

STUDY OF FACTORS INFLUENCING INTESTINAL PARASITIC INFECTIONS IN A RURAL COMMUNITY IN NORTHEASTERN THAILAND

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Abstract. We performed a survey in a rural village, in Nam Som District, Udon Thani Province, northeastern Thailand, focusing on intestinal parasitic infections and possible related personal factors. From a survey of the 178 villagers, we found the intestinal parasitic infection rate equal to 26.4 % (47 cases). Further factor analysis was performed to find whether factors were related to the intestinal parasitic infections among the subjects. Of the total 20 factors analyzed, only three factors showed significant correlations with intestinal parasitic infections. The three factors were average annual income ($p = 0.007$), having a toilet ($p = 0.040$) and eating undercooked food ($p = 0.010$). The factors identified are the common problem described in many studies, the poor sanitation of the villagers. The economic status of the subjects is still an important factor influencing intestinal parasites among this sample of the Thai rural population.

INTRODUCTION

Parasitic infections affect people in most developing countries worldwide. People in rural areas of Thailand have difficulty accessing good health care and basic health education. Consequently, some preventable diseases such as parasitic infections are still prevalent in many remote areas of Thailand (Triteerapapab *et al*, 1997; 1998; 1999; Suwansaksri *et al*, 2000). In Thailand, parasitic helminths affect more than 35% of the population in rural areas (Triteerapapab *et al*, 1997; 1998; 1999).

The distribution of intestinal parasites in Thailand is mostly discrete in the rural communities of all four regions of Thailand (northern, northeastern, southern and central regions). The main epidemiological pattern of intestinal parasites in Thailand can be explained as follows: 1) high prevalence of soil-transmitted parasites in the southern and central regions, and 2) high prevalence of fish-borne parasites in the northern and northeastern regions (Triteerapapab *et al*, 1999).

A number of demographic and socioeconomic factors influence infections among Thais. Here, we report the results of a survey of the prevalence of intestinal parasites among the population of a rural community of northeastern Thailand. The relation between the demographic and socioeconomic factors was studied.

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MATERIALS AND METHODS

Survey of the village under study

All the inhabitants of Sawasdee Village from Nam Som District in Udon Thani Province, were recruited into the study. The village is an endemic area for parasitic diseases, especially fluke diseases. It is located about 600 km from Bangkok. The survey was performed in the months April-May 2001. At the beginning of the project, we worked with local health workers and gained maximum community participation. One hundred and seventy-eight cases were included in the study by using stratified sampling of all households in the study setting. The sample size for this study was calculated based on previous prevalence in this area (Suwansaksri *et al*, 2002; Wiwanitkit *et al*, 2002). Twenty-two percent of the total villagers (830) were selected.

This setting has been previously reported as an endemic area for liver fluke (Suwansaksri *et al*, 2002; Wiwanitkit *et al*, 2002). Nevertheless, the possible migration effect on the intestinal parasitic infection pattern in this village has been proposed (Suwansaksri *et al*, 2002; Wiwanitkit *et al*, 2002).

Stool examination for parasites

The protocol of this study was approved by the Faculty of Allied Health Sciences, Chulalongkorn University. All subjects were asked for consent before starting this survey. Stool specimens were obtained from all participants and examined for the presence of intestinal parasite eggs or larvae (Triteerapapab *et al*, 1997; 1998; 1999). About

10 grams of stool specimen were required. Stool examination was performed by two methods: 1) direct smear technique with iodine staining, using light microscopy by medical technologists; 2) stool samples were sent for examination by the concentration technique, which was the confirmatory test at the Faculty of Allied Health Sciences, Chulalongkorn University.

Data collection and analysis

In addition to the data from the stool examinations, we collected demographic information, including behaviors, and socioeconomic factors of the subjects, which might influence parasitic infection by survey during home visits. The twenty demographic/socioeconomic factors studied were 1) sex, 2) age, 3) education level, 4) occupation, 5) average annual income, 6) having a toilet, 7) wearing shoes, 8) covering food, 9) washing hands before eating, 10) eating raw vegetables, 11) eating aquatic vegetables, 12) source of drinking water, 13) source of non-drinking water, 14) garbage in the house, 15) using a toilet, 16) distance between toilet and water source, 17) pretreatment of drinking water, 18) having bushes around the house, 19) wearing shoes while working, and 20) eating undercooked food. All recorded data were collected and analyzed using descriptive statistics. Multiple logistic regression analysis was used for determining the correlation between parasite infection and demographic or socioeconomic factors of the subjects. The statistical significance level was accept at p-value equal to 0.05. All the statistical analyses in this study were performed by SPSS 7.0 for Windows program.

RESULTS

Stool parasites of the subjects

Stool collection cartons were provided to 178 individuals (65 males and 113 females) residing in Sawasdee Village, Nam Som District, Udon Thani Province, at the time of our visit. The study population consisted of 13 children and 165 adults, with the average age being 47.27 ± 5.62 years old. All individuals returned their stool samples the next day. The intestinal parasitic infection rate was 26.4% (47 cases). The results of the stool examinations are shown in Table 1. The three most common intestinal parasites in this village were hookworm (22 cases, 12.4%) *Opisthorchis viverrini* (12 cases, 6.7%), and *Fasciolopsis buski* (11 cases, 6.2%). In cases where infections were detected, the villagers were advised to get antihelminthic drugs from the local hospital.

Correlations between parasitic infection and demographic or socioeconomic factors of the subjects

Of the total 20 analyzed factors, only 3 factors showed significant correlations with intestinal parasitic infections. The 3 factors were average annual income ($p = 0.007$), having a toilet ($p = 0.040$) and eating undercooked food ($p = 0.010$) (Table 2).

DISCUSSION

The Sawasdee village was selected because it was previously described as an area with a high prevalence of liver fluke (8.7%). This village is included in a fluke drug treatment program. Almost 27% of the study population harbored fluke parasites. Age, sex, education level or occupation of the subjects had no significant correlation with infection.

Our result, 26.4% infection, is lower than previous reports from remote areas in Thailand which do not have a control program for intestinal parasites (34%-46%) (Triteeraprab *et al*, 1997; 1998). A health intervention program for intestinal parasitic infection control in remote areas is still necessary.

The 26.4% intestinal parasite infections in our study is similar to the national average of 23% in the national epidemiological survey of 2001 (Moji *et al*, 2002). This rate is lower than a recent survey in established communities in the same area (Wiwantitkit *et al*, 2001a,b). This rate is still similar to the recent survey in this village. In our study, the infection rate

Table 1
Results of stool examinations.

Parasite found	Total number of infected cases	Infection rate (%)
Hookworm	18	10.1
<i>Opisthorchis viverrini</i>	9	5.2
<i>Fasciolopsis buski</i>	8	4.5
<i>Strongyloides stercoralis</i>	4	2.2
<i>Ascaris lumbricoides</i>	2	1.1
Mixed infection ^a	6	3.3
No parasite found	131	73.6

^a *Opisthorchis viverrini*, hookworm and *Ascaris lumbricoides* infection, 2 cases; *Opisthorchis viverrini* and *Fasciolopsis buski* infection, 1 case; hookworm and *Fasciolopsis buski* infection 1 case; *Strongyloides stercoralis* and *Fasciolopsis buski* infection, 1 case; hookworm and *Ascaris lumbricoides* infection, 1 case.

Table 2
Correlation between parasite infection and some demographic or socioeconomic factors.

Studied factors	Correlation coefficients
1) sex	0.229
2) age	0.999
3) education level	0.999
4) occupation	0.999
5) average annual income	0.007
6) having a toilet	0.040
7) wearing shoes	0.678
8) covering food	0.773
9) washing hands before eating	0.475
10) eating raw vegetables	0.557
11) eating aquatic vegetables	0.148
12) source of drinking water	0.861
13) source of non-drinking water	0.861
14) garbage in the house	0.120
15) using a toilet	0.782
16) distance between toilet and water source	0.823
17) pretreating of drinking water	0.110
18) having bushes around the house	0.524
19) wearing shoes while working	0.811
20) eating undercooked food	0.010

of *Opisthorchis viverrini* (12.4%) was high, as this community is an endemic area for opisthorchiasis. Since eating raw or undercooked fish dishes is one of the cultural norms of the Thais, reinfection with *Opisthorchis viverrini* can be expected. Eating undercooked food is one of the three factors that have significant correlations with the parasite infections of the subjects.

Common fluke parasites in the other areas such as hookworm, which is common in the south (Upathum *et al*, 1989), and *Fasciolopsis buski*, which is common in the central region (Jaroovesma *et al*, 1980), could be detected at similar prevalences to *Opisthorchis viverrini*. Concerning the parasite life cycles, the fish-borne parasites have totally different cycles from soil-transmitted diseases such as hook worm or aquatic plant-related parasites such as *F. buski*. The environment of our setting is dry and hot, which is not suitable for soil-transmitted parasites. The water resources for growing aquatic plant in this area is limited. However, there was no significant correlation between the parasite infections of our subjects and those factors *ie* eating raw vegetables, eating aquatic vegetables, having shoes or wearing shoes while working.

The identified factors are the same common problem described in many studies, the poor sanitation of the villagers. Having a toilet and eating undercooked food are the two main demographic factors, and important behaviors related to infection. However, some other behaviors, such as using a toilet and washing the hands before eating, showed no significant correlation. These factors might have some correlation but it might be less than the two detected behavioral factors in this study. Larger scale studies may be helpful in answering this question. The average annual income reflecting the socioeconomic status of the subjects is another important factor influencing the intestinal parasites among this sample of the Thai rural population. In addition, this factor presents the strongest correlation to infection.

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