Entomological Investigations of DF/DHF Outbreak in Rural Areas of Hissar District, Haryana, India

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Abstract

Entomological investigations were carried out in six out of 18 villages which reported DF/DHF outbreaks and in four randomly-selected non-affected villages of Hissar district in Haryana State during August 1996. The investigations revealed the establishment of the breeding of vector species, *Aedes aegypti,* in artificial containers in domestic and peri-domestic situations due to water storage practices. Earthen pots, cement tanks, plastic containers , and desert coolers were found to be the main sources of *Ae. aegypti* breeding. In the fever-affected villages, the House, Container and Breteau indices ranged from 40.00 to 81.81, 11.50 to 35.10 and 51.10 to 150.00 respectively. However, in the randomly-selected non-affected villages, the House, Container and Breteau indices varied from 0.0 to 44.44, 0.0 to 14.86 and 0.0 to 55.5 respectively, indicating thereby the high receptivity of the area to DF/DHF transmission. The spread of DF/DHF to rural areas is a matter of great concern to public health authorities and needs immediate attention to gear up vector surveillance and timely preventive and intervention measures.

Keywords: *Aedes aegypti;* dengue fever; dengue haemorrhagic fever; Breteau Index; Hissar, India.

Introduction

Dengue/dengue haemorrhagic fever (DF/DHF) is endemic in many countries in South-East Asia and has been declared as one of the most fast spreading vector-borne diseases. During 1995, the estimated number of DHF cases in seven countries of the WHO South-East Asia Region was about 160 000 cases with 4000 deaths[1]. In India, dengue fever was recognized as a classical disease with a high morbidity but no mortality and being mainly restricted to urban areas of the country[2,3,4]. However, during the past few years the frequency of DHF outbreaks has increased[5,6]. Earlier, the disease was mainly restricted to urban and semi-urban areas of the country because of the availability of favourable breeding sites of the mosquito vector species, *Aedes aegypti,* and rural areas were reported to be largely free of the vector species[7] . However, over the years, the vector species has made inroads into rural areas of the country due to the introduction of safe drinking water supply schemes which have resutled in water storage practices. This has led to the establishment and proliferation of *Aedes aegypti* mosquito[8,9]. These developments have resulted in frequent outbreaks of dengue/DHF in rural areas of the country as well [10,11].

During 1996, Delhi, the capital city, experienced one of the most severe outbreaks of dengue/DHF, when 10 252 cases with 423 deaths were reported[6]. Concurrently, during July 1996, outbreaks of DF/DHF with a few deaths were also reported from a few villages of Hissar district in Haryana State. Signs and symptoms of the disease and the isolation of DEN-2 virus from the blood sera samples collected from the inhabitants of the fever-affected villages confirmed the dengue aetiology of the diseases[6]. The present communication deals with the entomological investigations carried out by the National Institute of Communicable Diseases, Delhi, in August 1996 during the period of the outbreak.

Material and methods

Entomological surveillance was carried out in six affected and four randomly-selected non-affected villages wherein a total of 136 houses in affected

villages and 68 houses in non-affected villages were searched for the breeding of *Ae. aegypti* and House, Container and Breteau indices were calculated. In addition, the landing/biting rate of *Ae. aegypti* and the total catch of adult mosquitoes by pyrethrum space spray was also undertaken in one of the worst affected villages.

Results and discussions

(i) Larval surveys

On the basis of the larval surveys carried out in fever-affected and non-fever-affected villages, the House Index, Container Index and Breteau Index in fever-affected villages ranged from 40.00 to 81.8, 11.50 to 35.10, and 51.10 to 150.0 respectively, whereas in non-affected villages, the House Index ranged from 0.00 to 44.44, the Container Index from 0.00 to 14.86 and the Breteau Index from 0.00 to 55.50. (Table 1 A&B). Mixed breeding of *Ae. aegypti* and *Anopheles stephensi, the* vector of malaria, was also detected in some of the earthen pots and desert coolers. Besides the breeding of *Ae. albopictus*, another important vector species was also detected in one of the discarded earthen pots lying in an outdoor situation in Bagla village.

(ii) Adult surveys

The adult *Ae. aegypti* surveys were undertken in village Bagla which reported the maximum number of fever cases. In the village, it was observed that the localities inhabited by poor socioeconomic groups haing mud houses with high dampness, less light and less ventilation revealed a high density of adult *Ae. aegypti* population.

Table 1. A Larval survey results of *Aedes aegypti* in affected and non-affected villages of Hissar during August 1996

A. Affected villages

Name of location and Population	House Index (%)	Container Index (%)	Breteau Index
Ladwa/Ladwa (7616)	55.55	25.80	88.8
Dhobi/Mohabatpur (4000)	63.15	19.71	147.3
Bagla/Bagla (2776)	76.92	22.50	138.4
Landhri/Landhri (5503)	78.94	26.96	126.3

Barwala/Khedar (8347)	40.00	11.50	51.1
Satroad/Satroad (5000)	81.81	35.10	150.0
	61.02	21.28	104.41

B. Non-affected villages

Name of location and Population	House Index (%)	Container Index (%)	Breteau Index
Landhri/Chickenwas (1200)	44.44	11.23	55.5
Barwala/Behbapur (4000)	40.00	14.86	73.3
Diktana*/Diktana (2500)	00.00	0.0	Nil
Talwandi/Talwandi Rana (5000)	36.36	11.32	54.5
	26.47	7.8	39.7

* *An.stephensi* was detected in one of the earthen pots.

The landing rate of *Ae. aegypti* recorded in this village was 8.0 per man/ hour and the total catch undertaken by pyrethrum space spray method led to the collection of *Ae. aegypti*, *Culex quinquefasciatus*, *An. stephensi* and *An.subpictus*.

Some of the areas surveyed included those which had reported high incidence of malaria during 1995. As these areas were covered with focal spray of HCH as per National Anti Malaria Programme norms, an extremely low density of adult *Ae. aegypti* mosquito was recorded, indicating thereby the efffectiveness of HCH spray in controlling the dengue vectors. However, the use of HCH has been banned in the country since April 1997.

Conclusions

The large-scale development activities in rural areas of the country, including Haryana state, though have contributed a great deal to the economic development of rural areas, the changes in cultural practices such as storage of water due to shortage of water supply for various household purposes, use of coolers, etc., have resulted in the spread and establishment of *Ae. aegypti* in rural areas and transmission of DF/DHF.

In Haryana, piped drinking water supply is available in most of the rural areas since 1980. However, as the supply of tap water is very erratic,

irregular and is provided for an extremely short period of 30-40 minutes a day with no fixed timings, the villagers have resorted to storing the tap water in earthen pots, cement tanks, plastic containers, drums, etc., with a capacity of 10 to 2000 litres. The large water containers were found to be the main source of *Ae. aegypti* breeding as these containers were never emptied completely and the water was replenished periodically as and when piped water supply was restored.

In view of the above, the spread of dengue to rural areas should be a matter of great concern to public health authorities, and there is an urgent need to create awareness among the rural population about the penetration of the disease into their areas. They should be imparted necessary education about the threat and their cooperation should be elicited in the early detection and elimination of *Ae. aegypti* breeding by undertaking source reduction, environmental management and personal protection measures.

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