ENTOMOLOGICAL ASPECTS OF ENDEMIC DENGUE FEVER IN SARAWAK 1973 — 1980

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SUMMARY

Dengue fever has been claimed to be endemic in Sarawak by Surtees (1970) although the first case was only officially reported in 1973. Up till 1980, a total of 17 cases had been confirmed in the State and the cases were confined to certain localities only. No correlation between incidence of cases and the vector densities were noted.

The vector responsible for the transmission of the disease in the State has not been determined but Aedes albopictus is suspected (Surtees, 1970). Since 1975 the density of both species of Aedes has gradually been brought to a low level and is possibly one of the factors contributing to the low incidence of cases.

The recent dengue case was reported in a non-control area in Sibu where the Aedes vector densities are extremely high. However no further transmission occurred in the surrounding area where the vector density is low.

INTRODUCTION

The first appearance of Dengue Haemorrhagic Fever (DHF) in Peninsular Malaysia occurred in the city of George Town, Penang in 1962 though Dengue Fever (DF) has been endemic since its first description by Skae (1902) and Rudnick *et al* (1965). The disease, since then has reached its epidemic proportion in 1973. *Aedes aegypti* has been considered (Rudnick *et al,* 1965 and Gill, 1978) as the main vector, responsible for the outbreak.

In Sarawak, despite the scarcity of reliable epidemiological data, serological evidence has shown that classical Dengue is endemic and the suspected vector is *Aedes albopictus* (Surtees, 1970). Since 1973, all suspected DF cases were made notifiable and the serological diagnosis of paired sera from patients suspected with viral infections were carried out at the Institute for Medical Research, Kuala Lumpur. However, due to the low incidence of the disease for the past few years, the epidemiology and virology of DF could not at present be fully understood.

The known DF vector in South East Asia i.e. *Aedes aegypti* and *Aedes albopictus* has been present with a high density in most of the major towns of Sarawak (Macdonald and Rajapaksa, 1972; Medical Dept., Unpublished data). In view of the epidemic of DHF in Peninsular Malaysia and sporadic DF cases occurring in Sarawak since 1973, an *Aedes* vector control programme was commenced in 1975.

The following is a brief review of the entomological aspects of endemic DF in Sarawak for the period between 1973 - 1980.

VECTOR DISTRIBUTION AND DENSITY

The *Aedes aegypti* population is associated mostly with shophouses (both commercial and industrial) and the slum areas. But foci do exist in some suburban areas which are similar to that

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commonly found in the South East Asian Countries (Chan *et al.*, 1971).

In the shophouses area, it breeds indoors, whereas in most residential areas of suburban localities, it mainly breeds outdoors.

Aedes albopictus is widely spread in both urban and rural areas in Sarawak. The species is often associated with residential and "Kampong" houses where houses are fairly far apart. It is primarily an outdoor breeder. However a substantial proportion breeds indoors.

The *Aedes* larval density indices was only available in 1975 when an *Aedes* baseline survey was conducted in all the 24 main towns with a total of 6,642 houses surveyed. Table I shows the House and Breteau indices of these 2 species. The mean House Index and Breteau Index for *Aedes aegypti* were 31.8 percent and 80.6 percent respectively. For *Aedes albopictus* the figures were 43 percent and 57.9 percent. *Aedes aegypti* has a higher Breteau Index than *Aedes Albopictus* in e above surveyed areas.

The implementation of integrated *Aedes* vector control programme was subsequently carried out. Attention was focused on the main towns where *Aedes aegypti* has been predominant. Routine monthly house inspection, source reduction, health education and quarterly Abate larvicidal treatment in permanent water containers were simultaneously carried out. As a result of all the intensive control measures, the *Aedes* indices dropped sharply in 1976 (Figure 1).

INCIDENCE OF DENGUE FEVER

Though classical Dengue Fever has been claimed to be endemic in Sarawak in 1970 by Surtees, the first reported case appeared in 1973. Between 1973 and 1980, a total of 17 cases were serologically confirmed. For the period under review, the morbidity rate per 100,000 population ranged from 0 to 0.009 with no mortality notified.

Between 1973 - 1980, Kuching reported a total of 12 cases (70.5 percent); Bandar Sri Aman, 2 cases (11.8 percent) followed by a Bau, Sarikei and Sibu which reported 1 case each (5.9 percent). A total of 9 cases were serologically confirmed in 1973

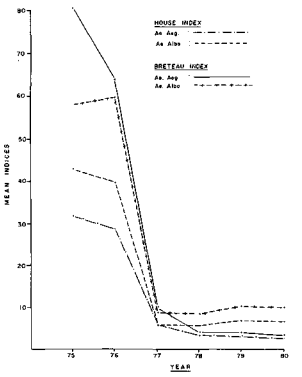

Fig. 1. Entomological Aspects of Endemic Dengue Fever in Sarawak 1973 - 1980.

representing 52.9 percent of the total cases occurring in the State between 1973-1980. There was a low incidence of cases in 1974 (3 cases); 1975 (4 cases) and 1980 (1 case). Specific attack rates were highest in the 15-19 age group followed by 20-24 age group.

The epidemiology of the above cases is by no means comprehensive as no definite seasonal pattern could be observed in the occurrence of the disease. This may be attributed to the scarcity of cases being reported and it is not possible to established a pattern of occurrence. From the cases reported in 1973, 7 occurred in January - February, 1 in April and 1 in June which indicate that all the cases occurred in the first half of the year. However, it is interesting to note that no cases were reported as between 1976 and 1979 when the State *Aedes* control programme was actively deployed; whereas in 1980, a case of Dengue Fever was detected just outside the locality of the Vector Control Programme in Sibu, 3rd Division where the Breteau Indices for *Aedes aegypti* and *Aedes albopictus* are 200 and 533.3 respectively. Despite a three month belated remedial action there have been no other cases.

DISCUSSION

Aedes aegypti is considered a primary vector of DHF in Singapore (Lim, *et al.*, 1961) and *Aedes albopictus* has been shown to be an efficient vector in the experimental transmission of classical Dengue and has been considered as an important

TABLE I
HOUSE INDEX AND BRETEAU INDEX FOR AEDES AEGYPTI AND AEDES ALBOPICTUS (1975 SURVEYED) BY GEOGRAPHICAL SITE

Division	Towns/Localities	No. of House Surveyed	House Index %		Breteau Index	
			Ae.aeg.	Ae.albo.	Ae.aeg.	Ae.albo.
I	Kuching Municipal area	1398	28.0	33.0	50.0	63.0
	Kuching Rural area	1492	31.4	30.3	50.0	73.4
	Bau	190	0.3	32.0	0.7	46.0
	Lundu	278	10.0	14.0	13.0	21.0
	Upper Sadong (Serian)	160	4.0	30.0	9.0	67.0
	Lower Sadong (Simunjan)	195	43.0	13.0	95.0	19.0
II	Bandar Sri Aman (Simanggang)	200	45.0	24.0	124.0	40.0
	Lubok Antu	90	43.0	32.0	53.0	43.0
	Saribas	160	35.0	8.0	53.0	8.0
	Kelaka	115	30.0	19.0	71.0	26.0
III	Sibu Urban area	150	33.0	38.0	54.0	75.0
	Mukah	200	36.0	14.0	54.0	21.0
	Dalat	50	61.7	33.3	18.3	23.3
	Kanowit	100	29.0	12.0	47.0	16.0
IV	Miri	500	7.0	78.0	14.0	200.0
	Bintulu	200	24.0	36.0	48.0	77.0
	Subis	100	61.0	15.0	136.0	39.0
	Marudi	143	12.0	29.0	32.0	60.0
V	Limbang	150	7.0	49.0	15.0	117.0
	Lawas	116	0	57.0	0	130.0
VI	Sarikei	220	28.0	4.0	54.0	6.0
	Binatang	180	99.0	3.0	585.0	7.0
	Matu/Daro	200	91.0	3.0	266.0	3.0
VII	Kapit	55	38.0	70.0	93.0	210.0

vector of endemic Dengue in South East Asia (Smith, 1956). In Penang, it has been confirmed that the distribution of DHF cases coincided with the distribution of *Aedes aegypti* but not *Aedes albopictus* (Rudnick *et al.*, 1965). However, in Sarawak this phenomenon could not be fully ascertained as no virus isolation has been done in the areas affected by Dengue Fever.

In Singapore, the incidence of Dengue cases appeared to follow a seasonal pattern and coincided with fluctuations in the population of both *Aedes aegypti* and *Aedes albopictus* (Chan *et al.*, 1971). In Sarawak, the incidence of cases reported since 1973-1975 seem to coincide with the season as most of the cases were reported in the early part of the year, that is during the wet season. But due to the majority of the cases occurring before 1976 when no vector control programme was implemented in the State, it is difficult to ascertain that the incidence of cases of DF do not coincide with the density of *Aedes* population as no monitoring of the population of both species of

Aedes was done.

From the limited epidemiological data obtained between 1973 to 1975; incidence of dengue cases seems to be limited to only certain localities notably Kuching and Bandar Seri Aman (Simanggang) where more than ⅔ of the cases were found. This may be attributed to the ease of air transport between Singapore, Kuala Lumpur and Kuching and road transport between Kuching and Bandar Seri Aman as well as the presence of the army camps which suggest that the virus might have been imported periodically from the Peninsular and subsequently transmitted to Bandar Seri Aman.

Little is known regarding the role of *Aedes aegypti* and *Aedes albopictus* in the transmission of endemic DF though one might expect that *Aedes albopictus* is the vector of classical Dengue in Sarawak. Epidemiological records show that all DF cases occurred in areas where both *Aedes* species are present. In Kuching where the most number of cases was reported, the *Aedes aegypti* and *Aedes albopictus* house indices were moderately high, 28 percent and 33 percent respectively (Table I). Since 1976, when the vector control programme was first implemented until 1979, no case of Dengue Fever has been reported. The control programme has been able to reduce the density of both species of *Aedes* from the Breteau indices of 80.6 and 57.9 for *Aedes aegypti* and *Aedes albopictus* to 3.4 and 9.9 in 1980 for the entire State (Figure I).

The latest case of confirmed Dengue Fever in the State occurred in a rubber garden, Upper Tong Sun Road, Sibu in June 1980. However no *Aedes* control programme was carried out in the area prior to occurrence of the case. *Aedes* larval survey carried out upon receipt of notification of the case showed that the indices for both species of *Aedes* were very high. However, even though notification of the case was delayed for three months and the appropriate control measures were only carried out then, no subsequent case was reported in the area or its vicinity which includes Sibu Town proper where the patient was studying. One possible suggestion is that in Sibu Town, the presence of low *Aedes* indices (House indices of 5.2 percent and 6.3 percent for *Aedes aegypti* and *Aedes albopictus* respectively) as a result of proper control programmes maintains a threshold that inhibits the transmission of the disease.

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