Evaluation of Community-based *Aedes* control programme by Source Reduction in Perumnas Condong Catur, Yogyakarta, Indonesia

By

Sitti Rahmah Umniyati* and Sri Sumarni, Umayah

Department of Parasitology, Faculty of Medicine, Gadjah Mada University, Yogyakarta, Indonesia.

Abstract

Community-based (Desawisma – group of housewives) control of *Aedes* population through source reduction was evaluated in Rukun Wilayah 17, Perumnas Condong Catur, Yogyakarta special province, Indonesia. Source reduction activities included (i) emptying and brushing of positive containers; (ii) providing lids on earthen pitchers/filled containers; and (iii) removal of discarded articles in the experimental areas. Control areas (Rukun Wilayah 13) received regular temephos application four times a year, general outdoors malathion fogging before the rainy season, and malathion fogging indoors/outdoors within 100 metres of DHF case. Ovitrap indices (OI) indoors for *Aedes aegypti*; *Aedes Albopictus* and mixed population in experimental areas at pretest were estimated as 44.3%, 2.1% and 2.1%, respectively in contrast to control areas with similar indices of 28.9%, 2.2% and 3.3%, respectively, inspite of fogging in the area a week earlier. Definite decrease of OI was observed in experimental areas during six weeks of dry season, whereas it increased from 34.4% to 37.2% in the control areas. However, during the rainy season OI did not show any difference in both the areas. Breteau index decreased from 41.2 to 20.7 in dry season and further reduced to 9.8 at the end of 18 weeks in experimental areas, in contrast to increase from 16.7 at pretest to 27.9 at the end of 18th week in the control area. Study concluded that source reduction reduced significantly OI and BI of *Aedes* species in experimental area.

Key words: Source redution, *Aedes* species, Ovitraps, Yogyakarta.

Introduction

Dengue haemorrhagic fever (DHF) is a major public health problem in Indonesia. The first outbreak was recorded in 1968 with 58 cases and 24 deaths (case-fatality rate of 41.5%)[1]. Since then the disease incidence is not only increasing, but has spread geographically to other parts of the country. During 1976-77 an epidemic was reported in rural areas in Bantul, located 12 km away from Yogyakarta, with 1260 cases and 32 deaths[2]. It was estimated that there were 30,730 cases of DHF with 681 deaths (case-fatality rate of 3.05%) in Indonesia by 1997[3].

* *For correspondence: parasitfkugm@yahoo.com*

History of dengue control has undergone a series of trials starting with larviciding with temephos 1% sand granules @ 1ppm once a year in positive containers before the onset of transmission season supplemented by malathion focus fogging (around DHF case). Since 1992, emphasis shifted to community participation through DHF working groups (DHF/WG) at village level under the supervision of health centre. One of the members of DHF/WG is from Family Welfare Education Women's Movement [PKK – the women movement for family prosperity at village (Desa) level][4]

A study to evaluate the source reduction method through community participation of Dasawisma – a group of 10-15 housewives, was organized in Perumnas Condong Catur, Yogyakarta from 25 June – 4 September 1993. Results of the study are included in this paper.

Study area: For study, two areas with similar endemicity of DHF and *Aedes* breeding potential at least 300 metres apart were selected: Rukun Wilayah 17 Perumnas Condong Catur was designated as experimental area, while Rukun Wilayah 13, Perumnas Condong Catur was taken as control area. Both the areas belong to Sub-district Depok, District Sleman, Yogyakarta Special Province, Indonesia.

Methods and materials

Experimental area: Dasawisma housewives* carried out source reduction activities once a week for 18 weeks. It was started after "larval survey" and raising pre-test data. Housewives carried out three activities, viz. (i) emptying and scrubbing of positive containers, i.e. wash basins, earthen pitchers, animal drinking pans, and flower vases; (ii) covering earthen pitchers and drums with lids, and (iii) eliminating discarded articles. No other control activities were carried out in the experimental areas.

Control area: Routine activities undertaken by health staff included temephos application 4 times a year in selective (+ve) containers, ULV outdoors, general thermal fogging in early rainy season, two times. Malathion fogging indoors and outdoors within 100 metres of a DHF case.

Evaluation

Ovitrap Index: Ovitraps as per WHO manual 1972[5] were placed at pretest, and repeated at 6, 12 and 18 weeks later, both in the experimental and control areas, both indoors and outdoors.

Larval survey: Similarly larval surveys were carried out at pretest, 6 weeks, 12 weeks and 18 weeks' interval to work out Breteau Index (BI).

Analysis of Data: Data from both the experimental as well as control areas was analysed statistically by Mantel-Haensel Chi Square Test.

Results and discussions

Effect of source reduction on the ovitrap index (OI): The data on OI were collected at pre-test, 6 weeks and 12 weeks later only, because there was thermal fogging measure carried out by health worker at 18 weeks later. The effects of source reduction for 12

** Housewives were given information and training about lifecycle of* Aedes *and source reduction techniques. They were also provided with water basin brushes and buckets with lids for removal of discarded articles.*

weeks on the OI indoors are presented in Table 1. It revealed that the OI of *Aedes aegypti*, *Aedes albopictus* and both (mixed) species indoors in the experimental area at pre-test were 44.3%, 2.1% and 2.1 respectively, whereas the OI of *Aedes aegypti*, *Aedes albopictus* and both (mixed) species indoors in the control area were 28.9%, 2.2% and 3.3% respectively, although control areas had been fogged indoors and outdoors with malathion a week before the research study. The total OI (*Aedes spp*) indoors at pre-test between experimental and control areas did not differ significantly ($X^2 = 3.7225$; $P > 0.05$). Table 1 also revealed that the total OI decreased from 48.5% to 23.3% in the experimental area but it increased from 34.4% to 37.2% in the control group. It was concluded that source reduction for 6 weeks in the dry season showed significant decline while there was no decline in the control group (X^2 MH = 7.1181; $P < 0.05$). The total OI indoors in the 12th week between experimental area and control area did not differ significantly in the early rainy season (X^2 = 0.0589; $P > 0.05$). It was concluded that the effect of source reduction on the OI indoors did not differ significantly with control areas in the early rainy season. The effect of source reduction to the OI outdoors is given in Table 2. It revealed that the OI of *Aedes aegypti*, *Aedes albopictus* and both (mixed) species outdoors in the experimental area at pre-test was 32.17%, 17.3% and 4.1% respectively, whereas the OI of *Aedes aegypti*, *Aedes albopictus* and both (mixed) species outdoors in the control group were 28.4%, 4.5% and 2.3% respectively. The total OI outdoors decreased significantly ($X^2 = 8.7931$; $P < 0.05$) from 54.1% to 32.1% in the experimental group, meanwhile it did not decrease significantly in the control areas ($X^2 = 0.5052$; $P > 0.05$). It was concluded that source reduction of *Aedes* for 6 weeks in the dry season were able to bring down significantly the total OI outdoors too, meanwhile there was no decline in the control area (X^2 MH = 6.5323; $P < 0.05$). The total OI outdoors in the 12th week between experimental area and control area did not differ significantly in the early rainy season ($X^2 = 0.1239$; $P > 0.05$). It was concluded that the effect of source reduction of *Aedes* on the OI outdoors did not differ significantly from control areas in the early rainy season.

Table 1. *Effect of source reduction of Aedes sp. to the ovitrap index (OI) of Aedes aegypti (1) and Aedes albopictus (2) indoors in Perumnas, Condong Catur, Yogyakarta, Indonesia*

Area	Weeks	Season	N	1		2		1&2		Total	
				+	OI (%)	+	OI (%)	+	OI (%)	+	OI (%)
Experimental	0*	D	97	43	44.3	2	2.1	2	2.1	47	48.5
	6	D	86	20	23.3	0	0.0	0	0.0	20	23.3
	12	R	85	24	28.2	0	0.0	0	0.0	24	28.2
Control	0	D	90	26	28.9	2	2.2	3	3.3	31	34.4
	6	D	86	28	29.2	4	4.7	0	0.0	32	37.2
	12	R	77	23	29.9	0	0.0	0	0.0	23	29.9

* = Pre-test; N = Number of ovitrap examined; D = Dry season; R = Rainy season

Table 2. *Effect of source reduction of Aedes sp. to the ovitrap index (OI) of Aedes aegypti (1) and Aedes albopictus (2) outdoors in Perumnas, Condong Catur, Yogyakarta, Indonesia*

Area	Weeks	Season	N	1		2		1&2		Total	
				+	OI (%)	+	OI (%)	+	OI (%)	+	OI (%)
Experimental	0	D	98	32	32.7	17	17.3	4	4.1	53	54.1
	6	D	84	20	31.0	0	1.2	0	0.0	27	32.1
	12	R	86	22	25.6	0	0.0	1	1.1	23	26.7
Control	0	D	88	25	28.4	4	4.5	2	2.3	31	35.2
	6	D	86	20	23.3	6	7.0	0	0.0	26	30.2
	12	R	75	22	29.3	0	0.0	0	0.0	22	29.3

Effects of source reduction of *Aedes* for 18 weeks on the BI are given in Table 3. It showed that the BI in experimental area at pre-test and six weeks later in the dry season were 41.2 and 20.7 respectively, whereas the BI in control area were 16.7 and 7.0. Otherwise the BI in experimental area decreased to 1.0 in early rainy season (the 12th week), meanwhile it increased to 21.1 in the control area. According to WHO (1994), BI>20 poses a risk of dengue transmission[6]. It was concluded that the source reduction of *Aedes* for 6 weeks during the dry season was not able to eliminate this risk but was able to reduce it after continuing for 12 weeks. The BI in experimental area decreased significantly in the rainy season, meanwhile it increased significantly in the control area (Fisher exact test = 0.03; P<0.05). It was concluded that the source reduction efforts of *Aedes* for 12-18 weeks were able to reducing the BI, meanwhile there was no decline in the control area, especially in the rainy season.

Table 3. *Effect of Source Reduction of Aedes sp. to the Breteau Index (BI) of Aedes sp. In Perumnas Condong Catur, Yogyakarta*

Weeks	Season	Breteau Index (BI)	
		Experimental	Control
0	D	41.2	16.7
6	D	20.7	7.0
12	R	1.0	21.1
18	R	9.80	27.9

Conclusion

The source reduction of *Aedes* done by community (Dasawisma housewives) for 18 weeks (6 weeks in the dry season and 12 weeks in the rainy season) in Perumnas Condong Catur, Yogyakarta, Indonesia, were able to reduce significantly the OI and BI of *Aedes spp* (*Aedes aegypti* and *Aedes albopictus*).

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