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Intestinal parasites in a migrant farmworker population



Intestinal Parasites in a Migrant Farmworker Population

Beth L. P. Ungar, MD; Ellen Iscoe, MHS; Jane Cutler, MPH; John G. Bartlett, MD

• Three hundred thirty-nine migrant worker women and children were screened by single stool examination for intestinal parasites. Infection occurred in 34.2%. *Giardia lamblia* and *Trichuris trichiura* were the most common pathogens; *Entamoeba coli* and *Endolimax nana* were the most common commensals. Infants under 1 year of age were free of infection. Children between 2 and 5 years old and women between 25 and 35 years old had the highest prevalence. Significantly more Haitians were infected than Mexican-Americans or American blacks. Of ten symptoms, only abdominal pain and gas correlated significantly with infection. This migrant population has a greater prevalence of intestinal parasites than the general American public. Screening by stool examination may be beneficial to diminish the reservoir of infection.

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Each year 8,000 to 10,000 migrant farmworkers spend from May to November on the Delmarva Peninsula, the parts of Delaware, Maryland, and Virginia separated from the US mainland by the Chesapeake Bay. They are typically poor, live and work in crowded and frequently unsanitary conditions, and have inadequate diets. Although limited, data show a greater prevalence of intestinal parasites in such migrant populations than in the general American public¹ (J. R. Seed, PhD, written communication, March 3, 1983, and oral communication, Aug 13, 1984). Two preliminary unpublished studies of migrant workers on the Delmarva Peninsula showed 30% of 160 and 59% of 173 workers had intestinal parasites identified by examination of a single stool specimen. These studies were limited mainly to Haitian male migrant workers.

The present study is a survey of Haitian, Mexican-American, and American black migrant farmworker women and children in two work sites on the Delmarva Peninsula to determine the prevalence of intestinal parasites in this population. The study also attempts to correlate selected sociodemographic factors and clinical symptoms with parasitic infection.

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From the Johns Hopkins University School of Medicine, Baltimore (Drs Ungar and Bartlett), and Delmarva Rural Ministries, Dover, Del (Mrs Iscoe and Cutler).

Reprint requests to Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bldg 5, Room 112, Bethesda, MD 20205 (Dr Ungar).

SUBJECTS AND METHODS

The study population included women over 18 years old and children under 18 years old (predominantly under 5 years old) surveyed during the 1983 growing season. The sample was a convenience sample based on the subject's ability to contribute the necessary information and stool specimen. Adult subjects, children over 5 years old, and 20% of children under 5 years of age were contacted at home (multifamily campsites or houses). For adults, a bilingual health worker explained the study, obtained informed consent, and gathered sociodemographic and clinical information in the subject's preferred language. When possible, stool samples were collected immediately; otherwise, women were instructed to save morning specimens from themselves or their children; these specimens were picked up by the health worker, stored on ice, and processed within four hours of passage. Eighty percent of children under 5 years of age were surveyed in day-care centers. Sociodemographic information was assembled by health workers from teacher comment and school files. Diaper or potty-chair stool specimens were collected in plastic bags and refrigerated until processing on the same day. A single stool sample was obtained from each participant.

Stool specimens were processed by preservation in polyvinyl alcohol and in 3.7% formaldehyde solution. The former were examined microscopically following trichrome staining; the latter were concentrated by formaldehyde-ether technique and examined microscopically.² A single parasitologist at The Johns Hopkins Hospital, Baltimore, examined all samples. Sixty-three randomly chosen specimens were split and preserved as above as well as being kept unpreserved on ice for microscopic examination within six to eight hours of stool passage. Fourteen of the 63 specimens were positive for parasites and 49 of the 63 were negative for parasites, with results consistent using all three techniques. Subsequently, samples were examined only after preservation in polyvinyl alcohol and in formaldehyde. Follow-up and treatment of infected individuals were provided by Delmarva Rural Ministries.

Sociodemographic information, clinical information, and results from the stool examinations were analyzed by cross-tabulation and one-way analysis of variance (University of Maryland Computer Science Center, College Park).

RESULTS

Three hundred thirty-nine individuals were surveyed. Of these, 116 (34.2%) were infected with at least one intestinal parasite (17.7% with pathogens only, 9.7% with non-pathogens only, and 6.8% with a mixture). *Giardia lamblia*, *Trichuris trichiura*, and hookworm species were the most frequently noted pathogens; *Entamoeba coli* and *Endolimax nana* were the most frequently noted non-

pathogens. The following tabulation gives the number of positive specimens for different parasites with the percentage of the total number of specimens (339) given in parentheses.

Parasites	No. (%)
Pathogens	
<i>G lamblia</i>	45 (13.3)
<i>Entamoeba histolytica</i>	3 (0.9)
<i>Dientamoeba fragilis</i>	1 (0.3)
Hookworm species	7 (2.1)
<i>Ascaris lumbricoides</i>	3 (0.9)
<i>Strongyloides stercoralis</i>	2 (0.6)
<i>T trichiura</i>	33 (9.7)
<i>Hymenolepis nana</i>	2 (0.6)
Nonpathogens	
<i>Entamoeba hartmanni</i>	1 (0.3)
<i>E coli</i>	34 (10.0)
<i>E nana</i>	23 (6.8)
<i>Iodamoeba bütschlii</i>	1 (0.3)

(Some specimens contained more than one parasite; 223 specimens contained no parasites.) Of 83 persons infected with a pathogenic parasite, 73 harbored a single pathogen, eight had two, and one each had three or four pathogenic parasites. Twenty-three of this group were also infected with at least one nonpathogen. Thirty-three others had only nonpathogenic parasites. Differences in work site or type of housing did not affect rate of infection significantly.

The frequency of parasites in the various age categories is summarized in Table 1. Prevalence of parasites was significantly greater for ages 2 to 5 years than for 0 to 2 years ($P < .001$); of note, no parasites were identified in infants less than 1 year of age. There was no significant difference in infection rate for male vs female children. Of the 124 children enrolled in six different day-care centers, 43 (35%) were infected. Thirty-two were infected with *G lamblia*; 14 of these were from one day-care center and seven from another.

Women between ages 18 and 35 years were infected more often than women over age 35 years. *Trichuris trichiura* and nonpathogenic protozoa were most prevalent. More than half the women in the younger age group were Haitian, the ethnic group with most infections. Of the total of 53 infected women, 43.4% (23/53) were both field hands and mothers, 30.2% (16/53) field hands without children, 22.6% (12/53) mothers with jobs out of the field, and 3.8% (2/53) other women. There was no statistically significant correlation between these job groupings and infection with either protozoa or helminths. Women who had children living with them at home had a similar frequency of parasitic infection as those who did not. Five (27.8%) of 18 pregnant women and two (40%) of five nursing mothers carried intestinal parasites.

The prevalence of parasites according to ethnic background showed that more Haitians were infected than Mexican-Americans or American blacks ($P < .005$) (Table 2). The sample included 167 persons born in the United States to non-Haitian parents, 29 born in the United States to Haitian parents, 79 born in Haiti, 17 born in Mexico, and the rest born elsewhere or with no identified country of origin. There were 82 adults who had been in the United States for four years or less and 74 of these were from Haiti. The prevalence of parasites in persons born in Haiti (44/79, 56%) was significantly greater than the prevalence among persons born in the United States to non-Haitian parents (39/167, 23%). This difference was significant ($P < .005$) for the prevalence of both pathogens and nonpathogens. There was also a significant increase in the prevalence of parasites among persons born in the United States to Haitian parents

Table 1.—Frequency of Intestinal Parasites by Age

Group*	Age yr	At Least 1 Intestinal Parasite		At Least 1 Non-pathogen		At Least 1 Pathogen	
		No.	%	No.	%	No.	%
A (0-5 yr)	0-1	0/33	0.0	0/33	0.0	0/33	0.0
	1-2	9/40	22.5	1/40	2.5	9/40	22.5
	2-3	17/39	43.6	2/39	5.1	16/39	41.0
	3-4	8/17	47.1	3/17	17.7	6/17	35.3
B (6-17 yr)	4-5	11/27	40.7	3/27	11.1	9/27	33.3
	6-10	15/36	41.7	10/36	27.8	9/36	25.0
	10-17	3/10	30.0	2/10	20.0	2/10	20.0
C (18-60 yr)	18-25	15/49	30.6	10/49	20.4	11/49	22.5
	25-35	29/56	51.8	19/56	33.9	16/56	28.6
	35-60	9/32	28.1	6/32	18.7	5/32	15.6

*Group A represents 156 children, of whom 45 (28.9%) were infected; group B, 46 persons, of whom 18 (39.1%) were infected; and group C, 137 persons, of whom 53 (39.4%) were infected.

†Expressed as number of individuals per total number of individuals in age group.

Table 2.—Frequency of Intestinal Parasites by Ethnic Group

Ethnic Group	At Least 1 Intestinal Parasite		At Least 1 Non-pathogen		At Least 1 Pathogen	
	No.*	%	No.	%	No.	%
American black	13/56	23.2	8/56	14.3	6/56	10.7
American white	0/0	0.0	0/10	0.0	0/10	0.0
Haitian	61/135	45.2	29/135	21.5	48/135	35.6
Mexican-American	39/130	30.0	18/130	13.9	27/130	20.8
Oriental	0/0	0.0	0/1	0.0	0/1	0.0
Puerto Rican	2/7	28.6	1/7	14.3	2/7	28.6

*Expressed as number of individuals per total number of individuals in ethnic group.

compared with those born in the United States to non-Haitian parents ($P < .005$).

One hundred forty-seven adult subjects were able to answer clinical questions. Abdominal pain ($P < .001$) and gas ($P < .002$) were the only symptoms that correlated with infection. Persons complaining of abdominal pain were infected with *G lamblia* (two), *E histolytica* (two), hookworm species (six), *A lumbricoides* (one), *T trichiura* (12), *E coli* (eight), and *E nana* (13); persons complaining of gas were infected with *T trichiura* (18), *E nana* (13), *E coli* (13), hookworm species (four), *G lamblia* (two), *E histolytica* (one), and *A lumbricoides* (one). Other clinical symptoms whose presence did not correlate with infection were nausea, vomiting, diarrhea with or without urgency, constipation, abdominal bloating, rectal bleeding, discharge, and itching.

COMMENT

The overall prevalence for intestinal parasites in this study was 34.2%, including a 24.5% prevalence for pathogenic parasites. The results are similar to those reported by Ortiz,¹ who found a prevalence of 35% in 1980 among Puerto Rican farmworkers living in western Massachusetts. Furthermore, an unpublished study from the University of North Carolina, Chapel Hill, in 1982 showed a prevalence of 34.2% among migrant farmworker children in that area (J. R. Seed, personal communications). Additional data on

Intestinal parasites are scarce among a relatively young population of immigrants.¹⁴ Puerto Rican and Asian refugees: comparison purposes. Submitted to selected personnel from the group. Nevertheless, some nonpathogenic *Giardia lamblia* most prevalent among farmworkers. 9.7%, respectively. Comparison of stool specimens in Maryland. *G lamblia* or 30,000 specimens in 1978.¹⁵ In the Delmarva Peninsula, the prevalence of *G lamblia* was 9.7% in the 2- to 5-year-old group.¹⁶ Maternal care center: hygienic living conditions year old who perhaps brought personal contact with women over 15 years of age. Significant contact with mothers and other family members. It is a sanitary condition of women in the group and prevalence of parasites among immigrants and nonimmigrants. Reported parasitologically suggested harbored

1. Ortiz J. Intestinal parasites in Puerto Rico. *Am J Trop Med Hyg* 1975;102:52.
2. Melvin J. Intestinal parasites in Puerto Rico. *Am J Trop Med Hyg* 1975;102:52.
3. Hargrett-Keane M. Intestinal parasites in Puerto Rico. *Am J Trop Med Hyg* 1975;102:52.
4. Flores A. Intestinal parasites in Puerto Rico. *Am J Trop Med Hyg* 1975;102:52.
5. Winstanley J. Intestinal parasites in Puerto Rico. *Am J Trop Med Hyg* 1975;102:52.
6. Wiesner M. Intestinal parasites in Puerto Rico. *Am J Trop Med Hyg* 1975;102:52.
7. Jones K. Intestinal parasites in Puerto Rico. *Am J Trop Med Hyg* 1975;102:52.

intestinal parasites in migrant farmworkers in the United States are scant, although numerous investigators have noted a relatively high prevalence for intestinal parasites among other populations such as nonmigrant worker immigrants,¹⁴ Puerto Rican residents of Chicago,⁵ Southeast Asian refugees,¹⁵ and recent Haitian entrants.⁹ For comparison purposes, a survey of 414,820 stool specimens submitted to state public health laboratories in 1976 from unselected persons residing in the United States and potentially from groups at high risk of parasitic infection nevertheless showed that only 15.6% contained pathogenic or nonpathogenic parasites.¹⁰

Giardia lamblia and *T trichiura* were among the three most prevalent parasites identified in all studies of migrant farmworkers. These agents were recovered in 13.3% and 9.7%, respectively, of the Delmarva specimens. Again, for comparison purposes, fewer than 2% of more than 38,000 stool specimens submitted to state public health laboratories in Maryland and Virginia in 1976 were positive for *G lamblia* or *T trichiura*,¹⁰ and fewer than 1% of more than 30,000 specimens were positive for these same agents in 1978.¹¹ In the latter survey, approximately 4% of specimens contained nonpathogenic protozoa, compared with 17.4% of the Delmarva specimens.

In the 2- to 5-year age group, prevalence of *G lamblia* was greater than in other age groups. Fecal-oral transmission presumably accounts for the well-recognized increased prevalence of *G lamblia* in day-care centers.^{12,13} *Giardia lamblia* was the most prevalent parasite in children under 6 years old in one crowded Los Angeles semicomunal group.¹⁴ Many of the migrant children are not only in day-care centers but also live in camps that do not facilitate hygienic living. Absence of parasites in children under 1 year old who are likely still in diapers, less mobile, and perhaps breast-fed has been noted by others¹⁴ (J. R. Seed, personal communications).

Women under 35 years old had more infections than women over 35 years old. This does not appear to be due to contact with young infected children since there was no significant difference in frequency of infection between mothers and women who had no direct child-care responsibilities. It is possible that increased exposure to poor sanitary conditions in agricultural fields or increased numbers of recent immigrants from Haiti in the younger group of women explains the difference in infection between this group and older women.

Prevalences of 45% (61/135) among Haitian-born immigrants and their US-born children likely represent imported parasites comparable with those found in socioeconomically parallel populations in Haiti. This is also suggested by the finding that 72% of 97 male Haitians harbored intestinal parasites when they entered the United

States in 1980 and 1981.⁹ Haitians composed the majority of the study population living exclusively in the United States less than four years, a group with a high parasite prevalence in this and other studies.¹⁵

Fewer than a third of the Hispanics and fewer than a fourth of the American blacks were infected, prevalences that are nevertheless considerably higher than those of the general American public.^{10,11} These rates are similar to those in the North Carolina study of migrant worker children in which 34.3% (58/169) of the Mexican-Americans and 21% (16/76) of the American blacks harbored pathogenic parasites (J. R. Seed, personal communications). These two ethnic groups are largely born in the United States and rarely travel beyond their Florida home base when they are not working, suggesting that their life-style is more contributory to increased parasite burden than exposure to infectious agents outside the United States. Close and frequently unhygienic living quarters in campsites of every size, regardless of location, inadequate bathroom facilities, and the sporadic use of complete foot coverings promotes person-to-person fecal-oral and soil-mediated transmission of parasites to all populations living and working in this setting and potentially to others who interact with these populations.

The presence of clinical symptoms proved to be a relatively poor indicator of infection in this survey, as also noted by Winsberg et al.⁵ This may reflect that most adults were infected with parasites unlikely to cause noteworthy symptoms. For those with symptoms but no documented parasites, it might reflect the methodologic limitation that only one stool specimen was examined for each individual, and that, despite unremarkable preliminary testing, some protozoan infections would have been missed by not examining an unpreserved portion of every stool.

Migrant farmworker women and children on the Delmarva Peninsula have a higher prevalence of intestinal parasites than the general American public. The more recently arrived Haitians have more infections, suggesting that newer immigrants from endemic areas might benefit from routine stool examinations. Additional screening on a population basis, such as the 1- to 5-year age group, may detect reservoirs of infection maintained by life-style that can lead to reinfection of treated individuals and potential transmission to others.

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References

- Ortiz JS: The prevalence of intestinal parasites in Puerto Rican farm workers in Western Massachusetts. *Am J Public Health* 1980;70:1103-1105.
- Melvin PM, Brooke MM: *Laboratory Procedures for the Diagnosis of Intestinal Parasites*, US Dept of Health, Education, and Welfare publication 75-8282. Atlanta, Centers for Disease Control, 1974.
- Hargus EP, Lepow M, Lau T, et al: Intestinal parasitosis in childhood populations of Latin origin. *Clin Pediatr* 1976;15:927-929.
- Flores EC, Plumb SC, McNeese MC: Intestinal parasites in an urban pediatric clinic population. *AJDC* 1983;137:754-756.
- Winsberg GR, Sonnenschein E, Dyer AR, et al: Prevalence of intestinal parasites in Latino residents of Chicago. *Am J Epidemiol* 1975;102:526-532.
- Wiesenthal AM, Nickels MK, Hashimoto KG, et al: Intestinal parasites in Southeast Asian refugees. *JAMA* 1980;244:2543-2544.
- Jones MJ, Thompson JH, Brewer NS: Infectious diseases of Indo-chinese refugees. *Mayo Clin Proc* 1980;55:482-488.
- Skeels MR, Nims LJ, Maun JM: Intestinal parasitosis among Southeast Asian immigrants in New Mexico. *Am J Public Health* 1982;72:57-59.
- Moore JD, Buster SH: Intestinal parasites in Haitian entrants. *J Infect Dis* 1984;150:965.
- Ruebush TK, Juranek DD, Brodsky RE: Diagnoses of intestinal parasites by state and territorial public health laboratories, 1976. *J Infect Dis* 1978;138:115-117.
- Intestinal Parasite Surveillance: Annual Summary 1978*. Atlanta, Centers for Disease Control, 1979.
- Black RE, Dykes AC, Sinclair SP, et al: Giardiasis in day-care centers: Evidence of person-to-person transmission. *Pediatrics* 1977;60:486-491.
- Keystone JS, Krajden S, Warren MR: Person-to-person transmission of *Giardia lamblia* in day-care nurseries. *Can Med Assoc J* 1978;119:241-248.
- Millet VE, Spencer MJ, Chopin MR, et al: Intestinal protozoan infection in a semi-communal group. *Am J Trop Med Hyg* 1983;32:54-60.