group which is statistically highly significant at 0.01% i.e. P<0.001.

Months (2015-16)	Months in each Period	Dengue (%)			Chi Square Test	P-value	Significant at 5% Level
		Paediatric +ve	Adults +ve	Total			
September 2015 to December 2015	4	119 (24.8%)	184 (38.4%)	303 (63.3%)	16.48	<0.001	Yes
January 2016 to April 2016	4	9 (1.9%)	15 (3.1%)	24 (5.0%)			
May 2016 to August 2016	4	31 (6.5%)	121 (25.3%)	152 (31.7%)			
Total	12	159 (33.2%)	320(66.8%)	479 (100%)			
Table 2. Prevalence of Dengue in Paediatric and Adult Group							

Table 3 shows the sex-wise prevalence of Dengue in the adult group is not statistically significant at 5% level i.e., P>0.05. Thus, the distribution of male and female dengue cases in different periods is proportionally similar.

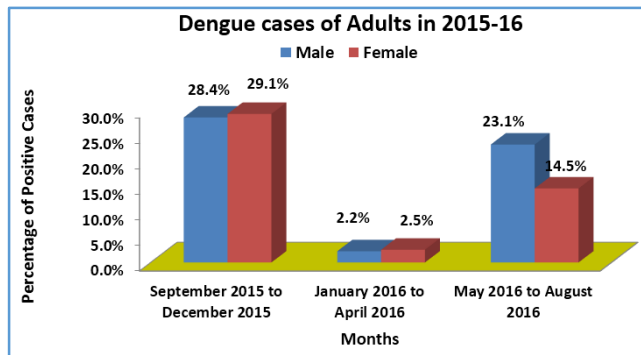| Months (2015-16)	Months	Adults Dengue (%)			Chi Square Test	P-value	Significant at 5% Level
		Male +ve	Female +ve	Total			
September 2015 to December 2015	4	91 (28.4%)	93 (29.1%)	184 (57.5%)	4.338	0.114	No
January 2016 to April 2016	4	7 (2.2%)	8 (2.5%)	15 (4.7%)			
May 2016 to August 2016	4	74 (23.1%)	47 (14.5%)	121(37.8%)			
Total	12	172 (53.8%)	148 (46.3%)	320 (100%)			
Table 3. Sex-wise Prevalence of Dengue in Adult Group							

Figure 3. Sex-wise Prevalence of Dengue in Adult Group

Table 4 shows that amongst the positive cases, 46.35% were IgM positive which indicated recent dengue infection. Out of these, 31.73% were also positive for both IgM and IgG indicating convalescent phase. Besides these, 21.92% were only IgG positive which showed past infection with dengue. Rest of the other patients showed clinical manifestations of dengue with even low platelet counts, but the serology was negative probably due to early investigations for antibody detection.

Month	Total Suspected Cases	IgM only	IgG only	IgM+ IgG	Total Seropositive Cases	Prevalence
Sep. 2015	276	43	25	35	103	37.32%
Oct. 2015	254	35	16	46	97	38.19%
Nov. 2015	251	36	20	28	84	33.47%
Dec. 2015	120	9	8	2	19	15.83%
Jan. 2016	74	2	0	4	6	8.12%
Feb. 2016	105	4	0	3	7	6.67%
Mar. 2016	75	0	3	0	3	4.00%
Apr. 2016	140	2	2	4	8	5.71%
May 2016	163	3	3	13	19	11.66%
Jun. 2016	58	8	2	4	14	24.14%
Jul. 2016	190	20	10	2	32	16.84%
Aug. 2016	280	60	16	11	87	31.07%
Total	1986	222 (46.35%)	105 (21.92%)	152 (31.73%)	479 (100%)	24.12%
Table 4: Monthly Distribution of Seropositive Cases based on Detection of Antibody						

DISCUSSION

Dengue has been classified as a 'neglected tropical disease,' based on the historical lack of coordinated efforts, political will, and research attention despite the significant disease, social, and economic burden it places internationally. Many experts hypothesise that dengue will increase in the future, including geographic expansion, incidence and reporting to WHO.[3]

Since our laboratory was mainly concerned with clinical diagnosis, we used immunochromatographic method which has the advantage of rapidity. In facilitating early diagnosis by using this Dengue Rapid Test, therapy and monitoring can begin much earlier, reducing the risk of severe complications.[8] The other available test in our laboratory was Dengue IgM Microlisa which is only a screening test.[9] Keeping in mind the type of laboratory facilities and technical expertise available, costs, and the time of sample collection,[10] we employed rapid diagnostic test.

In our study, the seroprevalence of dengue is 24.12% which is similar to study conducted by Raut et al.[11] Maximum prevalence was seen during the post-monsoon period in months of September to December 2015 which is concurrent to most of the previous outbreaks in India and maybe because this time period is a very favourable season for high breeding of the vector Aedes aegypti.[12,13] The male to female ratio was 1.16:1 which is similar to the studies by other researchers.[14] But it was not statistically significant in our study. However, few other studies show a slightly higher male preponderance.[11,15] We could not find any paediatric preponderance in our study. Adults were more commonly affected than children. Other Indian studies have reported young adults as the most affected age group.[12,13,16]

The number of samples positive for dengue virus-specific IgM antibodies was 222 (46.35%). Out of this, 31.73% were also positive for IgG. Besides these, 21.92% were only IgG positive. Study by Singhal et al has also reported the similar findings.[17]

Limitations of the Study

Our study is a hospital-based study and hence may not characterise the whole population. Increasing awareness, quality diagnostic resources, accessibility of more sensitive and specific diagnostic tests can affect reporting pattern to some level.

CONCLUSION

The high rate of detection reported here i.e. 24.12% of clinically suspected patients indicates that dengue is becoming an emerging problem in Thane city and surrounding areas. Hence, it is essential to consider policy and strategic direction that will help to decrease the burden of this disease. Diagnosis of dengue at an early stage is the effective strategy to control disease progression. Also, preventive measures against dengue infection should be vigorous during water stagnation periods and at the end of monsoon.

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