

Additional Data Concerning Human Intestinal Parasite Infections in Indiana

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Introduction

The question of the status of human parasite infections in Indiana is one which yet remains to be answered satisfactorily. Only meagre information is available concerning the incidence of parasite infections in this region and their importance in reference to public health. In a former report on the subject (Headlee, 1937), the available literature was reviewed, and certain case reports of parasite infections not in the literature were mentioned. The parasites listed in that report were *Plasmodium* (causal organisms of malarial fevers), *Endamoeba gingivalis*, *Trichomonas vaginalis*, *Diphyllobothrium latum* (the fish tapeworm of man), *Enterobius vermicularis* (the pinworm or seatworm), *Filaria bancrofti*, *Trichinella spiralis* (the pork worm), and among the arthropods, *Pediculoides ventricosus* (the grain mite), and the larva of the sheep gad fly *Oestrus ovis*. For the most part this information was gained from case reports, and there were no valid data concerning the incidence of these parasites in the general population of the state. No information was available concerning the incidence of intestinal protozoa. Reasons for this lack of information were set forth, data concerning the human parasite infections of neighboring regions were cited, and the hypothetical status of human parasite infections in Indiana was presented. It was concluded that "Indiana may have a considerable incidence of human parasite infections, particularly in the southern part of the state, but definite proof of this probable condition awaits more detailed studies than have at present been made."

During the past two years an attempt has been made to gain further information concerning human parasite infections in Indiana, particularly in reference to the incidence of intestinal parasites. The additional data now available have been obtained primarily from surveys conducted at Longcliff State Hospital, Logansport, Indiana, and among students at Purdue University. Other data have been obtained from the examination of individuals not included in the two groups just mentioned.

Materials and Methods

The only accurate method of detecting and diagnosing infections of intestinal parasites is by a microscopic examination of fecal material from the individual in question, which examination will reveal the ova of worms and the cysts and trophozoites of protozoa, if present. There are certain exceptions to this rule. Only a small percentage of infections with the pinworm, *Enterobius vermicularis*, are detected by fecal

examinations, due to the fact that the female worms do not lay eggs while they are in the intestine. The gravid females migrate from the bowel and burst when they reach the exterior, and eggs are scattered in the perianal and perineal regions. To diagnose this infection, perianal scrapings should be made and examined microscopically. In still other cases, if and when the larger worms, or portions of them, are passed in the stool, they may be examined and identified. However, an individual may have a parasite infection for years before it is detected in this latter manner.

The present data were obtained by microscopic examination of fecal specimens. The specimens were collected in cardboard containers and examined within 24 hours after collection. Both unconcentrated and centrifugalized, concentrated preparations were examined from each fecal specimen. A smear was made by comminuting a portion of fecal specimen in a few drops of physiological saline solution on a 40 x 75 mm. slide. A cover glass was placed over a portion of the smear, and to the remaining portion a drop of Donaldson's iodine was added before covering. This preparation was then examined under the microscope. A portion of the stool was comminuted in tap water, strained through gauze, and centrifuged. A portion of this concentrate was used to make an iodine-stained preparation for further examination. In this manner both trophozoites and cysts of protozoa and eggs and larvae of helminths can be observed in their natural and fixed conditions.

In 1936 Kmezza (1939) examined 1,200 patients of Longcliff State Hospital, Logansport, Indiana, for intestinal parasites. The patients of the hospital were all from northern Indiana, i.e., they had established their residence in the northern part of the state at least a year previous to admission to the hospital. Therefore, the results of this survey are a good indication of the incidence of infection with various species of intestinal parasites for this locality. Of the 1,200 patients examined, 565 were males and 635 were females. Among this group of patients 622, or 51.8%, were harboring one or more species of protozoa, helminths, or both. Six hundred and eighteen patients, or 51.5%, were infected with one or more species of protozoa; 20 patients, or 1.7%, harbored helminth infections, and 14 patients, or 1.2%, were parasitized with one or more species of protozoa and one species of helminth. The species of protozoa and helminths noted and the percentage incidence of each were as follows: *Endamoeba histolytica*, 0.2; *Endamoeba coli*, 31.3; *Endolimax nana*, 37.7; *Iodamoeba bütschlii*, 3.2; *Giardia lamblia*, 1.8; *Enterobius vermicularis*, 1.6; and *Diphyllobothrium latum*, 0.1.

During the past two years, primarily during the spring of 1937, a number of students of Purdue University were examined for intestinal parasites.¹ One hundred and forty-seven of these students indicated that their residences were in Indiana, and the data obtained will add to our knowledge of the incidence of intestinal parasites in this state. Of this number, 118 were males and 29 were females, ranging in age from 17 to 36 years. Of these students, 64, or 43.6%, were infected with one or

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more species of protozoa, and one, or 0.07%, with one species of helminth. The species of protozoa and helminth noted and the percentage incidence of each were as follows: *Endamoeba histolytica*, 3.4; *Endamoeba coli*, 17.7; *Endolimax nana*, 32.0; *Iodamoeba butschlii*, 0.07; *Giardia lamblia*, 3.4; *Chilomastix mesnili*, 0.07; and *Trichocephalus trichuris*, 0.07. Although these students had visited the Student Health Service for medical attention, only a small percentage of these were seeking relief from gastro-intestinal disturbances. In some instances the gastro-intestinal illness was proved to be due to, or enhanced by, parasite infection; in others it was not due to the presence of parasites.

Additional data may be added from the results of examinations of 13 other individuals residing in Lafayette and vicinity. These individuals sought examinations because they were desirous of knowing whether or not they were harboring infections. Thirteen persons were examined, 8 males and 5 females, ranging from 2 to 45 years of age.

Ten, or 76.9%, were infected with one or more species of protozoa, helminths, or both; 6, or 46.2%, harbored helminths, and 5, or 38.5%, had infections of protozoa. The parasites noted and percentages of incidence were as follows: *Endamoeba histolytica*, 7.7; *Endamoeba coli*, 23.1; *Endolimax nana*, 23.1; *Chilomastix mesnili*, 7.7; *Ascaris lumbricoides*, 7.7; *Enterobius vermicularis*, 30.8; and *Hymenolepis nana*, 7.7.

Combining the data from these three groups, the following percentage incidences of parasitism were noted; *Endamoeba histolytica*, 0.6; *Endamoeba coli*, 29.7; *Endolimax nana*, 36.9; *Iodamoeba Butschlii*, 2.9; *Giardia lamblia*, 2.0; *Chilomastix mesnili*, 0.15; *Ascaris lumbricoides*, 0.07; *Trichocephalus trichuris*, 0.07; *Euterobius vermicularis*, 1.7; *Hymenolepis nana*, 0.07; and *Diphyllobothrium latum*, 0.07. Of the 1,360 individuals examined 687, or 50.5%, were infected with one or more species of protozoa; 27, or 2.0%, were infected with helminths, and 16, or 1.2%, were infected with both protozoa and helminths, while 696, or 51.2%, were harboring infections of protozoa, helminths, or both.

The data for these three groups of individuals and the combined groups are presented in Table 1.

Discussion and Conclusions

The data presented in this paper give us a more complete picture of the incidence of human intestinal parasites in Indiana than has previously been available. However, more data are necessary before a complete picture can be presented. To date only a relatively small group of persons have been examined, and they were not representative of the general state population. Those individuals examined by one survey were representatives of a select group living under excellent sanitary conditions. The second group, representing university students, may be considered as a sample of the population group that has been more fortunate in regard to sanitation and general economic conditions. Therefore, a representative sampling of the population of the state has not yet been obtained, only a very few having been examined from the group representing the lower economic and social levels. Also, only a very few

children were examined, and in this group we would expect a higher incidence.

The incidence of *Endamoeba histolytica*, 0.6% for the general group is very low. Craig (1934) estimated that from 5 to 10% of the people of the United States were carriers of this parasite. The incidence of this parasite among the students, (3.4%) more nearly approaches this estimated figure.

If perianal scrapings had been examined, it is quite certain that the incidence of *Enterobius vermicularis* would have been considerably higher. The incidence of all parasites would no doubt have been higher if more than one examination of each person had been made.

The case of *Diphyllobothrium latum* infection was of interest because of an unusual clinical history, reported in detail by Headlee, Kmecza, and Cable (1939). This is the fifth case of diphyllobothriasis to be reported from Indiana.

The data presented justify the previous conclusion that "Indiana may have a considerable incidence of human parasite infections." The present data indicate that the incidence of pathogenic species is low, but, as examinations are made from a more representative part of the population, this incidence will probably increase.

Literature Cited

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