

# Intestinal Parasites Among Indochinese Refugees and Mexican Immigrants Resettled in Contra Costa County, California

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Stool examinations of 186 Indochinese refugees and 90 immigrants from Mexico resettled in Contra Costa County, California, have shown that 60 percent of refugees and 39 percent of immigrants are infected with one or more species of pathogenic protozoa and helminths. The mean prevalences of infections among refugees and immigrants, respectively, were: hookworm, 25 and 2 percent; whipworm, 22 and 12 percent; *Ascaris*, 20 and 12 percent; *Giardia lamblia*, 11 and 11 percent; *Strongyloides*, 9 and 1 percent; and *Entamoeba histolytica*, 2 and 4 percent. *Clonorchis sinensis* was found in 13 percent of refugees and dwarf tapeworm in 9 percent of immigrants. Rates of infection varied with age and sex.

Treatment of these parasitic infections is important and justified because: the prevalence is high; some species are highly pathogenic and directly transmittable; most species have long life spans; and safe broad-spectrum drugs are now available.

Of the various diseases and infections of Indochinese refugees resettled in the United States, infections with intestinal parasites, especially soil transmitted helminths, are more prevalent than any other condition.

This paper reports the results of a survey of the prevalence of intestinal parasites among Indochinese refugees and Mexican immigrants resettled in Contra Costa County, California. The treatment of such infections is also discussed.

## Methods

Between early 1978 and the end of April 1980, about 3,000 Indochinese refugees entered and resettled in Contra Costa County, California. Stool samples of 186 refugees referred by health authorities or physicians to the county's Public Health Laboratory were examined for intestinal parasites.

In addition, stool samples of 90 immigrants from Mexico who entered and resettled in the county during the same period were examined in the same laboratory and the results used for comparison of the rates of parasitic infections between two groups.

Three stool specimens were collected from each person over a period of five to seven days. Stools

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**Table 1. Rate of Helminthiasis by Age and Sex Among Indochinese Refugees Resettled in Contra Costa County, California (1978-1980)**

| Age Groups (years) | Number Examined |    | Percentage of Prevalence |    |    |          |    |    |          |    |    |               |    |    |            |    |    |    |
|--------------------|-----------------|----|--------------------------|----|----|----------|----|----|----------|----|----|---------------|----|----|------------|----|----|----|
|                    |                 |    | Roundworm                |    |    | Whipworm |    |    | Hookworm |    |    | Strongyloides |    |    | Clonorchis |    |    |    |
|                    | M               | F  | T                        | M  | F  | T        | M  | F  | T        | M  | F  | T             | M  | F  | T          | M  | F  | T  |
| 0-4                | 18              | 14 | 32                       | 19 | 31 | 24       | 13 | 31 | 21       | 6  | 0  | 3             | 6  | 8  | 7          | 0  | 15 | 7  |
| 5-9                | 10              | 12 | 22                       | 22 | 33 | 29       | 33 | 0  | 14       | 22 | 50 | 38            | 0  | 17 | 10         | 22 | 8  | 14 |
| 10-14              | 10              | 6  | 16                       | 22 | 50 | 33       | 33 | 66 | 47       | 22 | 33 | 27            | 17 | 0  | 7          | 22 | 0  | 13 |
| 15-19              | 13              | 13 | 26                       | 31 | 15 | 23       | 8  | 15 | 12       | 31 | 15 | 23            | 0  | 15 | 8          | 8  | 15 | 12 |
| 20-39              | 40              | 25 | 65                       | 16 | 5  | 12       | 29 | 14 | 24       | 34 | 19 | 29            | 16 | 5  | 12         | 16 | 19 | 17 |
| 40 & over          | 13              | 12 | 25                       | 9  | 20 | 14       | 27 | 20 | 24       | 45 | 20 | 33            | 18 | 0  | 10         | 27 | 0  | 14 |
| <b>Total</b>       | 104             | 82 | 186                      | 19 | 21 | 20       | 24 | 20 | 22       | 28 | 21 | 25            | 10 | 8  | 9          | 15 | 12 | 13 |

M=male      F=female      T=total

**Table 2. Rate of Infection with One or More Species of Helminths or Pathogenic Protozoa Among Indochinese Refugees Resettled in Contra Costa County, California (1978-1980)**

| Age Group (years) | Number Examined | Prevalence (%) |             |               |              |                 |                       |            |
|-------------------|-----------------|----------------|-------------|---------------|--------------|-----------------|-----------------------|------------|
|                   |                 | Helminth       |             |               |              | Protozoa        |                       |            |
|                   |                 | Single Species | Two Species | Three Species | Four Species | Giardia lamblia | Entamoeba histolytica | All Types* |
| 0-4               | 32              | 21             | 17          | 3             | 0            | 28              | 3                     | 55         |
| 5-9               | 22              | 20             | 14          | 14            | 5            | 19              | 0                     | 62         |
| 10-14             | 16              | 33             | 27          | 13            | 0            | 13              | 7                     | 80         |
| 15-19             | 26              | 27             | 8           | 8             | 0            | 12              | 4                     | 50         |
| 20-39             | 65              | 32             | 17          | 7             | 2            | 17              | 2                     | 64         |
| 40 & over         | 25              | 19             | 5           | 10            | 10           | 0               | 0                     | 42         |
| <b>Total</b>      | 186             | 26             | 15          | 8             | 2            | 16              | 2                     | 60         |

\*Parasite species included are: roundworm, whipworm, hookworm, Strongyloides, Clonorchis sinensis, Giardia lamblia, and Entamoeba histolytica

were passed into clean containers. Using the wooden sticks provided, a portion of stool the size of a cherry was placed into an empty bottle and the same amount into a bottle containing polyvinyl alcohol (PVA). The samples were transferred to the laboratory and were examined between one and three days after collection.

In most cases, fecal specimens were collected from all members of a family. Unpreserved samples were routinely examined by standard zinc flotation and formalin-ether concentration methods. Specimens preserved in PVA were used to prepare trichrome stains, as recommended by Brooke and Goldman.<sup>1</sup>

**Table 3. Rate of Infection with One or More Species of Helminths or Pathogenic Protozoa Among Immigrants from Mexico Resettled in Contra Costa County, California (1978-1980)**

| Age Group (years) | Number Examined | Prevalence (%)                  |                 |                       |            |
|-------------------|-----------------|---------------------------------|-----------------|-----------------------|------------|
|                   |                 | One or More Species of Helminth | Giardia lamblia | Entamoeba histolytica | All Types* |
| 0-4               | 18              | 11                              | 11              | 0                     | 28         |
| 5-9               | 21              | 52                              | 19              | 10                    | 62         |
| 10-14             | 11              | 27                              | 0               | 9                     | 36         |
| 15-19             | 6               | 50                              | 17              | 17                    | 66         |
| 20-39             | 26              | 19                              | 12              | 0                     | 27         |
| 40 & over         | 8               | 25                              | 0               | 0                     | 25         |
| <b>Total</b>      | <b>90</b>       | <b>29</b>                       | <b>11</b>       | <b>4</b>              | <b>39</b>  |

\*Parasite species included are: roundworm, whipworm, hookworm, Strongyloides, dwarf tapeworm, Giardia lamblia, and Entamoeba histolytica

Slides prepared by various methods were examined microscopically for parasite eggs and organisms.

**Results**

Among the Indochinese refugees, the overall rate of infection with one or more species of parasites was 60 percent, with a rate of 80 percent in the age group of 10 to 14 years (Table 1). The highest percentages of infection with roundworm (*Ascaris lumbricoides*) and whipworm (*Trichuris trichiura*) were in the age group of 10 to 14 years, while for hookworm and *Strongyloides stercoralis* the highest infection rate was in the age group of 5 to 9 years. Multiple infections with these helminths, *Clonorchis sinensis*, protozoa (*Giardia lamblia*), and *Entamoeba histolytica* were common (Table 2).

The rates of infection with various helminthiasis were lower among the 90 Mexican immigrants than among the Indochinese refugees. Again, rates of infection varied with age and sex, with higher rates among the lower age groups (Table 3). Only 1 percent were infected with *Strongyloides*, but 24 percent of the children in the age group of 5 to 9 years had dwarf tapeworm (*Hymenolepis nana*).

Among the Mexican immigrants, *Ascaris* was found in 12 percent of the population, whipworm in 12 percent, hookworm in 2 percent, and dwarf tapeworm in 9 percent. Five percent of immigrants were infected with two or more species of helminths. Rates of infections with *G lamblia* and *E histolytica* were 11 percent and 4 percent, respectively.

**Discussion and Conclusion**

The potential public health impact of the influx of hundreds of thousands of refugees from Southeast Asia into the United States has been a subject of controversy among public health authorities, sponsoring agencies, and the public over the last two years.

According to the *1980 World Refugee Survey*,<sup>2</sup> the estimated number of Indochinese refugees resettled in the United States by 1979 was 220,000 and is expected to increase to more than 400,000 by the end of 1980. The number of Indochinese refugees resettled between October 1, 1979, and January 1, 1980, is 119,158, of which about 3,000 are living in Contra Costa County, California.<sup>2</sup>

In addition to diseases infecting refugees in their countries of origin, unsanitary conditions of camps where they may spend a long time before

coming to this country contribute to their ill health. According to the present data, as well as other reports,<sup>3-5</sup> at least 60 percent of Indochinese refugees are infected with one or more intestinal parasites. The incidence of infections with hookworm (50 to 72 percent in some areas) is higher than that with other helminths or with protozoa.

Of the parasites infecting the Indochinese refugees, *S stercoralis* and *G lamblia* are particularly important, considering their pathogenicity and the percentage of people infected. It should be noted that the observed rate of infection with *Strongyloides* (9 percent) would have been higher if more specific methods of examination had been used.<sup>5</sup>

In this study, the rates of parasitic infections found in immigrants from Mexico were lower than those reported by other investigators.<sup>6</sup> The findings of the present study are similar to those of Lindes<sup>7</sup> in that most members of a family were infected with the same species of parasite.

Treatment of the Indochinese refugees and Mexican immigrants infected with intestinal parasites is justified and recommended, considering the following facts:

1. More than 50 percent of the Indochinese refugees and almost 50 percent of the Mexican immigrants are infected with intestinal parasites, a rate much higher than in the general population of the United States.

2. Parasite infections usually involve more than one species. Some species, such as *S stercoralis*, *G lamblia*, and *E histolytica*, are highly pathogenic and directly transmittable. With *Strongyloides*, there are the additional factors of complications due to the infection and the possibility of autoinfection.

3. Most helminths have long life spans. Thus, to achieve cure through self-elimination of infecting organisms can require several years of living in helminth-free communities.

4. It was observed during this study that the work load of the diagnostic laboratory was increased because many patients had been referred two or three times.

5. Highly effective and safe broad-spectrum drugs are now available for the treatment of most soil transmitted helminth infections, and reinfection of treated people is unlikely with the change to a more hygienic environment.

The drug of choice for treatment of helminthiasis should be safe and effective against most spe-

cies. Results of trials in countries in which soil transmitted helminths are prevalent show that several new anthelmintics are effective against most intestinal helminths, but only a few against whipworm. These trials have shown that mebendazole (Vermox) is very effective and safe in the treatment of infections with *Ascaris*, *Trichuris*, *Strongyloides*, *Trichostrongylus*, and hookworm.<sup>8</sup> Except for *Trichostrongylus* infections, administration of a standard dose of mebendazole will result in the cure of most cases. Best results have been achieved by giving mebendazole tablets in doses of 100 mg twice daily (morning and evening) for three consecutive days.

Treatment of giardiasis and amebiasis is more difficult and warrants greater justification and caution. Amebiasis in particular presents considerable diagnostic problems. As Krogstad and colleagues have stated: "Even after the diagnosis is established, substantial uncertainty about the best treatment remains. The most reasonable approach at present is treatment selected for the patient's particular form of disease, and careful follow-up observation, including evaluation of the patient's close contacts."<sup>9</sup>

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#### References

1. Brooke MM, Goldman M: Polyvinyl alcohol-fixative as a preservative and adhesive for protozoa in dysenteric stools and other liquid material. *J Lab Clin Med* 34:1554, 1949
2. 1980 World Refugee Survey. New York, US Committee for Refugees, 1980
3. Center for Disease Control: Health status of Indochinese refugees. *Morbidity and Mortality Weekly Report* 28:395, 1979
4. Center for Disease Control: Survey of intestinal parasites—Illinois. *Morbidity and Mortality Weekly Report* 28:346, 1979
5. Chaia G: Studies on methods of strongyloidiasis control. Proceedings of the 8th International Congress of Tropical Medicine and Malaria, Teheran, Iran, September 1968
6. Center for Disease Control: Intestinal parasites—New York City. *Morbidity and Mortality Weekly Report* 28:226, 1979
7. Lindes C: Intestinal parasites in Laotian refugees. *J Fam Pract* 9:819, 1979
8. Arfaa F, Farahmandian I: Progress achieved in the chemotherapy of soil-transmitted helminths. In Williams JD, Geddes AM (eds): *Chemotherapy: Parasites, Fungi and Viruses*. New York, Plenum Press, 1976, vol 6, pp 11-12
9. Krogstad DJ, Spencer HG, Healy GR: Amebiasis. In *Current Concepts in Parasitology*. Boston, New England Journal of Medicine, 1979, pp 49-58