Human Intestinal Parasite Infections: Further Data Primarily Concerning Indiana Residents[1]

WILLIAM HUGH HEADLEE,[2] Indiana University

The data presented adds to that accumulated by the writer and his associates during the past five years, on the incidence of intestinal parasite infections among residents of Indiana (Headlee, 1937, 1939, 1940, 1942a, 1942b, 1943; Headlee and Hopp, 1940, 1943a, 1943b; Headlee, Kmecza, and Cable, 1939; Hopp, 1943; and Kmecza, 1939). Prior to these studies no valid data were available concerning the incidence of intestinal parasite infections in population groups of the state. The present note is for the purpose of recording the data from a small number of examinations, which should aid in giving a more complete picture when summarized with the data obtained in previous studies.

In order to accurately determine the incidence of intestinal parasite infections, it is necessary to make a microscopic examination of fecal material from the individuals in question, which examination will reveal the trophozoites and cysts of protozoa and the ova and larvae of helminths, when present. In this study only one stool specimen from each individual was examined, but both a fecal film and a concentrated preparation (zinc sulfate centrifugal concentration technique) were examined from each fecal specimen (Faust et al., 1939). The individuals examined included both student and non-student groups, and some of the former were not residents of Indiana.

Fecal specimens from 117 individuals were examined for intestinal protozoa and helminths. Of the 117 persons examined, 89 were residents of Indiana, 63 of these being university students enrolled at Purdue University. A total of 91 students were examined, but of this number 22 were from 13 other states, and 6 were from countries or regions outside the United States; Canal Zone, China, Iraq and Egypt. Of the foreign students, 2 Chinese were infected, one of these with *Endamoeba coli*, *Endolimax nana* and *Clonorchis sinensis*, and the other with *E. coli* and *Giardia lamblia*. The university students ranged in age from 18 to 52 years, most of these being in the 18 to 22 age group. In the non-university group of 26 individuals, eight were under 15 years of age. The 63 university students, residents of Indiana, were from 29 counties widely distributed over the state. The data concerning the parasites found, the incidence of these parasites and other relavent data, for the individuals that were residents of Indiana (both students and non-

[1] From the Parasitology Laboratory, Department of Biology, Purdue University. This work was supported by a research grant provided jointly by the American Association for the Advancement of Science and the Indiana Academy of Science.

[2] Assistant Professor of Parasitology, Indiana University School of Medicine, Indianapolis, Indiana, since January 1, 1943.

students), are presented in table I. In table 2 a comparison of the incidence of parasite infections of the Students that were residents of Indiana is made with that of non-resident students. The total incidences of parasite infections for the various groups, expressed in percentage, were as follows: university students, 37.4; university students, residents of Indiana 36.5; out-state university students, 39.3; all residents of Indiana, 36.5, and residents of Indiana that were not university students, 46.2. For the entire group of 117 individuals, the parasites found and the percentage incidence of each were as follows: *Endamoeba histolytica*, 0.86; *Endamoeba coli*, 21.4; *Endolimax nana*, 21.4; *Iodamoeba bütschlii*, 1.7; *Giardia lamblia*, 1.7; *Chilomastix mesnili*, 1.7; *Ascaris lumbricoides*, 0.85; *Necator americanus*, 0.85; *Enterobius vermicularis*, 0.85; *Hymenolepis nana*, 0.85; *Taenia sp.*, 2.6, and *Clonorchis sinensis*, 0.85. In addition, perianal scrapings were examined from 8 individuals, residents of Indiana but not university students, and all (100 per cent) were found to be positive for the pinworm, *Enterobius vermicularis*.

Conclusion

It is not wise to attempt to draw far-reaching conclusions from data involving such a small number of individuals. It can be pointed out that the more common intestinal parasite infections were found, with the exception of the flagellate, *Trichomonas hominis*, the whipworm, *Trichuris trichiura*, and *Strongyloides stercoralis*. These have been found among individuals of other groups of Indiana residents (Headlee, 1942b, and Hopp, 1943). The presence of an infection of the liver fluke, *Clonorchis sinensis*, serves to illustrate that one may find the infection of this or other parasites in individuals that are far removed from the endemic centers of the parasite. Because of the present dispersal of individuals and groups to the many parts of the globe involved in this world conflict, we may expect to be confronted with infections that are new to us when these persons return to their homes. This study concerning intestinal parasite infections, and other more extensive studies that have been completed (vide supra), serve to indicate that even now we have a considerable incidence of these parasites among residents of Indiana. The evidence now available is sufficiently clear to indicate that these parasite infections should receive considerable more attention on the part of the practitioner than they have in the past.

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TABLE I.

The Incidence of Intestinal Parasite Infections among a Group of Persons Living in Indiana

	Students in Purdue Univ.						Non-Students						Total					
	Male		Female		Total		Male		Female		Total		Male		Female		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Endamoeba histolytica							1	6.3			1	3.8	1	2.4			1	1.1
Endamoeba coli	4	15.4	7	18.9	11	17.5	3	18.8	3	30.0	6	23.1	7	16.7	10	21.3	17	19.1
Endolimax nana	5	19.2	8	21.6	13	20.6	6	37.5	2	20.0	8	30.8	11	26.2	10	21.3	21	23.6
Iodamoeba bütschlii							1	6.3			1	3.8	1	2.4			1	1.1
Giardia lamblia	1	3.8			1	1.6							1	2.4			1	1.1
Chilomastix mesnili	1	3.8			1	1.6	1	6.3			1	3.8	2	4.8			2	2.2
Ascaris							1	6.3			1	3.8	1	2.4			1	1.1
Necator							1	6.3			1	3.8	1	2.4			1	1.1
Enterobius vermicularis			1	2.7	1	1.6									1	2.1	1	1.1
Taenia sp.	1	3.8	1	2.7	2	3.2							1	2.4	1	2.1	2	2.2
Hymenolepis nana							1	6.3			1	3.8	1	2.4			1	1.1
Heterodera radicicola			1	2.7	1	1.6									1	2.1	1	1.1
Infected with Protozoa	8	30.8	12	32.4	20	31.7	7	43.8	4	40.0	11	42.3	15	35.7	16	34.0	31	34.8
Infected with Helminths	1	3.8	3	8.1	4	6.3	3	18.8			3	11.5	4	9.5	3	6.4	7	7.9
Infected with both Protozoa and Helminths			1	2.7	1	1.6	2	12.5			2	7.7	2	4.8	1	2.1	3	3.4
Total Infected	9	34.6	14	37.8	23	36.5	8	50.0	4	40.0	12	46.2	17	40.5	18	38.3	35	39.3
Total Examined	26		37		63		16		10		26		42		47		89	

TABLE II.

The Incidence of Intestinal Parasite Infections among Purdue University Students; Comparison of Students from Indiana with those from Out of State

	From the State of Indiana						From States and Countries Outside of Indiana					
	Male		Female		Total		Male		Female		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Endamoeba coli	4	15.4	7	18.9	11	17.5	6	26.1	2	40.0	8	28.6
Endolima nana	5	19.2	8	21.6	13	20.6	1	4.3	3	60.0	4	14.3
Iodamoeba bütschlii							1	4.3			1	3.6
Giardia lamblia	1	3.8			1	1.6	1	4.3			1	3.6
Chilomastix mesnili	1	3.8			1	1.6						
Enterobius vermicularis			1	2.7	1	1.6						
Taenia sp.	1	3.8	1	2.7	2	3.2	1	4.3			1	3.6
Clonorchis sinensis							1	4.3			1	3.6
Heterodera radicicola			1	2.7	1	1.6						
Infected with Protozoa	8	30.8	12	32.2	20	31.7	6	26.1	4	80.0	10	35.7
Infected with Helminths	1	3.8	3	8.1	4	6.3	2	8.7			2	7.2
Infected with both Protozoa and Helminths			1	2.7	1	1.6	1	4.3			1	3.6
Total Infected	9	34.6	14	37.8	23	36.5	7	30.4	4	80.0	11	39.3
Total Examined	26		37		63		23		5		28	