

Sero-surveillance in Delhi, India – An Early Warning Signal for Timely Detection of Dengue Outbreaks

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In India the first major outbreak of dengue fever (DF) accompanied with dengue haemorrhagic fever (DHF) was reported in Kolkata (Calcutta) in 1963^[1]. More than 60 outbreaks have been reported since 1956 to date^[2]. Of these two major outbreaks of DF/DHF occurred in 1996 and 2003 in Delhi and its adjoining states. Surveillance is the most cost-effective approach for prevention and control of dengue. A strong surveillance system will help in detecting early warning signals of an outbreak, instituting timely and appropriate control measures, assessing the impact of intervention measures and early containment of the outbreak. Considering the above facts, the arbovirus laboratory at the National Institute of Communicable Diseases, Delhi, has started sero-surveillance and monitoring of dengue fever in Delhi since 1996 as an ongoing activity. It was intended to develop an early warning signal for timely detection of an impending outbreak and institution of preventive and control measures in high-risk areas.

Sera samples of clinically suspected cases of DF and/or DHF are received from various hospitals of Delhi round the year.

These samples were tested for dengue by haemagglutination inhibition (HI) test^[3] or IgM Capture ELISA Test^[4]. A titre of $\geq 1:1280$ in HI test in acute phase serum is considered a presumptive diagnosis of a current dengue infection^[5]. Samples positive for IgM antibodies against dengue virus indicate recent infection with dengue virus.

The results of the sentinel sero-surveillance from 1996 to 2003 are summarized in the Table. The analysis of data over the period of eight years shows that dengue strikes Delhi every year. The positivity ranges from approximately 13%-33%, except in 1996 and 2003 when dengue fever occurred in epidemic proportions along with DHF. The positivity in these two years was 53.4% and 57.8% respectively.

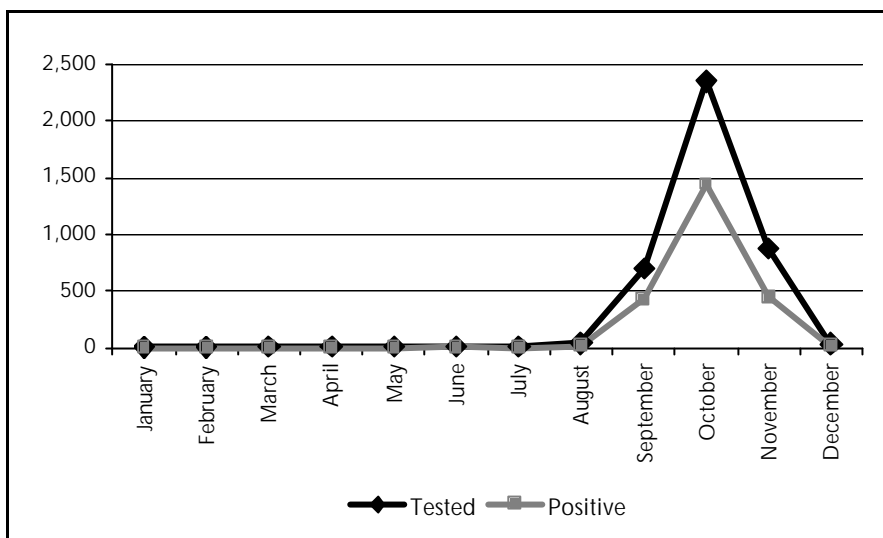
The month-wise distribution of samples tested from 1996-2003 shows that the positivity for dengue starts appearing in the month of August and reaches a peak in October and continues till mid-November and then a decline starts and the last cases are reported upto 2nd week of December. The data for 2003 also shows a similar trend (Figure).

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Table: Dengue serology during the years 1996 – 2003 in Delhi

Year/ Month	1996		1997		1998		1999		2000		2001		2002		2003	
	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve
JAN	1	0	5	0	21	1	5	0	11	0	19	0	18	0	7	0
FEB	4	0	6	0	11	0	11	0	8	0	21	0	19	0	5	0
MAR	3	0	4	0	24	0	12	0	9	0	11	0	19	0	13	0
APR	0	0	39	1	28	0	7	0	8	0	10	0	34	0	8	0
MAY	3	0	33	0	67	0	11	1	26	0	13	0	6	0	10	0
JUN	0	0	8	0	27	0	12	0	9	0	22	0	12	0	11	5
JUL	0	0	15	0	31	1	11	0	18	0	22	1	23	0	11	0
AUG	3	0	20	3	48	0	27	0	32	1	43	6	17	0	43	16
SEP	159	73	169	65	70	5	71	17	56	13	127	44	31	1	701	433
OCT	643	343	369	159	201	38	145	35	188	74	304	129	55	12	2,351	1,438
NOV	104	74	81	26	293	140	130	35	254	112	225	94	60	18	877	450
DEC	11	3	15	1	47	21	40	5	77	13	35	9	34	11	35	14
Total	931	493 (53.4%)	764	255 (33.3%)	868	206 (23.7%)	482	93 (19.2%)	696	213 (30.6%)	852	283 (33.2%)	328	42 (12.8%)	4,072	2,356 (57.8%)

Figure. **Month-wise samples tested/positive for dengue antibodies in Delhi during the year 2003**



The studies for the estimation of the House Index (HI) of mosquitoes also shows that the house index for *Aedes aegypti*, the vector of dengue fever, starts building-up during the rainy season, i.e. from July and reaches a peak in August-September^[6].

A regular monitoring of suspected dengue cases by detection of IgM antibodies

to dengue virus can act as an early warning signal for an impending outbreak. The above observations show that serological surveillance throughout the year, especially during the outbreak-prone period, can play an important role in the detection of early cases.

References

- [1] Ramakrishnan SP, Gelfand HM, Bose PN, Sehgal PN and Mukherjee RN. The epidemic of acute haemorrhagic fever, Calcutta. *Ind J Med Res*, 1964, 52: 633-650.
- [2] Epidemic preparedness – dengue fever, DHF and DSS. CD Alert, Monthly Newsletter, National Institute of Communicable Diseases, Delhi, June 2001, Volume 5 (16).
- [3] Clark DH and Casals J. Techniques for haemagglutination and haemagglutination inhibition with arthropod borne viruses. *Am J Trop Med*, 1958, 7: 561-573
- [4] Lam SK, Devi S and Pang T. Detection of specific IgM dengue infection. *Southeast Asian J Trop Med Public Health*, 1987, 18: 532-538.
- [5] Gubler DJ. Serological diagnosis of dengue/dengue haemorrhagic fever. *Dengue Bulletin*, 1996, 20: 20-23.
- [6] Katyal R, Singh K and Kumar K. Seasonal variation in *Aedes aegypti* population in Delhi, India, *Dengue Bulletin*, 1996, 20: 78-81.