

ORIGINAL RESEARCH ARTICLE

An Entomological Survey as a Tool for Control of Dengue Vector during an Outbreak Situation

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Abstract:

Introduction: Five dengue cases were reported in mid 2013 from an urban area, which were in excess compared to previous year (2012; 2 cases) during the same period and predicting a dengue outbreak an entomological investigation was carried out to assess the vector indices. **Aims and objectives:** To conduct an entomological survey on dengue vectors and to plan the control measures in an outbreak situation. **Methodology:** The larval survey was conducted in 200 houses; 50-100 on an average per locality, and the larvae of dengue vector were identified to analyze the various indices. Results: The various vector indices were derived; house index of 24% and Breteau index of 44.6% were in excess of actual prescribed norms, which have possibly led to an outbreak. **Conclusion:** Vector indices are important variables, which help in planning, management and control of an outbreak situation, to break the man, host chain and help in prevention of such excursions.

Key Words: Entomological survey, dengue vector, outbreak, vector indices, Global positioning system.

INTRODUCTION

Dengue an arthropod borne arboviral disease, widely distributed in the tropical belt, having an at-risk population of 2.5 billion, forms a huge burden to the public health services [1]. India happens to be a hyper endemic country. (Category A), having all 4 serotypes, remaining as a major public health problem, a leading cause of hospitalization and death among children, and also spreading in to the rural areas [2].

The disease is associated with poor sanitation, erratic water supply and inferior housing conditions [3]. Onset of rains, variation in the humidity and the climatic changes facilitates breeding and prolongs vector

life [4]. This close interplay of man, host and the environment during that time tend to facilitate an outbreak. An entomological survey helps to identify breeding places of dengue vector and also has been identified as one of the important tool for dengue vector control [5].

Five dengue cases were reported in mid 2013 from an urban area, which were in excess compared to previous year (2012; 2 cases) during same period. An entomological survey was planned and conducted in and around the index house of the first reported case in a given locality, as a beginning point of a predicted outbreak situation. Thus, the survey intended to determine the proximate

environmental conditions and identifying the factors facilitating the close contact of man and the vector, so as to interrupt the transmission.

MATERIALS AND METHODS

The survey was conducted in Khasbag a suburb area of Belgaum having a population of 53003 living in 11276 houses [6]. Belgaum is one among the northern districts of Karnataka state, at an altitude of 751 meters above sea level and climate ranging from 22°- 36°, with relative humidity of 82 - 88% during the monsoon season. Its moderate climatic conditions and lush greenery make it an ideal breeding place for the vector aedes. The erratic and irregular water

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supply compels the inmates to store water in containers such as drums, cement tanks, pots, earthen ware etc. within their houses under precarious conditions which facilitates breeding and harboring of aedes mosquitoes putting them at greater risk. The health worker reported three cases of dengue fever as a part of routine surveillance. Predicting an outbreak situation, an entomological survey was planned and conducted by the local health team. An adequate number of households (50-100)^[4] in and around the index house from the three localities i.e. Mahatma Phule Road, Goodshed Road and SPM Road were selected with the help of GPRS mapping system. 200 households were identified and included for survey. [Fig: 1]. Active search for aedes larvae in the locality was carried out by the trained team, which comprised of postgraduates, interns and trained paramedics. [Fig: 2] The survey team collected required data and collected, breeding larvae from the water bodies by using torch and the muslin cloth, which was accepted by the housemates. The specimens were collected in bottles and were brought to the center for larvae identification ^[7] and reports were dispatched on weekly basis to the surveillance officer. The doubtful samples were deemed as positive and corrections were made after identification of an emerging adult mosquito in the laboratory. Data was analyzed and the results were tabulated, vector indices were calculated and final report was prepared..

Fig 1: Map of Khasbag showing the affected areas.



Fig: 2 Flow chart showing the surveillance activities.

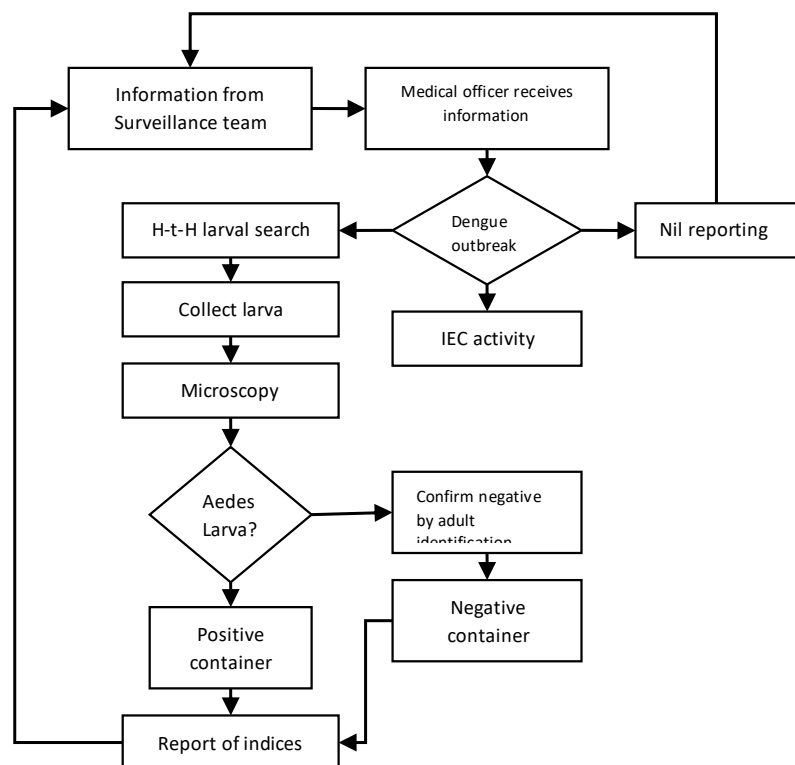


Table 1: Area wise report of an entomological survey

Area	Houses surveyed	Houses positive	Container surveyed	Container positive
Mahatma phule road	82	18	352	38
Good shed road	76	20	225	30
SPM road	42	10	177	20
Total	200	48	754	88

Table 2: Vector Indices derived for Khasbag urban.

Indices/ area	Mahatma Phule road	Good shed road	SPM road	Average
House index (HI) = Total houses positive x 100/houses surveyed.	21.9	23.8	26.3	24.0
Container index (CI) = Total containers positive x 100/ total container searched	10.7	11.3	13.3	11.7
Breteau index (BI) = Positive containers x 100/ total houses surveyed	46.3	47.6	39.5	44.4

RESULTS

A total of 200 houses were surveyed from three different localities and 754 containers in and around the houses were searched for the larvae. Forty-eight houses were positive for the aedes larvae. Out of 754 containers that were, searched 88 were containing the larvae [Table 1]. The various vector indices were derived as follows, resulting in House Index of 24.0% (48/200); Container Index of 11.7% (88/754) and Breteau Index of 44.6% (88/200) [Table 1&2]. The House Index and Breteau index were in excess to the prescribed norms.

DISCUSSION

An entomological survey was carried out with a possibility of an outbreak situation and vector indices were used as tool to control and prevent the spread of disease. The study found higher vector indices (HI 24% and BI 44.4%) against prescribed level of less than 5% and 20% respectively and were near critical values for dengue vector

[8]. The House Index is suggesting that, the given locality is favoring a high risk of transmission of dengue [4]. The Breteau Index of a locality is higher than the prescribed critical level (20%) [8] indicating that the locality is dengue sensitive and is almost close to the high risk transmission levels. These indices suggested a hypothetical plausibility of an outbreak situation indicating the vector control interventions. Similar findings (HI 26.3- 47.1 and BI 26.3-261.9) were observed in other studies carried out across various parts of India [3,9].

Improper water collection inside the house and irrational dumping of unused containers were the main sources found positive in our survey, the commonest being drums and cement open tanks inside the house and the coconut shells, plastic cups and tyres in the surrounding. A study conducted by Balkrishnan found, cement tanks and plastic containers to support aedes, where as Singh in his study in Ranchi and Lal Kuan town found that cement

tanks, drums and tyres were maximally infested with Aedes larvae. Another study conducted in Quezon City found unrecognized containers dish organizer tray and metal drums. Similar observations were made in our study as well which were in concordance with all these studies conducted across urban and rural areas. In different settings, finding larvae in same sources reverberates the fact; man is the main factor for his own peril at the hands of the deadly, stealthy vector [3, 9, 10, 11, 12].

Until the proper water supply and storage facilities are made available and rational solid waste management are taken care, the dengue vectors are going to breed in these potential sources increasing risk of dengue transmission, posing a threat of an outbreak. An entomological survey during pre monsoon period may bring out or reveal a critical situation about dengue vector and the vector indices can be a hint to predict an outbreak situation. Thus an entomological survey

can be used as an important tool in planning and management of an acute outbreak of dengue fever. In the present study predicting the situation and given the criticality of indices, we resorted to immediate fogging in the area (despite low for fogging, Breteau index) followed by IEC activities regarding control of vectors and personal protective measures. These activities helped to halt the dissemination and further exaggeration of the situation and the study found it as an effective measure. Incorporation of GPRS technology was even helpful to plan and properly execute the vector control measures.

Apart from as a tool in planning, vector indices also provide an evidence for breeding of dengue vector to the community which will help in timely execution of vector control measures. The IEC activities

during the need of the hour will make communities more receptive for such interventions. Such activities help at large the community and prevent disease outbreaks by bringing out effective behavioral change among them through man vector chain interruption [10, 11]. Hence the study concludes it as an important interventional approach to control similar situations. This entomological approach has been identified as one of the appropriate vector control intervention for dengue which strengthens the community based environmental management and personal protection measures through health promotional campaign.

CONCLUSION

An entomological survey during pre-monsoon period brought out the critical situation about dengue vector and the

vector indices gave a hint to predict an outbreak situation. The survey also provided an evidence for the breeding of dengue vector to the community, which has brought effective behavioral change towards vector control. Hence, the study concludes it as an appropriate interventional tool to control such outbreak situations and strengthens the community based environmental management. Incorporation of GPRS technology was even helpful to plan and properly execute the vector control measures.

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