

IMPACT OF A FILARIASIS CONTROL PROGRAM ON INTESTINAL HELMINTHIC INFECTIONS; A PILOT STUDY IN NARATHIWAT PROVINCE, THAILAND

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Abstract. This study was conducted in 9 villages located in endemic areas for brugian filariasis in Narathiwat Province, Thailand. Parasitological and anthropometric examinations were cross-sectionally performed to assess the prevalence of intestinal parasitic infections of 539 villagers. Paired stool samples were collected before and after mass treatment for the filariasis control program in 150 participants in order to study the impact of the filariasis control program on intestinal helminthiasis. The results found that 50.3% of the villagers were infected with one or more types of intestinal parasites. Double and triple infections were found in 10.9% and 1.6% of infected individuals respectively. The prevalence of intestinal parasitic infections peaked in the 1-10 year old age-group, which are pre-school and young school-age children. A significant reduction of intestinal helminthic infections in the post-treatment stool sample was observed in the 150 participants who were examined six months after mass treatment. Integrating an intestinal helminthic control program along side the existing filariasis control program would be an appropriate and cost-effective strategy in the control of intestinal helminths. However, reinfection of parasites was observed.

INTRODUCTION

The high prevalence of intestinal helminthic infection is closely related to poverty, poor environmental hygiene and an impoverished health service (WHO, 1996). Children and pregnant women are particularly vulnerable to helminthiasis, which decreases work capacity (Crompton and Stephenson, 1990) and fitness and, in children, influences the nutritional status, which in turn causes growth retardation (Adam *et al*, 1994) and reduced learning ability (Nokos, 1992). Some of the morbid conditions attributed to intestinal helminthiasis are malnutrition, growth retardation, anemia, vitamin A deficiency and impaired intellectual performance.

This problem and its impact have contributed to the need to design appropriate and cost-effective strategies for treatment and control based

upon a sound knowledge of epidemiological patterns (Anderson, 1986; Tomkin and Watson, 1989). At the beginning of a control program for helminthiasis, baseline surveys are recommended (WHO, 1996). Baseline surveys provide a sound basis for estimating the present status and the need for intervention in a population. It provides essential data for guiding the development of control programs at the national, regional and district levels.

The aim of control measures is to sustain a reduction in the intensity of soil-transmitted helminthic infections. These control measures will take a long time to implement and are costly (WHO, 1987). To optimize resources, any helminthic control program can be integrated with other existing national health programs. The availability of drugs such as diethyl carbamazine (DEC) and albendazole, which have anthelmintic and anti-filarial properties, opens the possibility of integrating an intestinal helminth control program with a filariasis control program. The

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co-administration of DEC and albendazole raises several issues relating to frequency of administration, efficacy and cost effectiveness (Burman *et al*, 1970).

Intestinal helminths are abundant in the southern part of Thailand due to a suitable climate for egg development and the unsanitary conditions of the inhabitants (Muennoo *et al*, 2001). Narathiwat Province is an endemic area of filariasis and is located in southern Thailand. It is surrounded by big open swamp forest, which is a huge breeding place for *Mansonia*. In this area, *Mansonia* spp is the main vector for *Brugia malayi*, a causative agent of brugian lymphatic filariasis. This area is noted for having the nation's highest brugian filariasis rate (Filaria Division, 2001). On the contrary, no update data of the epidemiological status of the intestinal parasites or prevalence of parasites in the area is available. Recently, the Filaria Division, Ministry of Public Health in co-operation with the WHO have established a filariasis control program in Narathiwat Province. The aim of this study was to examine the impact of the filariasis control program on intestinal helminthiasis, to assess the prevalence of intestinal parasitic infections, and to evaluate the possible epidemiological impact of some social-behavioral practices in the endemic areas for filariasis in Narathiwat Province, Thailand.

MATERIALS AND METHODS

Study design

A cross-sectional intestinal parasitic infection survey was carried out in endemic areas of brugian filariasis in Narathiwat Province. Since the studied area is homogeneous regarding climate, humidity, ecology and soil, villages were randomly selected for data and stool collection (Montresor *et al*, 1998).

Study population

To study the prevalence of intestinal parasitic infection, one-time stool samples were collected from 539 villagers from 9 villages located in endemic areas of brugian filariasis in Narathiwat Province, Thailand as follows : 4 Kuba Egor, 5 Ban Todang, 4 Kubasalaw, 3 Ban Mai, 1 Ban Youyo, 5 Cok Chumbok, 7 Pileng, 10 Payae and 2 Daoh.

To study the impact of the filariasis control program on intestinal helminthiasis, two sets of

stool samples were collected from 150 participants who live in 3 villages, 3 Su-ngai Padi, 1 Bang Khuntong, 5 Ban Khuntong. The first set of stool samples was collected in February 2002 before DEC and albendazole mass treatment, which was conducted in June 2002. The second set of stool samples was collected from the same participants in December 2002, six month after mass treatment. Only the participants who gave both pre-treatment and post-treatment stool samples were included in the study.

Oral consent to participate in the present study was given by the willing inhabitants in each village.

Data collection

A questionnaire was designed to obtain information on demographic characteristics (age, sex, level of education, socio-economic and sanitary condition etc). The data was collected using multiple methods, which included personal interviews, in-depth interviews and participant observation.

Sample collection and parasitological diagnosis

Each stool sample was collected and preserved in 10 % aqueous formalin and transported to the laboratory of Department of the Parasitology, Faculty of Medicine at Siriraj Hospital, Mahidol University, Bangkok, Thailand for detection of intestinal parasites by means of simple saline smear and formalin-ether concentration techniques.

Data analysis

The percentage prevalence of intestinal parasitic infection was determined for each age grouping within the studied villages. Data was interpreted by descriptive statistics and expressed as percentages (%) for comparison of infected groups, demographic characteristics, etc.

RESULTS

The demographic characteristics of the inhabitants of 9 villages in the endemic areas for brugian filariasis are summarized in Table 1. The overall prevalence of intestinal parasitic infection and distribution and prevalence of various parasitic infections in different age groups and villages are presented in Table 2. The prevalence rates of intestinal parasitic infection in the studied villages were compared using a bar chart diagram (Fig 1). The results revealed that 50.3%

Table 1
Demographic characteristics (sex, education, household etc) surveyed in 9 villages located in endemic areas of brugian filariasis in Narathiwat Province.

Characteristic	Villeges								
	4 Kuba Egor	5 Ban Todang	4 Kuba-salaw	3 Ban Mai	1 Ban Youyo	5 Cok Chumbok	7 Pileng	10 Payae	2 Daoh
Sex (%)									
Male	56.0	50.0	31.8	63.0	40.0	47.0	100.0	50.0	33.0
Female	44.0	50.0	68.2	37.0	60.0	53.0	0	50.0	67.0
Education (%)									
No	16.0	37.5	41.0	18.5	32.0	3.0	12.5	25.0	0
Primary	64.0	48.0	54.5	66.7	60.0	68.2	87.5	50.0	67.0
Secondary	20.0	14.5	4.5	7.4	8.0	19.7	0	25.0	33.0
University	0	0	0	7.4	0	9.1	0	0	0
Accommodation (%)									
Good	8.0	87.5	0	51.8	0	62.3	0	87.5	0
Fair	92.0	12.5	100	48.2	100	37.7	100.0	12.5	100.0
Poor	0	0	0	0	0	0	0	0	0
Quality of latrine (%)									
Good	0	87.5	19	62.5	0	68.6	37.5	100.0	0
Fair	100	12.5	81	32.2	92.0	31.4	37.5	0	75.0
Poor	0	0	0	5.3	8.0	0	25.0	0	25.0
Defecation outside latrine (%)									
Yes	44	12.5	95.5	29.6	28.0	0	87.5	12.5	0
Water supply (%)									
Rain water	12	0	4.5	29.6	8.0	0	100	25.0	25.0
Pond, canal	88	100	95.5	70.4	68.0	100.0	0	75.0	75.0
Underground	0	0	0	0	24.0	0	0	0	0
Pet (%)									
Have	84	100	69.2	92.6	68.0	100.0	75.0	100.0	100.0
Wearing shoes out-doors (%)									
Every time	80	75	19.0	55.5	24.0	95.5	37.5	49.5	67.0
Some times	20	25	81.0	44.5	76	4.5	62.5	50.5	33.0
Never	0	0	0	0	0	0	0	0	0

of the villagers were infected with one or more types of intestinal parasites. Double and triple infections were found in 10.9% and 1.6% of infected individuals respectively. The highest prevalence of intestinal parasitic infections was found in the 1-10 year-old group, which are pre-school and school-age children, followed by those in the 11-20 year-old age range group, then slowly declining in the older age groups. Table 2 shows the age distribution and results of the stool examinations of the participants before and after DEC and albendazole mass treatment.

DISCUSSION

Control of the soil-transmitted helminthic

infections requires the deployment of resources, including money, man power and support by government-related agencies. The problem of lack of these resources is compounded by the fact that these infections are still regarded as a low priority where public health is concerned, despite their high prevalence worldwide and the growing data on their morbid effects in growing children (Holland *et al*, 1996). In developing countries, the most important issue is finding a cost-effective manner, either through selective or mass chemotherapy of controlling intestinal parasites. In the filariasis control program, a single dose of albendazole and DEC was given to villagers in endemic areas. A single oral dose treatment annually with albendazole (500 mg) or albendazole

Table 2

Results of stool examinations of 150 participants who live in an endemic area of brugian filariasis in Narathiwat Province before and after receiving DEC and albendazole mass treatment.

Participant age group (years)	Sex		Total	No. infection	
	Male	Female		Before (%)	After (%)
1-10	26	18	44	27 (61.4)	5 (11.4)
11-20	9	7	16	8 (50.0)	2 (12.5)
21-50	21	36	57	23 (40.4)	12 (21.0)
>50	13	20	33	9 (27.3)	4 (10.8)
Total	68	81	150	67 (44.7)	33 (22.0)

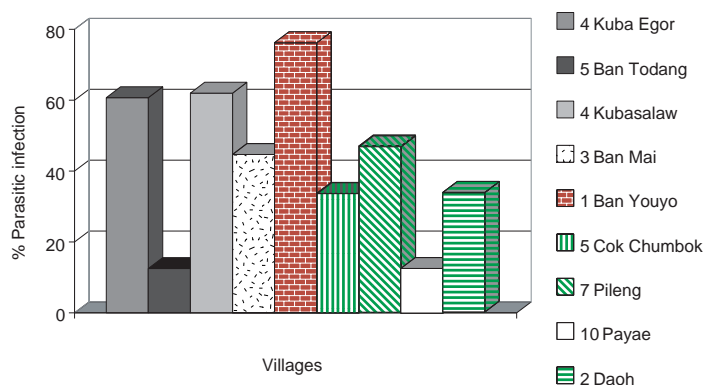


Fig 2—Intestinal parasitic infection rate (%) in 539 inhabitants live in 9 villages located in an endemic area of brugian filariasis in Narathiwat Province, Thailand.

(400 mg) is claimed to be very effective, safe and inexpensive. Although some infections are not completely cured by single dose treatment, the direct benefit of chemotherapy is that the worm burden is removed, which immediately alleviates morbidity and may reduce the rate of transmission. In Kenya, the treatment of hookworm in undernourished school boys showed improved physical fitness only seven weeks after treatment, despite continual exposure to re-infection and some incomplete cures (Savioli *et al*, 1992). The potential impact on multiple diseases control is also illustrated by the experience in Zanzibar in the control of schistosomiasis. The control of morbidity due to intestinal helminths has been added to this program as a natural process of progressively integrating the control of other communicable diseases (Revolutionary Government of Zanzibar, 1991).

Factors examined in this study included stool

examination traditional beliefs, behavioral risk factors and socio-economic status. Various socio-cultural and behavioral factors have impact on the prevalence of parasitic infection. In the villages that had a low prevalence of helminthiasis, most inhabitants had a good socio-economic status, sanitary living conditions and a more hygienic life-style. Results also indicate that poor knowledge and indigenous beliefs contribute to high-risk behaviors and inappropriate preventive behavior, as well a absenteeism of some villagers from drug treatment. The proportion of untreated villagers is likely to influence the impact of the control program, since the remaining members of the infected population not receiving treatment serve as a potential reservoir in the cyclical transmission of not only the intestinal helminths but also of the filaria parasite.

This study revealed that mass treatment with DEC and albendazole is helpful for the treatment and prevention of helminthiasis. The observed reductions in the percentage of parasitic infections after mass treatment in the filariasis control program are encouraging and are worthy of further attention. Coupling the provision of anthelmintic treatment with more effective skill-based health education which encourages a change in attitude and practices of personal hygiene within the village environment has been suggested as the most promising intervention and may reach the non-enrolled villagers (Holland *et al*, 1996). The study conducted by Paul and Gnanamani (1995) of helminthic infections revealed that by the end of the ninth month, the post-treatment prevalence

of helminthic infections had exceeded the pre-intervention level, but the intensity of infection was significantly lower. Thus, a half-year round repeated mass treatment of the population is recommended for a more effective control program due to re-infection with the parasites.

It has been shown from many locations worldwide, that children aged 5-15 years harbor many of the most intense infections of *Ascaris* and *Trichuris* (Anderson, 1986; Bundy *et al*, 1988; Asaolu *et al*, 1991). This study also found that the prevalence of intestinal parasitic infections peaked in the 1-10 year-old age group, which are pre-school and school-age children. Therefore, the control of worm infections through chemotherapy in school-age children is in great need, and could lead to a beneficial collaboration between the Ministry of Health and the Ministry of Education.

In conclusion, integrating an intestinal helminthiasis control program along with the existing filariasis control program in Narathiwat Province, Thailand, would be an appropriate and cost-effective strategy to control intestinal helminths. From the evaluation of this type of program, other models may be developed to help in the prediction of resource requirements for future control of helminthic infections, which will alleviate the morbidity caused by them and improve the overall health of the community.

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