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 ≥ 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

<table>
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<tr>
<th>Year/Month</th>
<th>1996</th>
<th>1997</th>
<th>1998</th>
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<td>764</td>
<td>255</td>
<td>868</td>
<td>482</td>
<td>696</td>
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</table>

- **2003**
  - **Total:** 2,356
  - **+ve:** 12.8%
  - **Tested:** 11
  - **+ve:** 3

- **2002**
  - **Total:** 852
  - **+ve:** 33.2%
  - **Tested:** 42
  - **+ve:** 4

- **2001**
  - **Total:** 283
  - **+ve:** 12%
  - **Tested:** 42
  - **+ve:** 2

- **2000**
  - **Total:** 188
  - **+ve:** 19.2%
  - **Tested:** 35
  - **+ve:** 5

- **1999**
  - **Total:** 35
  - **+ve:** 23.7%
  - **Tested:** 11
  - **+ve:** 1

- **1998**
  - **Total:** 140
  - **+ve:** 33.3%
  - **Tested:** 39
  - **+ve:** 6

- **1997**
  - **Total:** 643
  - **+ve:** 32%
  - **Tested:** 159
  - **+ve:** 5

- **1996**
  - **Total:** 159
  - **+ve:** 19.2%
  - **Tested:** 11
  - **+ve:** 2

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<th>Year</th>
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Note: The +ve percentages are calculated based on the total number of tested samples for each year.
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


