# **Research Article**

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# An epidemiological study of fever outbreak in Aurangabad, Maharashtra, India

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#### **ABSTRACT**

**Background:** Dengue fever is caused by an Arbovirus and spread by *Aedes* mosquitoes. Severity of disease ranges from Dengue haemorrhagic fever to dengue shock syndrome, which making it life threatening disease; hence an important public health concern. All the serotypes; Dengue 1- 4 have been isolated in India. Since 1<sup>st</sup> evidence of dengue fever in 1956 from Vellore district of Tamilnadu, India. Objective of the study was to study epidemiological factors associated with fever outbreak.

**Methodology:** All fever cases admitted at Government Medical College and Hospital Aurangabad during month of July and August from Aurangabad city was included in the study and 8 death cases during fever outbreak were studied in detail. Hospital records of all admitted fever cases were studied. Secondary data from Aurangabad Municipal Corporation and meteorological department were used to study serological and entomological parameters. **Results:** Fever outbreak was Dengue fever. Out of 308 cases studied in GMCH Aurangabad, 56 cases were NS1 positive. Maximum dengue cases (41%) were found in 11 to 20 year age group. Males were proportionally more

positive. Maximum dengue cases (41%) were found in 11 to 20 year age group. Males were proportionally more affected (66%). HUDCO and CIDCO Area were most affected area (37.5%). Total 8 death cases out of 56 diagnosed cases were due to Dengue haemorrhagic fever/Dengue shock syndrome. Rainy season with increased breading of Aedes mosquito is responsible for spread of Dengue.

Conclusion: Inter-sectorial coordination shall be improved, for water management and constructions in the city, to eliminate mosquitoes breeding sites. Aurangabad municipal corporation shall work together to improve public health care at Aurangabad. There is need of strengthening of disease surveillance system by notification of infectious diseases, establishment of peripheral health centers of municipal corporation of Aurangabad and orientation of medical officers in national integrated vector borne disease control programme. Monitoring committee comprising of experts from Medical colleges, Public Health services and administration of municipal corporation of Aurangabad shall be established to monitor control measures for various infectious diseases.

Keywords: Dengue, Fever, Outbreak

### INTRODUCTION

Dengue viruses are the members of the genus Flavivirus of the family Flaviviridae, consists four antigenically distinct Sero types, which do not offer cross protection. Dengue is an important mosquito borne disease in the world in terms of morbidity, mortality and economic cost, especially in the tropics, with more than 2/5<sup>th</sup> of the world

population living in areas at risk for Infection with any one of the four types leads to a mild, self-limiting febrile illness (dengue fever, DF). A more severe form of the disease, dengue haemorrhagic fever (DHF)/ dengue shock syndrome (DSS), is responsible for high mortality rate, especially in children. Dengue has now become a regular occurrence worldwide including America, Africa, Asia and the South Pacific, where the vector of the

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disease is wide spread.<sup>2</sup> The incidence of DF is on the increase and spreading to geographic regions not previously affected. Movement of Dengue between different geographic areas and also from urban to rural is an important element in the epidemiology of the disease. From being a sporadic illness, epidemics of dengue have now become a regular occurrence all over the world. In India Dengue was first isolated in 1946 and many epidemics have since been reported.<sup>4,5</sup>

The clinical features of dengue virus infection range from nonparent infection through dengue fever (DF) and the more severe dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). DHF/DSS, although common in South East Asia, has also been reported in India during Dengue epidemics. DHF was first reported in Calcutta, West Bengal, India in 1963-64 and subsequently in different states of India.<sup>6-8</sup>

Laboratory diagnosis of a recent dengue virus infection may be done by detection of the virus in patient's blood, either by virus isolation insusceptible cell cultures or by detection of the viral RNA by reverse transcriptase-polymerase (RT-PCR) chain reaction based techniques. 9,10

These processes are very specific and should be performed within 48 hours following the onset of illness in a well-equipped laboratory, as the virus disappears after that period. However, detection of IgM antibodies by ELISA method and detection of rise of antibody titres with the convalescent samples by Haemagglutination inhibition test are well accepted serological methods for the diagnosis of dengue infection.

This paper reports the detailed investigation of repeated outbreak of unknown fever in the 2014; in the city and establishes dengue activity in various areas on the basis of laboratory investigations.

### **METHODS**

All fever cases admitted at GMCH Aurangabad during month of July and August from Aurangabad city was included in the study and total of 8 death cases during fever outbreak were studied in detail.

Hospital records of all admitted fever cases were studied. Secondary data from Aurangabad municipal corporation and meteorological department were used to study serological and entomological parameters.

Clinical description of Dengue fever is as follow: it is an acute febrile illness of 2-7 days duration with two or more of the following manifestations: Headache, retroorbital pain, myalgia, arthralgia, rash, haemorrhagic manifestations.<sup>3</sup>

Criteria for Dengue haemorrhagic fever and Dengue Shock Syndrome are

### Dengue haemorrhagic fever

- A probable or confirmed case of dengue
- Haemorrhagic tendencies evidenced by one or more of the following:
- a. Positive tourniquet test.
- b. Petechiae, ecchymoses or purpura.
- c. Bleeding from mucosa, gastrointestinal tract, injection sites or other sites.
- d. Hematemesis or malena.
- Thrombocytopenia (<100,000 cells per cumm),
- Evidence of plasma leakage due to increased vascular permeability, manifested by one or more of the following:
- a. A rise in average haematocrit for age and sex >20%
- b. A more than 20% drop in haematocrit following volume replacement treatment compared to baseline
- c. Signs of plasma leakage (pleural effusion, ascites, hypoproteinemia)

## Dengue shock syndrome

All the above criteria for DHF plus evidence of circulatory failure manifested by rapid and weak pulse and narrow pulse pressure (<20 mm Hg) or hypotension for age, cold and clammy skin and restlessness.

Cases are classified as (a) suspected: a case compatible with the clinical description, (b) Probable: a case compatible with the clinical description with one or more of the following:

- Supportive serology (reciprocal haemagglutination.
- inhibition titre, comparable IgG ELISA titre or positive IgM antibody test in late acute or convalescent-phase serum specimens).
- Occurrence at same location and time as other confirmed cases of dengue fever.
- (c) Confirmed: A case compatible with the clinical description that is laboratory confirmed.<sup>3</sup>

### Laboratory criteria for diagnosis

One or more of the following are used for the identification of the case:

- Isolation of the dengue virus from serum, plasma, leucocytes or autopsy samples.
- Demonstration of a fourfold or greater change in reciprocal IgG or IgM antibody titres to one or more dengue virus antigen in paired serum samples.
- Demonstration of dengue virus antigen in autopsy tissue by immunohistochemistry or immunofluorescence or in serum samples by ELISA.
- Detection of viral genomic sequences in autopsy tissue, serum or CSF samples by polymerase chain reaction (PCR).

More than 5 cases of fever in a given week is considered as outbreak of dengue (IDSP). Rainy season, breading of Aedes mosquitoes and increased vector density are responsible for spread of Dengue. Rainy season and artificial water collection provides more place for mosquito breeding.

House index>10% and Bratue index>50% indicates that threshold for spread of mosquito borne infection is crossed and there is increased risk of outbreak. Humidity in the range of 60-80% make mosquito for vigorous biting.

#### RESULTS

Fever outbreak was Dengue fever. Out of 308 cases studied in GMCH Aurangabad, 56 cases were NS1 positive. Out of 56 NS1 positive cases 20 were IgG/IgM positive. Using NVBDCP (National vector born disease control programme) guidelines 56 cases were diagnosed as probable case of dengue.

Maximum dengue cases (41%) were found in 11 to 20 year age group, followed by 0 to 10 year age group (28.57%) (Figure 1).

Table 1: House index and Bratue index.

Houses surveyed	Houses with larvae	Container examined	Container with larvae	House index	Bratue index
2823	44	6162	55	1.56	1.94

Males were proportionally more affected (66%) (Figure 2). HUDCO and CIDCO Area were most affected area (37.5%) (Figure 3).

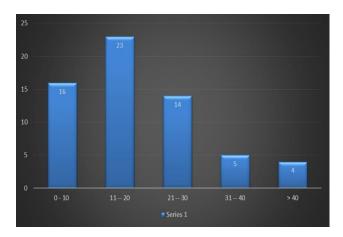


Figure 1: Age wise distribution of dengue cases.

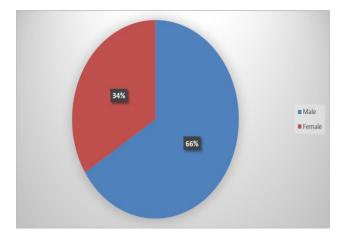
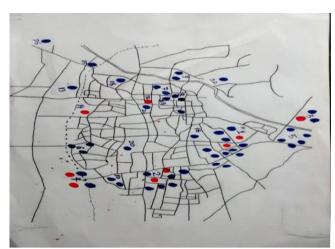


Figure 2: Male versus female distribution of dengue cases.



1-HUDCO Area, 2-CIDCO, 3-Ekta nagar, 4-Mukundwadi, 5-Harsul, 6-Shivaji nagar, 7-Samarth Nagar, 8-Khadkeshwar, 9-GMCH Campus, 10-Jaybhawani Nagar, 11-Shidheshwar Nagar, 12-Samata Nagar, 13-Deep Nagar, 14-Shahanoorwadi, 15-Navjeevan Colony, 16-Kat Kat gate, 17-Swami Vivekananda nagar, 18-Padampura, 19-Mourish chowk, 20-Pundlic nagar, 21-Juna bazar, 22-Begampura, 23-Bhoiwada, 24-Kranti chowk 25-Nakshatrawadi, 26-Pisadevi.

Figure 3: Spot map of dengue cases.

Total 8 death cases (out of 56 diagnosed cases of Dengue) were due to Dengue haemorrhagic fever/Dengue shock syndrome. Rainy season with increased breading of Aedes mosquitoes is responsible for spread of Dengue.

Administrative records reveal that there are manpower deficiency, inadequate logistics and insensitive integrated disease surveillance system. No corrective actions were taken when cases of fever start rising in month of June (after the rainfall).

#### **DISCUSSION**

Dengue is emerging as a major public health problem in India. It was first reported in Calcutta, West Bengal, in 1963-4 and subsequently in different states of India. 6-8,15-22 This epidemiological investigation showed that the outbreak was of dengue fever. The highest numbers of cases were recorded in the age group 11 to 20 yrs. and males (66%) clearly outnumbered the females. Gupta E et al and Chakravarti A reported maximum cases in the age group 21–30 years with male preponderance. 11,12 Sarkar A et al., however, reported maximum cases in the age group 0-10 years with female preponderance (Figure 1, 2). 13

All of the cases were reported during the Rainy seasons, in accordance with the reported patterns of dengue transmission in monsoon and post monsoon season. <sup>14,8</sup> Environmental conditions favoured an explanation of Aedes aegypti and dengue virus transmission. House index and Bratue index in our study are inconclusive, possibly due to simultaneous vector control measures by health services (Table 1).

HUDCO and CIDCO Area were most affected area (37.5%), these areas are developing ones and small water containers such as plastic tea cup, water bottles, chips packets, tyres, coconut shells, etc. were present in these areas, which favoured mosquito breeding. Dilip K Biswas et al<sup>8</sup> also have same finding. (Figure-3)

Administrative records reveal that there are manpower deficiency, inadequate logistics and insensitive integrated disease surveillance system. No corrective actions were taken when cases of fever start rising in month of June (after the rainfall)

## CONCLUSION

Inter-sectorial coordination should be improved, for water management and constructions in the city, to eliminate mosquitoes breeding sites. Aurangabad municipal corporation, Deputy Director of health services. Medical colleges of Aurangabad should work together to improve public health care at Aurangabad. There is need of strengthening of disease surveillance system by notification of infectious establishment of peripheral health centers of municipal corporation of Aurangabad and orientation of medical officers in national integrated vector borne disease control programme. Monitoring committee comprising of experts from Medical colleges, public health services and administration of municipal corporation of Aurangabad shall be established to monitor control measures for various infectious diseases.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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