A four year retrospective hospital based seroprevalence study of dengue infection in tertiary care hospital, Jaipur, Rajasthan

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Abstract

Introduction: Dengue is one of the serious mosquitoe-borne viral infection affecting tropical and subtropical countries in the world. As Dengue has become endemic in India with outbreaks occurring almost every year, there is a need to assess the magnitude of Dengue virus infection in the state of Rajasthan. A surveillance based retrospective study was conducted for 4 years. The study analyzed Dengue seropositivity among patients with clinical suspicion of Dengue fever like illness at a tertiary care hospital of Jaipur, Rajasthan. **Material and Methods:** Serum samples from 48540 suspected Dengue cases were received in the clinical microbiology section of central laboratory of S.M.S. Hospital, Jaipur over a period of 4 years (2012-2015). The samples were subjected to Rapid Immunochromatographic assay with differential detection of IgM and IgG antibodies. **Results:** Among 48540 patients screened, 6.7% (3265) were Dengue specific IgM antibody positive cases. Maximum numbers of positive cases were observed in 2013 (12.13%). Majority (10.86%) of positive cases were detected in the month of October i.e post monsoon season. The most commonly affected age group was 16 to 35 yrs. Thrombocytopenia was observed in 59.05% of Dengue positive case. **Conclusion:** Diagnosis of Dengue by rapid method like immunochromatography along with platelet counts was found valuable. Our study highlights the need for continuous surveillance for early detection of impending outbreak to initiate timely preventive control
Key words: Dengue fever, Seroprevalence, Jaipur.

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INTRODUCTION

Dengue is an important mosquito-borne viral disease of humans. In recent decades an estimated 2.5 billion people are at a risk of acquiring dengue infection and approximately 975 million of these live in urban areas of the tropical and subtropical countries of Southeast Asia, the pacific and America[1]. Dengue virus belongs to the family "*Flaviviridae*", and genus Flavivirus. It is a mosquito borne (Arthropod) viral infection and is transmitted by Aedes *aegypti* and Aedes *albopictus* mosquitoes[2]. Dengue is an enveloped virus with a single stranded positive sense RNA genome; ten proteins, three of which are structural and seven non structural. Dengue is caused by four distinct serotypes of virus; DEN-1, DEN-2, DEN-3 and DEN-4[3]. Early diagnosis of dengue virus infection is required to control high morbidity and mortality due to complication like dengue shock syndrome (DSS) and dengue hemorrhagic fever (DHF). Dengue virus specific IgM antibodies appear as early as three days of dengue viral fever and can persist for 30-60 days, whereas IgG antibodies appear at about seventh days peak at 2-3 wk and persist for life[4]. This study was done to assess the magnitude of dengue virus problem in Jaipur region and analyzing the seropositivity of dengue virus specific antibodies in patients with suspected dengue fever like illness. This study was conducted for four years and it was hospital based retrospective study.

MATERIAL AND METHODS

A total number of 48540 blood samples were collected from clinically suspected cases of dengue virus infection. The samples were collected from patients visiting various outdoors, Indoors and emergency departments of hospital. The study was done over a period of 4 years from January 2012 to December 2015. The samples were processed in laboratory by using immunochromatographic assay(ICT) based kit procured from(SD BIOLINE DENGUE IgG/IgM rapid test) with a differential detection of IgM and IgG antibodies. All the tests were performed in accordance with manufactures instructions. Interpretations of Dengue rapid test according to kit insert.

Negative result	-	The control line is only visible on the test device. No IgG and IgM antibodies were detected
IgM positive result	-	The control line(C) and IgM line(M) are visible on the test device.
IgG positive result	-	The control line (C)and IgG line (G) are visible on test device.
IgM and IgG positive result	-	The control line(C),IgM (M)and IgG line(G)are visible on the test device.
Invalid result	-	The control line fails to appear.

RESULTS

In this 4 year retrospective study a total 48540 serum samples were analyzed for dengue IgM and IgG antibodies. Dengue specific IgM and Ig G antibody were detected in 3265 (6. 7%) cases.

Table 1: Year- wise distribution of dengue positive cases

Year	Total no. of samples processed	Total no. of Dengue positive cases	Percentage of Dengue specific IgM and Ig G antibody positive cases
2012	6564	231	3.5%
2013	13669	1659	12.13%
2014	9731	600	6.16%
2015	18576	775	4.17%
Total	**48540**	**3265**	**6.7%**

Table 1 shows year- wise distribution of the number of tested samples being 6564 in 2012, 13669 in 2013, 9731 in 2014 and 18576 in the year 2015. A maximum number of 1659 (12.13%) seropositive cases were detected in the year 2013, followed by 775 (6.16%) cases in the year 2015.

Table 2: Sex- wise distribution of dengue positive cases

Year	Total number of dengue positive cases	Total no of dengue positive cases	
		Male	**Female**
2012	231	196	35
2013	1659	1274	385
2014	600	455	145
2015	775	598	177
	3265	2523 (77.27%)	742 (22.72%)

Table 2 shows sex- wise distribution of suspected dengue cases. Out of 3265 dengue serology positive cases 2523 (77.27%) were males and 742 (22.72%) were females. The male to female ratio in this study was 3.4:1.

Table 3: General age wise distribution of dengue positive cases

Age (yrs)	2012	2013	2014	2015	Total	Percentage
1 - 15	19	150	38	80	287	8.79%
16-35	162	1233	410	590	2395	73.35%
36-45	24	142	68	49	283	8.66%
46-65	22	109	75	47	253	7.74%
Above 65	4	25	9	9	47	1.4%

Table 3 Shows the general age wise distribution of dengue cases. Maximum seropositivity for dengue was seen between age group 16-35 years ie. 73.35% (2395) cases.

Table 4: Platelet count (cells /microlitre) and number of positive cases

S. NO.	Range of platelet count (cells /microliter)	No of positive cases	Percentage	Total Percentage
1	0.01 - 0.20	334	10.22%	
2	0.21-0.40	815	24.96%	59.05%
3	0.41-0.60	462	14.15%	
4	0.61-0.80	317	9.70%	
5	Above 1 lakh	1337	40.94%	40.94%

Thrombocytopenia was seen in 59.05% of the patients. The maximum fall in platelets count was observed between range 0.21 -0.40 cells /Micro liter. Figure 1 shows month and year - wise analysis of Dengue positive cases from 2011 to 2015. Maximum numbers of cases were reported from August to November. i.e. post rainy season.
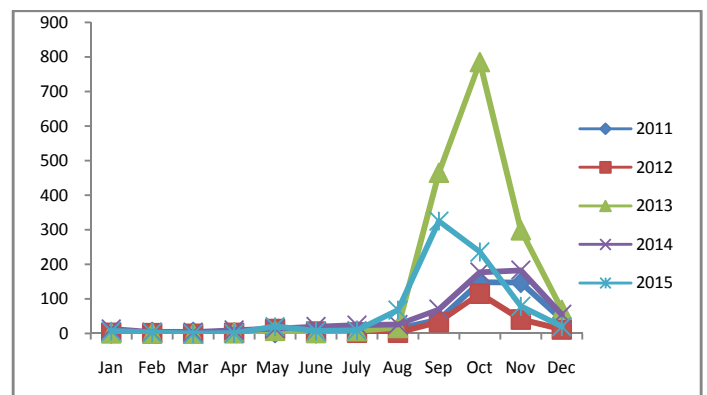
Figure 1: Month and year - wise analysis of Dengue positive cases from 2011 to 2015

DISCUSSION

In this study, 6.7 % patients had serologically confirmed dengue infection. These findings are in accordance with other studies conducted in India by A Garg[5], R Paramasivan[6] and Mahesh Kumer[7]. The higher prevalence of dengue infection was noted in males then in females. The males to females ratio in this study was 3.4:1 showing male predominance as reported by various authors[8-10]. Higher prevalence amongst males is probably due to more outdoor activities by males in comparison to females resulting in increased exposure to day biting mosquitoes. Most affected age group in this study was 16-35 years. Our findings were contrary to those of some Indian studies which had reported the vulnerability of children to dengue infection[6,11,12]. Recent studies from Singapore, Indonesia and Thiailand[13-15] have also shown that in areas where dengue infection is either endemic or epidemic are more frequent, a shift occurs in the predominant age group involved due to changes in locations where disease transmission takes place. In the present study thrombocytopenia was observed in 59.05% of the patients with clinical dengue and the maximum fall in platelets count was 0.21 -0.40 cells / microliter. A month-wise analysis of dengue infection revealed that dengue cases increased in number gradually from July onwards and that they peaked in the month of september/october each year. This seasonality of transmission of dengue with an increased activity during monsoon and post monsoon was observed due to the presence of stagnating water after rainfall favoring breeding of the mosquito vector, resulting in an increase in dengue cases. Hence it is recommended that preventive measures should be implemented during monsoon and post monsoon period.

CONCLUSION

This study showed that as dengue is emerging as a major health problem in Jaipur region, involvement of many laboratories in prompt diagnosis of dengue coupled with general awareness among the public and constant vigilance by healthcare officials, is needed to reduce morbidity and mortality due to dengue infection.

REFERENCES

1. Smita Sood. A Hospital based serosurveillance study of Dengue infection in Jaipur (Rajasthan), India. Journal of Clinical and Diagnostic Research. 2013 Sept, Vol-7(9):1917-1920.
2. Maheshwari Deepak, Dadhich Divya, Sexena Naveena. Seroprevalence of Dengue in Kota, Rajasthan: A study at a tertiary care hospital. J of Evolution of Med and Sci/eISSN-2278-4748 / Vol.4/Issue 05/Jan 15, 2015.
3. Gupta Nivedita, Srivastava Saskshi, Jain Amita and Chaturvedi Umesh C. Dengue in India. Indian J Med Res 136, September 2012, pp 373-390
4. Padhi Sanghamitra, Dash Muktikesh, Panda Pritilata, Parida Banojini, Mohanty I, Sahu S and Narasimham MV. A three year retrospective study on the increasing trend in seroprevalence of Dengue infection from southern Odisha, India. Indian J Med Res 140, November 2014, pp 660-664.
5. Garg A, Garg J, Rao Y K, Upadhyay GC, Sakhuja S. Prevalence of Dengue among clinically suspected febrile episodes at a teaching hospital in North India. J Infect Dis Immunity. 2011; 3: 85-89.
6. Paramasivan R, Thenmozhi V, Hiriyan J, Dhananjeyan KJ, Tyagi BK, Dash AP. Serological andentomological investigations of an outbreak of dengue fever in certain rural areas of Kanyakumari district, Tamil Nadu. Indian J Med Res. 2006; 123:697-701.
7. Kumar Mahesh, Sharma Rohitash, Parihar Geeta, and Sharma Mukesh. Seroprevalence of Dengue in central Rajasthan: A study at a Tertiary Care Hospital. Int. J Cutt. Microbiol. App. Sci (2015) 4 (9): 933-940.
8. Saini S, Kinikar AG, Deorukhkar S, Bhalerao D, Roushani SB. Epidemiology and seropositivity of dengue fever cases in a rural tertiary care hospital of western Maharashtra, India Correspondence Info: 3809 (2013).
9. Neeraja M, Laxmi V, Teja VD, Umbala P, Subblakshmi MV. Serodiagnosis of dengue virus infection in patients presenting to a tertiary care hospital. Ind J Med Microbiol 2006; 24 (4): 280-2.
10. Chakravarti A, Matlani M, Kashyap B, Kumer A. Awareness of changing trends in epidemiology of Dengue fever is essential for epidemiological surveillance. Indian J Med Microbiology 2012; 30 (2): 222-226.
11. Lal M, Aggarwal A, Oberoi A. Dengue fever-An emerging viral fever in Ludhiana, North India. Ind J Pub Health. 2007; 51 (3):198-99
12. Bennett SN, Holmes EC, Chirivella M, Rodriguez DM, Beltran M, et al. Selection- driven evolution of emergent dengue virus. Mol Biol Evol. 2003; 20: 1650-58.
13. Patumanond J, Tawichasri C, Nopparat S. Dengue hemorragic fever, Uttaradit, Thailand. Emerg Infect Dis 2003; 9: 1348-50.
14. Goh KT. Dengue a re-emerging infectious disease in Singapore. Ann Acad Med Singapore. 1997; 26: 664-70.
15. Corwin AL, Larasati RP, Bangs MJ, Wuryadi S, Arjoso S, Sukri N et al. Epidemic dengue transmission in southern Sumatra, Indonesia. Trans R Soc Trop Med Hyg 2001; 95: 257-65.

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