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## Combined low dosage and short term standard dose treatment with diethylcarbamazine to control Timorian filariasis

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### Summary

A combined weekly low dosage and short term standard dose treatment with diethylcarbamazine (DEC) to control Timorian filariasis is described. Weekly low dosage DEC was distributed by the village chief to all villagers for 6 months. The dosage of DEC was 50 mg weekly for group A, and 100 mg for group B. Children below 10 years of age received half the adult dose. Following the initial phase of low dosage treatment, 5 mg DEC/kg was distributed by one of us to all villagers for 6 consecutive days. The results of treatment were evaluated approximately one year later. There was no difference between the results of treatment with 50 mg DEC weekly compared to the 100 mg dosage. The microfilaria, adenolymphangitis and lymphoedema rates decreased drastically in both groups, similar to the results of our previous studies. Side reactions during low dosage and standard dose treatment of DEC were characteristically mild.

**Key words:** filariasis; *Brugia timori*; treatment; control; Indonesia.

### Introduction

Control of filariasis using standard doses of DEC has achieved significant results in many parts of Indonesia. In spite of many successes, filariasis remains a public health problem in many parts of the country. Some major factors that may account for unsatisfactory results include side reactions following DEC treatment, which leads to non-compliance, and ignorance of the affected community in regard to the true nature of filariasis. Low dosage DEC, 25 to 50 mg weekly, distributed by motivated villagers has been shown to effectively control

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Timorian filariasis (Partono et al., 1984). Mass treatment achieved optimal results when given continuously over a period of 1½ years. In an effort to shorten the period of DEC administration, a combined low dosage and short term standard dose treatment with DEC was studied in Mahima, West Flores, Indonesia, an area in which *Brugia timori* is endemic.

### **Population and Methods**

Mahima is located on a steep hill, approximately 300 m above sea level, and about 5 km inland from the North coast of West Flores. There was no standing water bodies inside the village or in the surrounding area. Water for domestic use had to be brought up from the nearby valley. Rice fields were located in these valleys, where *Anopheles barbirostris*, the vector of Timorian filariasis, was expected to breed. The population consisted of approximately 250 farmers. The methods used to determine filarial indices and health education were similar to those previously described (Partono et al., 1981, 1984). Briefly, 3 ml of venous blood samples were obtained from nearly every person above 4 years of age. Blood samples were processed by methods previously described (Partono and Idris, 1977). The density of microfilariae were not counted on pretreatment blood filters, since the process of counting thousands of microfilariae was laborious, and the results were often inaccurate. Clinical histories of recurrent lymphadenitis, lymphangitis, lymphoedema and elephantiasis were obtained from all persons yearly, and each individual was examined for acute and chronic signs of filariasis. Patients with obvious pitting oedema were classified as lymphoedema. Pre-treatment data on the prevalence of filariasis were collected in 1980 and 1981. Each family was numbered sequentially during the census and divided into uneven and even numbered groups (groups A and B, respectively). Treatment was given in two phases, the first phase with low dose and the second with standard doses of DEC. During the initial phase of treatment, DEC was distributed by the village chief after church services to each head of the family. The dosage of DEC was 50 mg weekly for group A and 100 mg weekly for group B, both for a period of 6 months. Children below the age of 10 years received half of the adult dose. Each family head was responsible to treat members of his family. Records of DEC administration and side reactions were recorded by the village chief. During the second phase of treatment, 5 MG DEC/kg was distributed by one of us to all villagers for 6 consecutive days, and side reactions recorded. The post-treatment microfilaria rate was determined at the end of the second phase treatment, and repeated approximately one year later, when other filarial indices were also determined.

## **Results**

### *Census*

In 1980 the village had a population of 239 persons. In 1981 the population was 253, consisting of 22 families with 131 persons in group A, and of 21 families with 122 persons in group B. During the one year period, 10 persons had left the village, 2 had died, 8 babies had been born, and 18 persons had moved into the village. In 1982 the census was 242; 22 persons had left, 3 had died, 5 babies had been born, and 9 had moved into the village.

### *Microfilaraemia*

There were 42 microfilaraemic persons in 1980 (Table 1). Of those, 25 remained positive, 13 reverted to negative, and 4 were not present in 1981. In

Table 1. Combined low dosage and short term standard dose treatment with diethylcarbamazine in Mahima, West Flores, Indonesia

	Pre-treatment		Post-treatment	
	1980	1981	1981	1982
Microfilaria <sup>a</sup> . . . . .	42/211* (20)	34/205 (17)	2/219 0.9)	0/216
Adenolymphangitis . . . . .	62/239 (26)	97/253 (38)	NE**	18/242 (7)
Lymphoedema . . . . .	11/239 (5)	10/253 (4)	NE	3/242 (1)

<sup>a</sup> present in 3 ml of filtered venous blood

\* number positive/number examined (percentage)

\*\* not examined

the same period 9 persons converted to positive, reflecting an incidence of 4.8%. Of the 34 microfilaraemic persons in 1981, 17 belonged to group A, and 17 to group B. From this group, 7 persons in group A and 8 in group B had also histories of recurrent adenolymphangitis. At the end of the second phase treatment, one person remained positive in group A, and one other in group B (Table 2), with 1 and 7 mf per 3 ml of blood, respectively. In 1982 none of the people examined were microfilaraemic, including the 2 persons found positive during the post-treatment evaluation (Table 2).

#### *Adenolymphangitis*

Histories of episodes of adenolymphangitis within the previous year were recorded from 62 persons in 1980 (Table 1). Only 2 persons, however, had observable signs of acute lymphadenitis at the time of survey. Between 1980 to 1981, 49 of the original 62 persons remained affected. 9 did not have any attacks, and 4 were not present in 1981. Within the same period, an additional 44 villagers and 4 newcomers experienced adenolymphangitis, reflecting an incidence rate of 26.0%. Of the 97 persons with histories of adenolymphangitis in 1981, 48 belonged to group A, and 49 to group B (Table 2). Approximately one year after DEC treatment, 9 persons remained affected in group A, and 9 others in group B. Of the 18 persons who remained affected after DEC treatment, 13 had suffered the same symptoms within the 2 previous years, and 4 within one year prior to treatment. One person with adenolymphangitis approximately one month following DEC treatment, did not have the symptoms prior to treatment.

#### *Lymphoedema*

There were 11 persons with oedematous legs in 1980; 10 had unilateral and one bilateral involvement. Most cases were relatively mild, and most demonstrated pitting, indicative of lymphoedema. On resurvey in 1981, 9 remained

Table 2. Distribution of filarial cases in group A and group B

	Pre-treatment 1981		Post-treatment 1981		Post-treatment 1982	
	A	B	A	B	A	B
Microfilaraemia . . . . .	17	17	1/16*	1/14	0/17	0/15
Adenolymphangitis . . . . .	48	49	NE	NE	9/44	9/45
Lymphoedema . . . . .	6	4	NE	NE	1/6	2/4

\* number positive/number previously positive and present at resurvey

affected, and 2 had no swelling. However, there was one new case of lymphoedema in 1981. Six patients belonged to group A, and 4 to group B (Table 2). Approximately one year after DEC treatment, one person remained affected in group A, and 2 in group B (Table 2).

#### *Side reactions*

Very few people had side reactions during low dosage DEC treatment, and the reactions were only reported during the first few weeks of treatment. During the standard course of DEC treatment, fever with or without headache, was the major side reaction. It lasted less than one day in 20 persons, less than two days in 3, and less than three days in 2 persons (Table 3). Eleven (44%) of the 25 persons with fever had microfilaraemia prior to low dosage DEC treatment. There were 11 persons with side reactions in group A, and 14 in group B. Other side reactions were inconspicuous (Table 3).

#### **Discussion**

We have been involved in filariasis control in West Flores since 1977. The main objective is to develop effective control strategies, that are well accepted by the affected communities. Conceptually, the success of filariasis control is primarily dependent upon a balance between the speed of control measures, and the ability of the parasite to become re-established within a given time frame (Partono, 1984). Considering the long life cycle of filarial parasites, their inability to multiply in the vector, and the high efficacy of DEC against the micro- and macrofilaria of lymphatic filariasis, it is conceivable to control lymphatic filariasis using DEC as the mainstay of control strategy without vector control. Different strategies have been developed, using the vertical approach with standard doses (Partono et al., 1981), or the horizontal approach with low dosage schedules (Partono et al., 1984). In both approaches, the focal point of control activities was village based, relying on motivated villagers to distribute

Table 3. Side reactions during a six day standard dose of DEC treatment

	Day 1*	Day 2	Day 3	Day 4	Day 5
Fever .....	25**	5	2	0	0
Headache .....	1	2	1	0	0
Vomiting .....	3	0	1	0	0
Nausea .....	1	1	0	0	0
Urticaria .....	2	4	0	0	0
Lymphadenitis .....	1	1	1	2	0

\* one day after the first dose of DEC

\*\* number of persons with side reactions

DEC. Side reactions during DEC treatment could be effectively dealt with, either through good communication with the treated population (Partono et al., 1979) or by using low and spaced doses of DEC (Partono et al., 1984).

The combined low dosage and short term standard dose treatment with DEC offered an alternative approach to filarial control. The initial phase of treatment aimed to decrease the microfilaria burden of the community gradually, so that severe side reactions could be avoided when standard doses of DEC were subsequently administered. The second phase of treatment aimed to shorten the period of DEC administration. Both the 50 mg and the 100 mg schedule were well tolerated and gave similar results. Microfilaria, adenolymphangitis, and lymphoedema rates decreased substantially, and side reactions were mild and well tolerated. The same approach for filariasis control has been initiated in *Wuchereria bancrofti* and *Brugia malayi* endemic areas, but the results are not yet available. The results of this combined approach highlight the possibility of improving the use of DEC to obtain more effective results. It also offers an alternative approach to filariasis control, which can be adapted to various local needs and circumstances.

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