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Strategies for Dengue Control in Malaysia

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Abstract: Dengue is one of the major public health problems in Malaysia. Since there is no vaccine available against the disease, vector control against Aedes mosquitoes is given emphasis in the dengue control programme. The strategies used in the control programme include anti-larval and anti-adult measures, health education and legal enforcement. The objectives are to reduce the incidence rate to less than 6 per 100,000 population and the case fatality rate to 0.4%. Despite intensive efforts in the last few years, these objectives have not been achieved. Many problems have been identified in carrying out these control activities and until these are overcome, dengue will continue to be a major problem in Malaysia.

Key words: Dengue, Vectors, Control Strategies, Problems

INTRODUCTION

Dengue has emerged as one of the major public health problems in Malaysia. The median incidence rate for dengue fever (DF) and dengue haemorrhagic fever (DHF) was 27.47 per 100,000 population in the last 5 years and the case fatality rate ranged from 0.21% to 0.59%. All the states in the country were affected, with the most number of reported cases occurring in the more populated states. DF and DHF occurred mainly in the urban population and the majority of reported cases were among the 5-29 years age group. For DHF, the age-specific morbidity rate was highest in the 20-29 years age group, followed by 10-19 years and 30-39 years age group. While all ethnic groups were involved, the majority of reported DF/DHF cases were among the Chinese followed by Malays and Indians.

The two vector mosquito species responsible for the transmission of dengue in Malaysia are Aedes aegypti and Aedes albopictus. These two species are found in and around human habitations. They breed in artificial and natural containers and receptacles which hold clean and clear water. Containers such as ant traps, earthen jars, flower pots, drums, concrete tanks, coconut shells and discarded tyres are some of the preferential breeding sites (Cheong, 1967; Lee and Cheong, 1987).
Strategies for dengue control

The strategies used in the prevention and control of dengue are contained in the Vector-borne Diseases Control Programme Sixth Malaysia Plan (1991-1995). These strategies are directed both at the larval and adult stages of the Aedes mosquitoes. For larval control, the activities carried out are source reduction measures, use of Abate larvicide, regular house inspection and enforcement of the Destruction of Disease-bearing Insects Act (DDBIA, 1975).

Control measures include fogging activities when a case is notified and conducting case investigations and contact tracing.

Health education activities are carried out routinely as an integrated approach for the prevention and control of dengue.

The objectives of the control programme are:
1. to reduce the breeding of Aedes mosquitoes to a level below 2.5% Aedes House Index and below a Breteau Index of below 10%
2. to promote public support and community participation in the prevention and control of dengue
3. to get the full participation of the local authorities in dengue control activities.

The overall control programme is very ambitious with the following targets in mind under the Sixth Malaysia Plan (1991-1995):
1. to reduce the incidence rate to less than 6 cases per 100,000 population
2. to reduce the case fatality rate to less than 0.4%.

Vector control against the Aedes adult and larval mosquitoes is given emphasis and the following activities are promoted.

(a) Source reduction

The objective of this exercise is the elimination of Aedes mosquito breeding grounds in and around the home environment, state lands, public parks, construction sites, factories, government premises, schools and cemeteries. This is carried out with community involvement together with various other agencies as well as the local health authority.

One of the problems encountered in source reduction is illegal dumping of household refuse by the roadside. This creates favourable breeding sites for the Aedes mosquitoes. To overcome this problem, the local health authority has stepped up scavenging services and provided additional bins at designated areas.

Surveys carried out recently have identified neglected and unusual breeding sites which hamper source reduction efforts. Some of these breeding sites are cocoa pods, septic tanks, abandoned housing projects, roof gutters, refrigerator trays and Chinese cemeteries.

(b) Use of Abate Larvicide

The use of a suitable larvicide such as Abate is given emphasis in the dengue control programme. It is safe, effective and convenient to use, especially in water holding
containers. The householders are encouraged to put Abate sand granules into water storage containers so that Aedes larvae will not breed. Its effectiveness will last for about 3 months. Abate is easily available in many outlets in Malaysia and priced so that it is within the means of all.

_Bacillus thuringiensis_ H-14 was found to be effective in suppressing _Aedes albopictus_ breeding in outdoor artificial containers (Lee and Cheong, 1987) and the use of spraying machines to disperse this agent is under investigation.

**(c) House inspection for Aedes Breeding**

House inspection for Aedes breeding is carried out daily by the health authority. The purpose of house inspection is to impart health education to the people on ways and means to prevent Aedes breeding including the use of Abate larvicide and to look for Aedes breeding in individual household.

Another purpose of the house visit is to ensure that the people carry out source reduction measures. The results of the Aedes larval surveys can be used to assess regularly the Aedes situation and density and to pin-point high risk areas as priority areas for prevention.

House inspection to assess risk of dengue outbreak is based on Aedes surveillance and the larval density is expressed as House Index and Breteau Index. Although these indices were useful indicators in the past (Cheong, 1986), recent studies have indicated that dengue continues to occur despite very low larval populations. A more sensitive surveillance method is sequential sampling using ovitrap (Jakob and Bevier, 1969). Lee (1991) used a similar technique and reported that an ovitrap larval index of 10% was crucial for the initiation of vector control to suppress a possible outbreak. The major setback to the wider use of ovitrap is that it is labour-intensive.

For the past five years, an average of 3.5 million houses were inspected for Aedes breeding. Out of this total, 12,111 (0.34%) houses were positive for _Aedes aegypti_ and 29,768 (0.84%) houses were positive for _Aedes albopictus_.

One of the problems encountered in house inspection is the coverage and frequency of visits to houses not being up to expectation due to shortage of manpower. For effective surveillance and control, each house should be visited at least once a month but this is seldom, if ever, achieved.

**(d) Enforcement of the DDBIA, 1975**

The enforcement of the DDBIA, 1975, against anyone found having Aedes larvae breeding in and around his house is an effective but unpopular strategy. However, it must be emphasized that the basis of enforcing this Act is not entirely to elicit public acceptance of legislation but to highlight the role of the public in supportive activities and the importance of their participation especially in source reduction measures.

Towards this end, the implementation of legislation will be supported by health education and viewed as a constant reminder and driving force behind the Ministry's
objective of seeking spontaneous and full community participation in the prevention of Aedes breeding.

FOGGING ACTIVITIES

Fogging activities are carried out as soon as a suspected case of dengue is notified to the health authority. For a single case of dengue, perifocal fogging 200m around the patient's house using the portable thermal fogging is carried out. For outbreak situation, ULV fogging is used to cover the whole locality.

During dengue outbreak, the first adulticidal treatment is normally followed by a second application 7-10 days later. The two treatment cycle is based on the life-cycle of the Aedes mosquitoes and the incubation period of the virus in the mosquito. The outbreak is declared as over once it has been possible to achieve a 20 day transmission-free period.

The insecticide of choice for fogging is malathion in fuel oil for thermal fogging and 96% malathion technical garde for ULV. Air-borne bioassay tests are conducted regularly and to date, there is no indication of resistance developing to the insecticide by the Aedes mosquitoes.

A number of problems are encountered in fogging activities, including the following:

1. Some houseowners tend to close the doors and windows during fogging which will reduce the effectiveness of the spray droplets reaching the target mosquitoes.
2. The difficulty of achieving total coverage of all houses and in carrying out second fogging within 7-10 days duration after the first round.
3. The use of new synthetic pyrethroid insecticides for fogging which are not effective in controlling outbreaks.
4. Private pest control operators conducting fogging without adequate supervision.

HEALTH EDUCATION ACTIVITIES

Health education is an ongoing activity and is continuously strengthened in order to gain public support and cooperation. These activities include health talks, individual advice, demonstrations, distribution of pamphlets, etc. They are carried out during the Aedes surveys from house to house, during fogging operations and case investigations.

This activity is intensified during the anti-dengue campaign months of January, April, July and October, especially in dengue-prone or sensitive areas. Demonstrations in the use of larvicides and destruction of breeding places are carried out in the premises inspected.

During outbreaks, health education activities are further intensified through the use of mass media (including electronic and print) at various levels. Government agencies, local authorities, and voluntary organizations participate in source reduction activities,
printing of education posters and pamphlets and distribution of health education materials. In addition, special health education teams are formed to ensure quicker and fuller coverage of the affected population.

CONCLUSION

Vector control remains an important strategy for the prevention and control of dengue since no vaccine is available. However, there are many problems in the implementation of the various activities as highlighted in a recent publication by Poovaneswari and Lam (1992). Besides the lack of community participation, delay in fogging and inadequate supervision, there was delay and non-compliance in disease notification by doctors.

Strategies to combat dengue have to be constantly monitored and reviewed as to their effectiveness and appropriateness. Community participation and support has to be continuously emphasized in all preventive and control activities so that dengue no longer remains as one of the major public health problems in Malaysia.

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