

Intestinal Parasites in Asymptomatic Adult Southeast Asian Immigrants

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All previous studies of intestinal parasites in Southeast Asian refugees have included immigrants with and without symptoms. In order to determine the prevalence of intestinal parasites in asymptomatic Southeast Asians, 226 adult refugees were studied who had no symptoms or signs suggestive of intestinal parasitism and who submitted one to three stools for examination. Fifty-four percent of these asymptomatic adults were infected with one or more potential pathogens, 22 percent with *Ascaris*, 20 percent with hookworm, 11 percent with *Opisthorchis* sp, 7 percent with *Trichuris*, 5 percent with *Strongyloides*, 5 percent with *Giardia*, and 2 percent with *Entamoeba histolytica*. Laotians and Cambodians, persons who stayed in Thai refugee camps, and patients with anemia or eosinophilia were more likely than other refugees to harbor pathogenic parasites. Nonetheless, refugees without these characteristics were often infected, and no single characteristic excluded any refugee from a high probability of being parasitized. There is a high prevalence of potentially pathogenic parasites in asymptomatic adult Southeast Asians, similar to that reported in refugees unselected for the presence or absence of symptoms.

In February 1981 the Southeast Asian population in the United States was estimated by the US State Department to be 465,596, with about 10,000 Southeast Asian refugees entering the country

each month.¹ The Centers for Disease Control (Atlanta) have recommended routine screening for intestinal parasites of all Southeast Asians seeking medical care for any reason, regardless of whether there is historical or physical evidence of parasitosis.² The yield of screening in asymptomatic Southeast Asian refugees is unknown, however, because no previous report has determined the prevalence in asymptomatic Southeast Asians. Reported here is the prevalence of intestinal parasites in Southeast Asian adults who had neither signs nor symptoms suggestive of parasitosis.

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Methods

In 1980 a questionnaire was added to the chart of all new Southeast Asian refugees presenting for any illness, pre-employment physical examination, routine health checkup, or antenatal care to a university family practice clinic or a community primary care clinic in San Diego. The questionnaire requested the patient's age, sex, country of origin, refugee camps visited, and duration of residence in the United States as well as the presence of any of the following symptoms: abdominal pain, abdominal distention, weakness, malaise, nausea, vomiting, diarrhea, weight loss, blood in the stool, and worms passed through the rectum. Clinicians were asked to complete the questionnaire with the help of a professional translator, to examine each patient for hepatosplenomegaly, and to order a complete blood count and three stools for ova and parasites.

Fresh stools were brought to the laboratory over a one- to three-week period. In the community clinic, stool specimens were preserved in polyvinyl alcohol (PVA) fixative and examined in one of two commercial laboratories using direct, trichrome stain and formol-ether concentration methods. In the university hospital laboratory, fresh stools were examined using direct, iron hematoxylin stain and formol-ether concentration methods.

In order to further exclude symptomatic patients from the study group, notes made by the clinician at the patient's initial visit were reviewed by one of the authors. If for any reason the clinician suspected a parasitic infection, the patient was excluded from the asymptomatic refugee group. This report is based on all new refugees 20 or more years of age, seen in the clinics during 1980, who had no signs or symptoms suggestive of parasitic infection.

Results

Four hundred sixty-four adult Southeast Asians were seen in 1980. Of these, 129 (28 percent) had signs or symptoms suggestive of parasitic infec-

tion. Of the remaining 335 asymptomatic refugees, 226 (67 percent) submitted at least one stool for examination and form the basis of this report. One hundred seventy-five patients (77 percent) submitted three stool specimens, 31 patients (14 percent) submitted two stool samples, and 20 patients (9 percent) submitted a single stool specimen. The age, sex, and country of origin were not significantly different for symptomatic refugees vs asymptomatic refugees who did or did not submit stools for examination.

The mean age of the asymptomatic study population was 35 years (range, 20 to 79 years); 54 percent were women. Ninety percent of these refugees had been in the United States 12 months or less, only 3 percent had been in the United States longer than 18 months, and no patient had been in the United States for more than three years. The majority came from Vietnam (49 percent) and Laos (42 percent). Seven percent were from Cambodia, and 2 percent from China. Immigration patterns differed significantly: Vietnamese refugees came to the United States via several different countries (Malaysia, 35 percent; Indonesia, 21 percent; Thailand, 21 percent; Hong Kong, 17 percent; other, 6 percent). Laotians and Cambodians came predominately by way of Thailand (96 percent and 81 percent, respectively). Chinese refugees came by way of Hong Kong (75 percent) or Malaysia (25 percent). Overall, 51 percent of the study group had stayed in Thailand, 20 percent in Malaysia, 11 percent in Indonesia, 11 percent in Hong Kong, and 6 percent in other countries.

Potentially pathogenic intestinal parasites were found in 54 percent of these asymptomatic adults. Forty-one percent had a single parasite, 8 percent two parasites, 3 percent three parasites, and 2 percent four parasites. *Ascaris lumbricoides* (22 percent) and hookworm (20 percent) were the most common, followed by *Opisthorchis* sp (11 percent), *Trichuris trichiura* (7 percent), *Strongyloides stercoralis* (5 percent), *Giardia lamblia* (5 percent), and *Entamoeba histolytica* (2 percent).

In these adult refugees neither age, nor sex, nor duration of residence in the United States was significantly associated with overall parasite prevalence. In contrast, the country of origin and the country of the refugee camp were significantly ($P < .02$) associated with parasite prevalence, as shown in Table 1. *E. histolytica* was found exclusively in Laotians who had passed through Thai-

Table 1. Asymptomatic Southeast Asian Refugees Infected with Each Parasite by Country of Origin and Country of Refugee Camp (%)

	Country of Origin				Country of Refugee Camp				
	Laos (n=94)	Viet Nam (n=110)	Cambodia (n=17)	China (n=5)	Thailand (n=77)	Malaysia (n=31)	Indonesia (n=17)	Hong Kong (n=17)	Others (n=10)
Protozoa									
E histolytica	5	0	0	0	4	0	0	0	10
G lamblia	6	5	0	0	5	3	12	6	0
Roundworms									
A lumbricoides	17	27	18	0	23	19	35	12	20
Hookworm	29	8	53	0	29	3	6	0	10
T trichiura	10	6	0	20	8	0	0	29	10
S stercoralis	7	3	6	0	4	0	6	0	0
Fluke									
Opisthorchis sp	25	1	0	0	18	0	0	0	0
Any pathogen	66	45	59	20	63	26	53	41	50

land. All but one of the patients infected with *Opisthorchis* sp were Laotian, and all had migrated through Thailand. Eighty percent of refugees with hookworm were from Laos or Cambodia, and all but three of these had lived in a Thai refugee camp. The Vietnamese, who immigrated by way of many countries, were less often parasitized (45 percent) than either Laotians (66 percent) or Cambodians (59 percent). Refugees who immigrated through Thai camps were most often parasitized (63 percent) compared with immigrants coming through Indonesia (53 percent), Hong Kong (41 percent), and Malaysia (26 percent).

The mean hematocrit was slightly but significantly ($P < .03$) lower in parasitized than unparasitized refugees and was highly correlated with hookworm infection. Thirty-six percent of those infected solely with hookworm had a hematocrit level of less than 36 percent compared with 6 percent of unparasitized refugees. Anemia was no more common in infected women than in infected men.

No significant difference in total white blood cell count was found between parasitized and un-

parasitized refugees. Parasitized individuals had significantly higher average eosinophil counts than unparasitized patients (9.1 percent vs 3.9 percent) and were much more likely to have eosinophilia of 6 percent or greater (41 percent vs 13 percent). Hookworm, *Strongyloides*, or *Opisthorchis* sp were the parasites most frequently associated with eosinophilia.

Discussion

Fifty-four percent of this group of adult Southeast Asians who had no signs or symptoms suggestive of intestinal parasites harbored one or more intestinal parasites. These results are comparable to previous reports of 30 to 80 percent parasite prevalence in refugees.³⁻¹¹ These earlier reports are based on one to three stool examina-

tions in convenience samples of 31 to 2,000 immigrants of all ages from multiple ethnic groups and refugee camp locations, with no attempt to exclude refugees with signs or symptoms attributable to intestinal parasites.

Although an extensive effort to exclude patients with symptoms or signs suggestive of parasitosis was made, it is possible, because of cultural and language barriers, that some symptomatic refugees were included in the study group. Alternatively, the similarity of the overall prevalence reported here to previous studies may reflect the paucity of symptoms in most persons with intestinal parasites, so that the presence of symptoms may not be a useful criterion for selecting refugees for stool examination. This conclusion was also reached by Eveland et al¹² in a study of Americans.

In this population 36 percent of refugees infected with hookworm were anemic and presumably had hookworm disease, but other causes of anemia were not systematically excluded. Conversely, 66 percent of those infected with hookworm had hematocrits in the normal range. Thus, while anemia in an asymptomatic adult Southeast Asian suggests hookworm disease, a normal hematocrit does not rule out the possibility of hookworm infection.

Similarly, although eosinophilia suggests the possibility of parasitosis, its absence does not rule out infection. Refugees infected with hookworm, *Strongyloides*, or *Opisthorchis* sp had significantly higher percent eosinophils, but most refugees harboring these parasites had no eosinophilia.

As previously reported,^{2,5,7,8,10} Laotians and Cambodians were more often parasitized than were Vietnamese. Nevertheless, 45 percent of asymptomatic Vietnamese were infected with one or more pathogenic parasites; and as reported by others,^{2,5,7,8,10} *Ascaris* was found consistently more often in Vietnamese than in other Southeast Asians. Laotians and Cambodians had a much higher prevalence of hookworm than Vietnamese, and 80 percent of hookworm infections were in non-Vietnamese refugees. Similarly, Hoffman et al¹⁰ found 92 percent of hookworm infections to be in non-Vietnamese refugees.

Some of the infections in Southeast Asian refugees were probably acquired in refugee camps or in transit to them. All persons infected with *Opisthorchis* sp and 88 percent of those with hookworm migrated through Thailand. Because nearly

all Laotians and Cambodians migrated through Thailand, it is difficult to determine whether these infections were acquired in Thai refugee camps or in the country of origin. Refugees who stayed in Malaysia had far fewer infections than patients who stayed in other refugee camps, but most of these refugees were Vietnamese who may have been less frequently parasitized prior to arrival in Malaysia.

This study documents for the first time the high prevalence of parasitic infection in asymptomatic adult Southeast Asians. Specific recommendations for routine screening of asymptomatic adult Southeast Asians should be based on considerations of the natural history of untreated intestinal parasitosis and the prevalence of treatable parasites.

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