Dengue Outbreak in Ludhiana (Punjab), India, 1996

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Abstract
An outbreak of dengue fever/dengue haemorrhagic fever was reported from Ludhiana city in Punjab state, India, during October 1996. The outbreak started in the last week of September and lasted up to the first week of December. The number of cases reported during the outbreak was 720, with 19 deaths. A community survey revealed a very high attack rate of fever cases (4.10%). Serological tests suggested a recent dengue virus infection as seven serum samples out of nine tested were found to be positive. Aedes survey carried out in some of the affected localities revealed the presence of Aedes aegypti, a vector mosquito. The values of House and Container indices in Ludhiana city during the survey were 32.8% and 29.16% respectively. Breeding of Aedes mosquitoes was detected in various types of containers, mostly desert-coolers. To prevent such outbreaks in the state of Punjab and in the region, there is an urgent need for taking appropriate preventive measures and for disease/vector surveillance.

Introduction
Dengue fever is one of the oldest arthropod-borne viral diseases known in India. Outbreaks of dengue fever/dengue haemorrhagic fever (DF/DHF) have been reported from various parts of the country\(^\text{[1,2,3]}\). Rapid transportation, industrialization, movement of infected human populations/mosquitoes and the changing ecology have facilitated its spread to newer areas\(^\text{[4,5,6]}\). During 1991-1995, a total of 18 DF/DHF outbreaks were reported from different parts of the country, and the trend shows that the disease is occurring with increased frequency\(^\text{[7]}\). A widespread outbreak of DF/DHF occurred in Delhi and its surrounding areas during 1996\(^\text{[8]}\). Similar outbreaks were also reported from the neighbouring state of Haryana\(^\text{[9]}\). In October 1996, a suspected dengue/DHF outbreak was reported from Ludhiana city of Punjab state. Following the outbreak, a team of specialists from the National Institute of Communicable Diseases (NICD), Delhi, investigated the outbreak and the findings of its investigations are presented in this paper.
Area

Ludhiana is a fast growing city of Punjab situated about 300 km away from Delhi in the north-west. It has a sizeable migratory population. It has 66 municipality wards. The city is roughly divided into new and old parts by a big drain/nullah. Old city is a highly congested area. The city has one civil hospital and a number of private hospitals.

Anti-mosquito measures

In Ludhiana, a city corporation is responsible for all the anti-mosquito activities. The district malaria office is also involved in anti-larval measures by using Malariol and Fenthion. Generally, these measures are directed towards the control of *Aedes* quinquefasciatus.

Methodology

The methodology used in this investigation included collection of institutional data regarding line-listing of cases and clinical details. Blood samples were collected from acute and convalescent cases admitted in different hospitals for laboratory confirmation of the aetiology. Rapid fever survey and entomological collections were carried out in the localities from where suspected dengue/DHF cases or deaths had been reported.

Results and discussions

Epidemiological

(a) Hospital records: Cases of dengue/DHF, based on clinical and laboratory criteria like high fever, headache, body-ache, rash, bleeding manifestations and low platelet count, were admitted in two major hospitals, viz. Dayanand Medical College (DMC) Hospital and the Christian Medical College (CMC) Hospital. The first case was admitted in DMC hospital on 24 September. Up to 18 October, a total of 67 cases were treated in the two hospitals. The proportion of cases by age was 0-10 years (22.4%), 11-20 years (32.8%), 21-30 years (16.4%) and > 31 years (26.9%). Both sexes were almost equally affected and cases were mostly among young adults and children, the youngest being seven-and-a-half-years old. The symptomatology of admitted cases included fever (100%), headache, body-ache, petechiae (8%), frank haemorrhagic manifestations (5%), rash (3%) and very low platelet count (100%).

(b) Community survey: Among the 2897 persons surveyed for the occurrence of fever cases, with one week recall period in the community, 119 fever cases were detected (attack rate 4.10%). The age-wise analysis of the cases showed that proportions included in the age group were 0-10 years (21%), 11-20 years (28.6%), 21-30 years (21%) and >31 years (29.4%). Both sexes suffered almost equally. The area-wise attack rate of fever cases from the community showed that Shivaji Nagar area was the worst affected, with an attack rate of 7.9%, Fatehgarh with 1.7%, Khud Mohalla with 1.3% and Indrapuri with 0.6%.

The outbreak started in the last week of September 1996 and lasted up to the first week of December 1996 during which period a total of 720 cases (deaths 19) were reported (Figure 1) (Source: Directorate of Health Services, Punjab). The
maximum number of cases were reported during the third week of November 1996.

**Serological**

Nine serum samples collected from acute and convalescent patients were tested by Haemagglutination Inhibition Test (HI), using antigen and antiserum received from Centers for Disease Control, USA, and dengue IgM immunoblot commercial kit (Gene Labs, Singapore). Seven of these sera were found to be positive for diagnostic dengue antibodies by HI and/or IgM immunoblot test. One sample showed low level of antibodies to dengue.

**Entomological**

The areas surveyed for *Aedes* mosquito breeding places were Civil Lines, Civil Surgeon’s Office complex, Daya Nand Medical College and Hospital area, Durga Puri colony and Shivaji Nagar colony. In these areas, *Aedes* survey was carried out in and around those houses from where suspected dengue fever/DHF cases or deaths had been reported. Houses were searched for *Aedes* mosquito’s larvae in various water collections/containers as per single larva technique and the results are summarized in the table below.

**Table.** *Aedes aegypti* indices in different localities of Ludhiana

<table>
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<th>Sr. No.</th>
<th>Locality</th>
<th>House Index</th>
<th>Container Index</th>
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During the survey a total of 73 houses/premises were searched for Aedes breeding and 24 were found positive (House Index 32.8 %). Similarly, a total of 120 containers were searched and 35 were found positive (Container Index 29.16 %). These indices were found to be higher than the critical index reported for dengue/DHF outbreaks[11].

The bulk of Aedes breeding sites comprised of desert-coolers. Other containers found positive for Aedes breeding were tin/plastic containers, flower vases, earthen pots, plastic buckets, etc. Adults of Aedes aegypti were also collected from inside rooms and water receptacles, particularly inside earthen pots and desert coolers. The entomological investigation revealed a significantly higher House Index and Container Index for Aedes aegypti mosquito, a proven vector of DF/DHF. The presence of this vector mosquito in Punjab state has already been documented[12]. However, higher larval indices of Aedes aegypti were found during the present investigation, thus indicating that the species is well established in Ludhiana city.

Conclusion

The clinical, epidemiological, laboratory and entomological findings of the investigation indicate that the present outbreak in Ludhiana was of DF/DHF. The prevalence of DF/DHF in Ludhiana has been reported for the first time in Punjab state. The last epidemic of dengue outbreak, reported from the northern part of the country, was from Jammu in the year 1974[14]. The current outbreak showed that the disease was now taking root in the plains of Punjab. The occurrence of dengue/DHF outbreak in Ludhiana emphasizes the urgent need for taking appropriate preventive measures and for surveillance of the disease/vector in order to prevent further such outbreaks in other parts of the state and in the region.

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References


