MASS TREATMENT OF MALAYAN FILARIASIS IN THE GUMBASA IRRIGATION AREA OF CENTRAL SULAWESI

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INTRODUCTION

The Gumbasa (Palu) Valley of Central Sulawesi (Celebes) has been identified as a *Brugia malayi* endemic area since colonial times (Tesch, 1937). An unpublished survey of villages in the valley during 1971 revealed microfilaria prevalence rates ranging from 11 to 31 per cent, and *Anopheles barbirostris* to be the local vector (Brug, 1937; Atmosoedjono, in press).

Because of the economic importance of Palu Valley, which will be the site of an irrigation project (Gumbasa), filariasis control has been initiated by both the local and central governments. The Gumbasa project will bring water to 12,000 hectares and lead to a doubling of the present population of 22,000. A mass treatment trial in the village of Sidondo, using diethylcarbamazine citrate, 5 mg/kg/day for 6 successive days, resulted in the disappearance of microfilaria in 88% of those infected.

This encouraging preliminary result inspired mass treatment of almost all the inhabitants of the valley.

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MATERIALS AND METHODS

The Gumbasa irrigation area is 40 km long and 5 km wide. It lies between the Palu River to the east and an irrigation canal to the west, between 119°50'E and 120°E and 0°55'S and 1°15'S (Fig. 1). Elevations range from 50 to 100 meters. The mean monthly temperature remains consistent throughout the year at 30°C, or thereabouts, and the relative humidity averages 80%. Rainfall is low, about 500 mm a year, with the rainy season between April and September. River banks tend to be low and

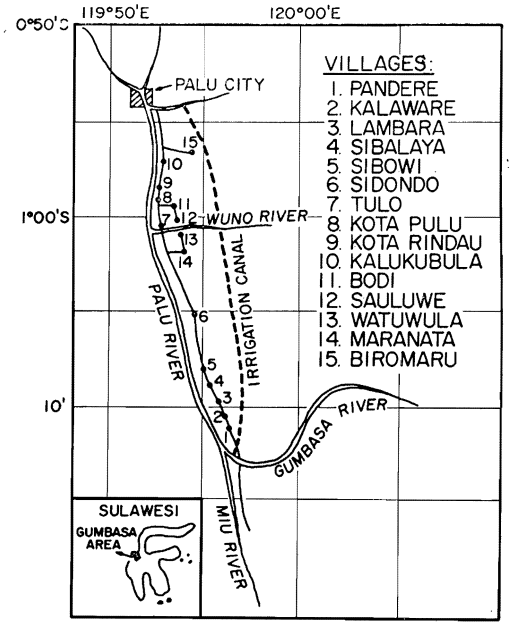

Fig. 1—Map of Gumbasa Valley showing villages surveyed.

swampy; these areas are conducive to mosquito breeding.

Approximately 22,000 inhabitants live in 20 major villages which parallel the river. Racially, they are mostly Moslem Kailiers, the original inhabitants of the valley; but there was much migration from South Sulawesi, North Sulawesi, and even Java. Most are farmers who work in the wet rice fields of the south, and in the dry corn and tobacco fields and coconut plantations in the arid north.

Fifteen large villages were surveyed completely. Inhabitants of six had low microfilaraemia (Mf) rates, and in one, Sidondo, the population had been previously treated; treatment was offered only in the villages of Pandere, Kalaware, Sibalaya, Sibowi, Tulo, Kota Pulu, and Kota Rindau. In Pandere and Kalaware, only carriers were treated (selective treatment), while mass treatment was applied in the other villages. A survey follow-up for filariasis was conducted in Sidondo to evaluate results 18 months after mass treatment.

Methods and organization were based on the initial Sidondo trial (Putrali and Caleb, 1974). A map census and Mf survey were performed in each village. Fifteen per cent of the families were selected at random, and, using a 20 mm micropipet, fingerblood was taken for thick smears between the hours of 2000 and 2300. Smears were dried, stained with Giemsa, and examined microscopically within 2 weeks.

In Pandere and Kalaware, where only carriers were treated, nonquantitative thick smears were obtained from almost all the inhabitants. In all other villages, all were treated except babies, very old people, pregnant mothers and those who were ill.

Filarzan(R) tablets, containing 100 mg diethylcarbamazine citrate each, were given orally at a dose of 5 mg per kg per day, on 6 successive days, with a total dose of 30 mg per kg body weight. Those treated were also given antipyretic and antihistamine tablets, to be taken in case of fever and/or vomiting. Those who were severely ill after taking medication were treated in their homes.

All villages were resurveyed 2 to 3 months after mass treatment.

RESULTS

The results of Mf surveys in 6 villages where inhabitants were not treated are shown in Table 1.

Table 1

Microfilaraemia surveys in 6 villages where inhabitants were not treated.

Village	Population	Examined		Positive	
		No.	%	No.	%
Kalukubula	2,360	475	20	16	3
Bodi	587	82	14	0	0
Sauluwe	554	85	15	6	7
Watuwula	273	58	21	1	2
Maranata	513	86	17	0	0
Biromaru	2,603	1,049	40	11	1

Except for Kalukubula, these villages are away from the highway, and a farther distance from the Palu River.

Results of the surveys in the other villages, before and after treatment, are presented in Table 2. A total of 7,930 inhabitants of the estimated population of 9,130 in all 6 villages were treated, a coverage of 87%. In the pre-treatment survey, 704 of 3,210 (22%) examined had microfilaraemia; only 76 (5%) of 1,506 examined after treatment were found positive.

Fever, with or without vomiting, was the commonest side reaction to the drug. Of

Table 2

Microfilaraemias before and after treatment with diethylcarbamazine.

Village	Pop. treated/ Total Pop. (%)	Examined							
		Positive before treatment				Positive after treatemnt			
		0-4 yr.	5-14	≥15	Total	0-4 yr.	5-14	≥15	Total
Pandere	(Selective treatment)	8/152 (5%)	30/226 (13%)	105/564 (19%)	143/942 (15%)	1/18 (6%)	6/42 (14%)	21/91 (23%)	28/151 (19%)
Kalaware	(Selective treatment)	5/117 (4%)	16/214 (7%)	64/467 (14%)	85/798 (11%)	0/22 (0%)	2/53 (4%)	2/72 (3%)	4/147 (3%)
Lambara	633/744 (85%)	9/9 (100%)	20/43 (47%)	33/75 (44%)	52/127 (41%)	0/18 (0%)	2/31 (6%)	1/56 (2%)	3/105 (3%)
Sibalaya	1567/1740 (90%)	29/188 (15%)	81/287 (28%)	264/688 (38%)	374/1163 (32%)	2/32 (6%)	7/72 (10%)	21/142 (15%)	30/246 (12%)
Sibowi	1475/1719 (86%)	12/170 (7%)	23/229 (10%)	109/585 (19%)	144/984 (15%)	0/35 (0%)	3/69 (4%)	6/111 (5%)	9/215 (4%)
Tulo	1680/1934 (87%)	2/31 (6%)	22/102 (22%)	30/192 (16%)	54/325 (17%)	0/13 (0%)	5/86 (6%)	16/209 (8%)	21/308 (7%)
Kota Pulu	1294/1486 (87%)	2/34 (6%)	8/85 (9%)	25/179 (14%)	35/298 (12%)	0/28 (0%)	1/86 (1%)	5/156 (3%)	6/270 (2%)
Kota Rindau	1281/1507 (85%)	1/29 (3%)	8/78 (10%)	35/206 (17%)	44/313 (14%)	1/31 (3%)	4/118 (3%)	2/213 (1%)	7/362 (2%)

Table 3

Microfilaraemia by age in Sidondo before and after treatment with diethylcarbamazine.

Age (years)	Before treatment			3 months after treatment			18 months after treatment		
	No. exam.	No. pos.	Per cent pos.	No. exam.	No. pos.	Per cent pos.	No. exam.	No. pos.	Per cent pos.
1-6	96	11	11	84	1	1	65	1	2
7-12	88	32	36	62	1	2	40	1	2
13-18	86	28	33	49	5	10	43	2	5
19-24	60	18	30	38	4	11	31	4	13
25-30	48	15	31	52	4	8	34	2	6
31-36	41	13	32	30	2	7	19	1	5
37-42	28	11	39	27	0	0	18	2	11
43-48	24	8	33	11	0	0	8	0	0
49	43	12	28	35	0	0	25	1	4
Total	514	148	29	388	17	4	283	14	5

7,930 treated, 2,772 (35%) experienced fever, while only 93 (1%) had lymphadenitis.

Results of mass treatment in Sidondo are shown in Table 3. Before treatment, the Mf rate was 29%, with a microfilarial density (MfD) per 20 c.mm, of 5.7. Three months after treatment the Mf rate was 4%, with an MfD of 0.2. Eighteen months after treatment, the Mf rate was 5% and the MfD 0.9.

DISCUSSION

This program covered 9 villages with a total population of 13,051, approximately 60% of the population of the entire area.

In 6 of the villages, the Mf rate was 24% before treatment, and 3 months after treatment it was 5%. The WHO Expert Committee on Filariasis (1967) recommended a total dose of approximately 72 mg of diethylcarbamazine citrate per kg body weight for filariasis treatment. Wharton *et al.*, (1958) in Malaysia, and Harinasuta *et al.*, (1970) in Thailand obtained satisfactory results with a weekly dosage scheme of 5 mg per kg body weight once a week for 6 weeks.

A weekly dosage scheme was impractical for our operational program, because teams had to stay either 6-7 weeks in one village or had to visit the village 6-7 times during a course of treatment. We, therefore, used a daily dosage scheme of 5 mg per kg body weight for 6 successive days, as was done in the filariasis mass treatment trial in Sidondo in 1972 (Putrali and Caleb, 1974). No serious side effects were observed, and public acceptance was good.

The most common side effect was fever, with or without vomiting, in 19-51% of those treated. It was alleviated in all cases by antipyretics and antihistaminics. Treatment of carriers in Pandere yielded relatively poor results, because it was done at the beginning of the Moslem fasting period. The post-treatment Mf rate was actually higher than the pre-treatment rate because quantitated micropipets were not used in pre-treatment survey and samples of blood were too small. The high post-treatment Mf rate in Sibalaya may also have been due to execution of the project during Moslem holidays.

Results of filariasis mass treatment in Malaysia, Thailand and Indonesia can be thus summarized:

Place	Time	Microfilarial rate	Microfilarial density
Malaysia (Wharton *et al.*)	Pre-treatment	49%	19.7
	1 month post-treatment	10%	0.26
	1 year post-treatment	14%	0.68
Thailand (Harinasuta *et al.*)	Pre-treatment	21%	4.8
	1 month post-treatment	2%	0.48
	1 year post-treatment	2%	0.12
Central Sulawesi (Present study)	Pre-treatment	29%	5.7
	3 months post-treatment	4%	0.2
	1-1/2 years post-treatment	5%	0.9

SUMMARY

In 6 villages of the Gumbasa irrigation area, Central Sulawesi, Indonesia there was mass treatment of Malayan filariasis with diethylcarbamazine. For 6 successive days, the daily dosage was 5 mg per kg of body weight. Results appeared to be satisfactory; the microfilaria rate dropped from 24% to 5% after 2-3 months. Mass treatment and the daily dosage scheme were practical for public health teams, side effects were not severe, and public acceptance was good.

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