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Intestinal protozoan diversity of the human population of Patna district

Afsana Begum*
Parasitology Research Lab, Department of Zoology, Patna University, Patna, Bihar, India

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Abstract : Intestinal parasitic infections continue to be an important cause of morbidity and mortality in the developing countries including India. A study was carried out on intestinal protozoan parasites in Patna district during the year 2015 to 2016 with the purpose of achieving a better understanding of the incidence of the disease. A total of 588 stool samples were collected randomly from the inhabitants of selected areas and examined by simple saline preparation technique. In addition stained preparation by Lugol's iodine solution was also used for the identification of nuclear character of the cysts. Chi-Square test (χ^2 - test) was used to compare relative frequencies between sex specific incidence. 34% of the population (198/588) was found to be harbored with parasites. The incidence of infections for various protozoan parasites was as follows *Entamoeba histolytica* (19.5%) *Entamoeba coli* (7.6%) and *Giardia lamblia* (3.4%). About 3% of the samples contained multiple infections. The study revealed that the prevalence of intestinal protozoan parasites in Patna district is still so high and required special control measures.

Keywords : Intestinal parasites, morbidity, mortality, protozoan, prevalence, Patna

INTRODUCTION

Parasitic infections are prevalent throughout the world including India. It is estimated that more than 3 billon people are infected with intestinal parasites[1,2] and remain significant cause of morbidity and mortality in the developing countries.[3] The prevalence of parasitic infections depends on different variables such as poverty, illiteracy, lack of adequate sanitation, drinking water, health care, prevailing climatic and environmental conditions.[4] Besides these, socioeconomic conditions and cultural habits are also responsible for transmission of parasites.[5] The most common parasitic infections reported worldwide are *Ascaris lumbricoides, Ancylostoma duodenale, Trichuris trichiura, Enterobius vermicularis, Entamoeba histolytica, Entamoeba coli* and *Giardia lamblia*.[6,7] Most of the populations chronically affected with these parasites are responsible to increased risk of iron deficiency and nutritional anaemia, malnutrition, growth deficit[8] and sometimes mentally related disorder.[9] Protozoans are microscopic single celled organism that can be either free living or parasitic in nature. The most common protozoan parasites are *Entamoeba histolytica*, *Entamoeba coli* and *Giardia lamblia.* The disease caused by these parasites are known as amoebiasis and giardiasis and they are associated with diarrohea.[10] *Entamoeba histolytica* recorded worldwide and is more prevalent in the tropics and subtropics in colder climate.[11] *Entamoeba histolytica* can cause amoebiasis with an incidence rate of 5%-81% and estimated to affect approximately 480 million people.[12] Amoebiasis is the third leading cause of death from parasitic disease worldwide. The WHO estimates that approximately 50 million people worldwide suffer from invasive amoebic infections each year, resulting in 40-100 thousand death

*Corresponding author :
Phone : 8294036786, 7632911275
E-mail : afsana.begum@gmail.com

annually.[13,14] *Giardia lamblia* also has worldwide distribution with an incidence rate ranging from 11% to 30%. In USA, it is now considered to be the most common parasite and the leading cause of diarrohea.[15]

In India, the overall prevalence rate ranges from 12.5% to 66% with the prevalence rate for individual parasites varying from region to region.[16] However, studies on the overall parasitic load in the state of Bihar are still so scanty whereas studies related to soil transmitted helminths among school children in Bihar have been published in recent years.[17] Another study reported that incidence of helminth infection is greater than protozoan ones in eastern part of Bihar.[18] Therefore the present study was undertaken to determine the incidence related diversity of different protozoan parasite infections in the socioeconomically backward population of Patna.

MATERIALS AND METHODS

The survey was carried out from March 2015 to Feb 2016. A total of 588 fresh fecal samples were collected in wide mouthed, sterilized container with and without 10% formalin bearing necessary code. Other details regarding age, sex, religion, food habits, living status, source of drinking water and laboratory facilities were also recorded.

A macroscopic examination of all the collected samples was carried out for determination of color, consistency and presence of mucus and blood. For microscopic examination, Saline wet mount and Lugol's iodine wet mount were prepared as per standard protocol[19] for the identification of eggs, cysts and trophozoites of intestinal parasites. The data was statistically analyzed by applying Chi-Square test ($\chi 2$ - test).

RESULTS

The result of the overall survey has been summarized in Fig 1. Out of a total 588 fecal samples examined 198 (34%) of individual were found to be infected with intestinal protozoan parasites. Although females show slightly higher infection rate (52.1%; 103/225) than male (47.9%; 95/363) and the difference was found to be significant ($p < 0.01$).The incidence of intestinal protozoan was highest (41.6%; 75/180) in the age group of 6 to 12 years followed by (38.8%; 35/90) in age group 1 to 5 years, (29.4%; 25/85) in 20 to 30 years, (28.6%; 43/150) in 13 to 19 years and the least incidence was seen in the age group >30 years (24%; 20/83) (Table 1). Among different species of protozoan parasite the highest rate of infection was of *Entamoeba histolytica* 19.5% (115) followed by *Entamoeba coli* 7.6% (45) and *Giardia lamblia* 3.4% (20). About 3%(18) multiple infections were present (Table 2).

DISCUSSIONS

This study shows a much higher prevalence of intestinal protozoan parasites. In this study 34% of healthy subject revealed positive results for intestinal parasites and three species of protozoans are detected. The high rate of infection may broadly attribute to poverty, illiteracy, lack of safe drinking water, poor hygienic condition of the surroundings and malnutrition. The incidence and diversity of intestinal protozoan parasitic infections are known to show spatial (place specific), demographic, community, ethnic and temporal (season) variations.[20-21] In sex related incidence, females show higher infection rate than males. Higher prevalence among females may be attributed to their prolonged contact with prevailing unhygienic surroundings, low literacy rate, lack of knowledge of proper hygiene and carelessness about health. With respect to different species of protozoan *Entamoeba histolytica* (19.5%) and *Entamoeba coli* (7.6%) showed relatively higher incidence than *Giardia lamblia* (3.7%). These results are similar to those reported in other parts of India including Bihar 40.4%[22-24] but they are not in line with those obtained by other authors who found that *Giardia lamblia*[25] was the most prevalent protozoan species. The high rate of *Entamoeba histolytica* and *Entamoeba coli* in our study could be due to the existence of resistant cysts of both parasites in the study area.

On the basis of our results it is evident that the incidence of intestinal protozoan parasitic infection is relatively high in the study area. Poor sanitation and inadequate environment constitute the main determining factors that predisposed this population to parasitic infection. Therefore, this findings suggests the need of the hour that preventive measures should be taken to educate social and medicinal personnel as well as NGO's which can further educate community for hygiene practice. Our study also suggests that steps should be taken rigorously to prevent health damage through intestinal parasitic infection which causes the financial burden of the nation.

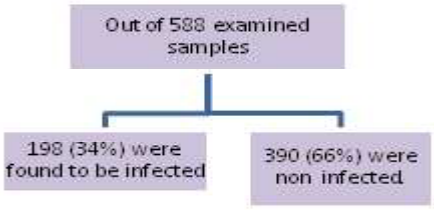
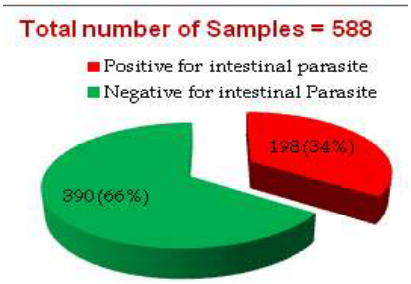


Fig.1.



Pie Chart with reference to Fig.1.

Table 1. The incidence of intestinal parasitic infection out of 588 samples studied.

Variables	Total no. of samples Studied (588)	No. of infected samples (198)	Prevalence % (34)	*P value*
Sex				
Male	363	95	47.9	
Female	225	103	52.1	<0.01
Age(Years)				
1 – 5	90	35	38.8	
6 – 12	180	75	41.6	
13 – 19	150	43	28.6	
20 – 30	85	25	29.4	
>30	83	20	24.0	

Table 2. Species wise prevalence of protozoan infection out of 588 samples studied.

Parasites	No. of infected case (198)	Prevalence (%)
E. histolytica	115	19.5
E. coli	45	7.6
G. lamblia	20	3.7
Multiple infections	18	3.0

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