

Intestinal Parasite Infections of 203 University Freshmen

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Introduction

This paper presents the results of another of a series of studies that have been made by the senior author, or under his direction, during the past six years in an effort to accurately determine the incidence of human intestinal parasite infections in the general Hoosier population, and to evaluate their importance in relation to public health. These studies have included residents of both urban and rural areas, university students and two large groups of individuals confined to State Hospitals for the Insane (Headlee, 1937, 1939, 1940, 1942a, 1942b; Headlee and Hopp, 1940; Headlee, Kmecza and Cable, 1939; Hopp, 1940; Kmecza, 1939).

In making these studies an attempt has been made to examine a representative group of individuals of the state, including persons from a large number of localities and from different economic and social levels of the population. Examination of Purdue University students has helped to achieve these ends, since a large number of these students are residents of Indiana and represent a general type in reference to economic and social status, although there are considerable individual differences. Accordingly, at the beginning of the summer term of 1942, examinations were made of a number of incoming freshmen men with the aim of adding to our information concerning the intestinal parasite infections among residents of Indiana, as well as to gain information that would aid in determining the need for attention to these organisms in relation to student health.

Materials and Methods

The data presented in this paper were obtained by the microscopic examination of fecal specimens. By this examination both the cysts and trophozoites of protozoa and the eggs of helminths could be detected. Two hundred and seventy-five men of the incoming freshman group were contacted individually as they took their entrance physical examination. Each person was given a cardboard container and requested to submit a stool specimen for examination, this specimen to be brought to the laboratory on an assigned date, during the months of May and June.

The stool specimens were examined in the laboratory by means of a combination of the direct smear method and the zinc sulfate centrifugal flotation technic (Faust et al., 1939), the latter being a concentration method.

Presentation of Data

A total of 203 students, or 74.0 per cent of those contacted, submitted stools for examination. Only one stool from each individual was examined, but it was examined by the two methods mentioned above.

All of the students examined were males, ranging in age from 16 to 48 years. One hundred and ninety-three, or 95.1 per cent, were in the 16-20 age-group, 8 were in the 21-25 age-group, 1 was 26 yrs. of age and 1 was 48 yrs of age. Of the total examined, 55 or 27.1 per cent, were infected with protozoa, helminths or both protozoa and helminths. Six, or 10.9 per cent, of these infected individuals were harboring one or more species of parasite of either proved or probable pathogenicity. The species of parasites found with their percentage incidences were as follows: *Endamoeba histolytica*, 1.0; *Endamoeba coli*, 18.2; *Endolimax nana*, 11.8; *Iodamoeba bütschlii*, 0.5; *Giardia lamblia*, 1.5; *Chilomastix mesnili*, 0.5; *Necator* (hookworm), 0.5, and *Enterobius vermicularis* (pinworm), 0.5. The hookworm and pinworm infections were harbored by the same individual. A detailed analysis of the data is presented in Table 1, consideration being given to the residents of Indiana as a group. The data would seem to indicate that students with an established residence outside of Indiana have a lower incidence of intestinal parasites, and fewer species of parasites. The number of students represented is too small to warrant a final conclusion of this kind.

TABLE 1.—Intestinal Parasite Infections among 203 University Freshmen

Age	State of Indiana 16-48		Other States 16-25		Total 16-48	
	No.	%	No.	%	No.	%
<i>Endamoeba histolytica</i>	2	1.3			2	1.0
<i>Endamoeba coli</i>	29	19.3	8	15.1	37	18.2
<i>Endolimax nana</i>	17	11.3	7	13.2	24	11.8
<i>Iodamoeba bütschlii</i>	1	0.7			1	0.5
<i>Giardia lamblia</i>	3	2.0			3	1.5
<i>Chilomastix mesnili</i>	1	0.7			1	0.5
<i>Necator</i>	1	0.7			1	0.5
<i>Enterobius</i>	1	0.7			1	0.5
Total infected with protozoa	43	28.7	12	22.6	55	27.1
Total infected with helminths.....	1	0.7			1	0.5
Total infected with both protozoa and helminths.....	1	0.7			1	0.5
Total infected with either or both protozoa and/or helminths	43	28.7	12	22.6	55	27.1
Total examined.....	150		53		203	

The students examined were residents of twelve states and the District of Columbia. One hundred and fifty, or 73.9 per cent were from the state of Indiana, 43 of the 92 counties of this state being represented. Thirty were from Tippecanoe County, 24 from Marion County, 11 from St. Joseph County, with lesser numbers from the remaining counties,

21 being represented by only one individual each. Of the states other than Indiana, Illinois had the largest representation, this being 27 students, or 50.9 per cent of all students outside of Indiana that were examined. In Table 2 data is presented indicating the number of students examined from each state, its per cent of the total examined and of those examined outside Indiana.

TABLE 2.—Data on the Residence of Students Examined.

State	No.	Per Cent of Total Examined	Per Cent Outstate Exams.
Indiana.....	150	73.9	
Illinois.....	27	13.3	50.9
Ohio.....	8	3.9	15.1
Kentucky.....	4	1.9	7.5
New York.....	3	1.5	5.7
Michigan.....	2	0.9	3.8
Mississippi.....	2	0.9	3.8
Wisconsin.....	2	0.9	3.8
Washington, D.C.....	1	0.5	1.9
Kansas.....	1	0.5	1.9
Massachusetts.....	1	0.5	1.9
New Jersey.....	1	0.5	1.9
Oklahoma.....	1	0.5	1.9
Total examined.....	203		

Discussion and Conclusions

No attempt will be made at this time to compare the data of the present survey with that obtained by similar studies of students of universities or schools outside of Indiana. Organisms of proven pathogenicity were harbored by 3, or 5.4 per cent, of those infected, while an equal number of individuals were infected with parasites of questionable pathogenicity. The two infections of *Endamoeba histolytica* were not producing demonstrable symptoms, but they should not be ignored as a source of infective material that will aid in the dissemination of the organism. Neither should these infections be ignored as a potential if not actual detriment to the individual harboring them, since lesions are produced even though symptoms may not be manifest.

There is no indication that the hookworm infection noted in this study was a native infection, since the individual harboring it had traveled considerably. Other surveys indicate that the hookworm infection may be native to Indiana. The incidence of the pinworm is rather low, and it is expected that the incidence would be higher if other methods of diagnosis were used (Headlee, 1942). Even in a similar group (Headlee, 1940) when less efficient diagnostic methods were used, the incidence of

this parasite was 1.9 per cent as compared to the 0.5 per cent of the present study.

The data obtained from the examination of university students prior to September, 1939 (Headlee, 1940) are presented in Table 3 along with the percentage incidence data of the present survey in such a manner that they can be compared. These two groups have been combined and the percentage incidence of the various parasites has been calculated, based on the examination of 416 students. Some parasites were represented in the 1940 survey that were not found in the present study. In the 1940 study the incidence for the various parasites was equal to or higher than the incidence for the same parasite in the present study.

TABLE 3.—Comparison of Data (Incidence Shown in Per Cent) of 1940 and 1942 Surveys; Data on Combined Surveys.

	1940	1942	Total
<i>E. histolytica</i>	2.8	1.0	1.92
<i>Endamoeba coli</i>	19.7	18.2	18.99
<i>Endolimax</i>	30.5	11.8	21.39
<i>Iodamoeba</i>	1.4	0.5	0.96
<i>Giardia</i>	2.3	1.5	1.92
<i>Chilomastix</i>	0.5	0.5	0.48
<i>Ascaris</i>	0.9		0.48
<i>Trichuris</i>	0.9		0.48
<i>Necator</i>	0.5	0.5	0.48
<i>Enterobius</i>	1.9	0.5	1.20
<i>Hymenolepis</i>	0.5		0.24
Tot. Inf. Protozoa.....	42.7	27.1	35.09
Tot. Inf. Worms.....	4.7	0.5	2.64
Total Infected.....	45.5	27.1	36.54
Total Examined.....	213	203	416

Although the incidence of pathogenic parasite infections among individuals of this group is relatively low, the data presented lend further support to previous studies, and indicate that parasite infections are a reality in the temperate regions, and, here as elsewhere, they should receive specific attention as factors and etiological agents of disease.

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