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Prevalence and associated risk factors of human intestinal parasitic infections in rural areas

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Abstract---Introduction: Determination of the prevalence and distribution pattern of intestinal parasites is a fundamental step to set up an effective control program to improve the health status. This study aimed to prevalence of intestinal parasitic infections and associated risk factors among inhabitants. Methodology:- Population of this study were 1150. Among all 430 participants were found infected with parasitic infection. This study was conducted in Department of Microbiology Bhagwan Mahavir institute of medical sciences, Nalanda. The duration of study was over a period of two years. Result:- This result of this study revealed that 1150 total cases were included. Out of all we have found 430 infected cases with parasite. Conclusion:-The conclusion of this study high prevalence of intestinal protozoan infections was observed among the inhabitants of the study area as compared to helminthes.

Keywords---parasitic infections, intestinal parasitic infections, protozoan, helminthes,

Introduction

Parasitic infections are among the major health problems of the world resulting in 450 million and 200,000 per annum disease and deaths, respectively [1]. One of the main among all these are protozoan infections those are predominantly prevalent in preschool children of developing countries [2, 3]. *E. histolytica*/dispar, *G. lamblia*/duodenalis, and *Cryptosporidium* spp. are the most prevalent pathogenic intestinal protozoan species worldwide [4]. The global burden of *E. histolytica* infection has been reported to be around 500 million people with an annual incidence rate of five million cases. It results in 50 million annual symptomatic morbidities and 100,000 mortalities [5]. It has been reported to result in 2.2 million disability adjusted life years [6, 7]. While *G. lamblia*/duodenalis, has been reported to infect 280 million people annually. In resource-poor countries, *Giardia* causes 2.5 million cases of diarrhea per year especially in early infancy and reaching up to 30% in less than 10 years old children. [8]. The worldwide prevalence of cryptosporidiosis is 1 to 4.5% and 3 to 20% respectively in developed and developing countries. In AIDS patients, its infection rate is 3 to 20% in the United States and 50 to 60% in Africa and Haiti [9-10]. Route of transmission of these protozoan infections is oral-fecal following direct or indirect contact with the infectious stages. This transmission may be human-to-human, zoonotic, waterborne, and food borne [11]. However, the airborne transmission has also been seen in *Cryptosporidium* [12]. The increased HIPPis can be caused by eating unwashed fruits, nail-biting, sucking fingers, and contact with infected family members [13, 14]. Protozoan infections are responsible for causing serious public health problems such as iron deficiency anemia, other nutritional depletion, poor immunity, mucosal loss and lymphatic leakages, local hemorrhages and physical and mental growth retardation among children [2]. Protozoan parasitic infections create major health concerns in developing countries despite astounding development in medical science [15]. Poor environmental sanitation, contamination of water, poor personal and food conditions and lack of awareness about simple health promotion practices make HIPPis the most common problems [16-19].

Material & Methods

Study Population:- Population of this study were 1150. Among all 430 participants were found infected with parasitic infection.

Study Area:- This study was conducted in Department of Microbiology Bhagwan Mahavir institute of medical sciences, Nalanda.

Study duration:-The duration of study was over a period of two years.

Data collection:- Stool specimens were collected in the labeled, wide-mouth, plastic containers. At the laboratory section of the health centers after examining the specimens for consistency, color, the presence of blood, mucus and adult intestinal helminths, macroscopically, a direct wetmount was prepared and examined for the fresh specimens with a watery consistency or containing blood or mucus under low-power objective (10×) and high dry objective (40×) for suspicious objects. Also, a part of each collected specimen (approximately 2 g)

was cultured on agar plates. Then, all specimens were preserved in 10% buffered formalin and transported to the laboratory.

Data Analysis:-Data were analysed by using Microsoft Excel.

Result

We were included 1150 total cases. Out of all we have found 430 infected cases with parasite. In this study we were included total 430 cases. Among all 200 were male and rest were female. This study observed 142 cases from the age group 10-30 years followed by 31-50 (127), 1-9 (117) & >50 (44). We observed that housewife were 25.8% ,101 students,81 children followed by farmer (18.1), employed ,unemployed and others. Predominantly we were found illiterate cases rather than littrate. 64.8% cases drink tap water and rests were drinking well water. Among all 65% cases were in contact of animal and rest 35% cases were not contact of animal. In this study we were found protozoan infection in 306 cases and in 124 cases helminthes infection.

Table:1 Distribution of population on the basis of infected cases

Cases	numbers
Infected cases	430
Uninfected cases	720
Total	1150

Chart:1 Distribution of cases according to gender

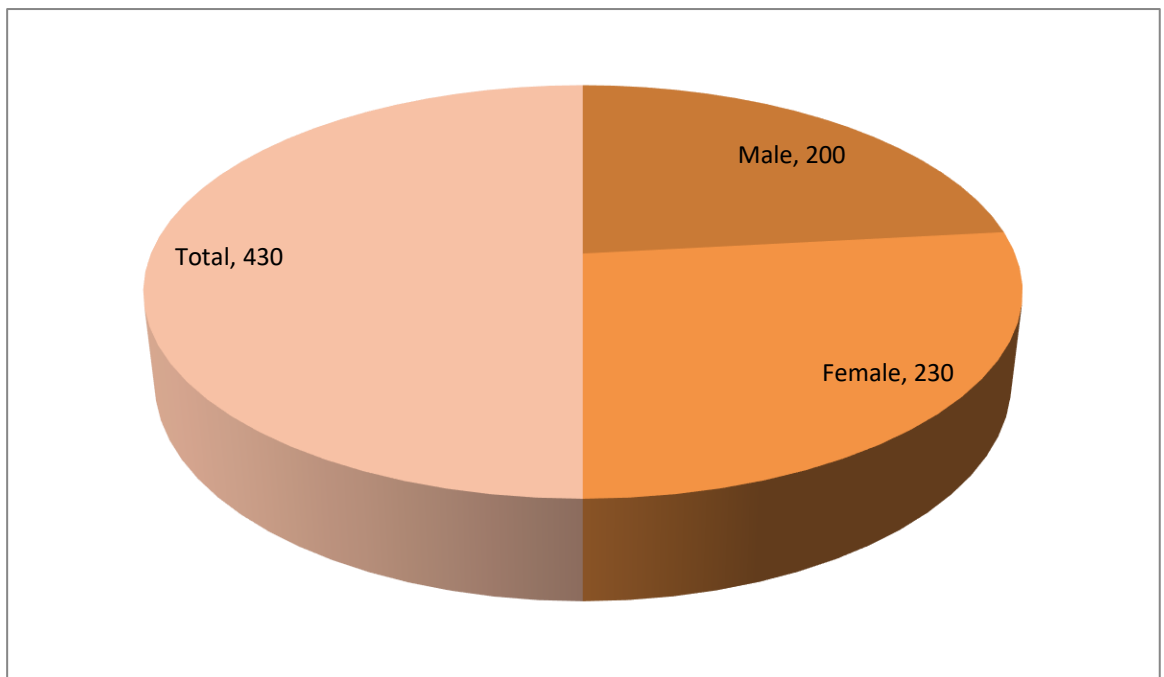


Chart: 2 Age group distribution

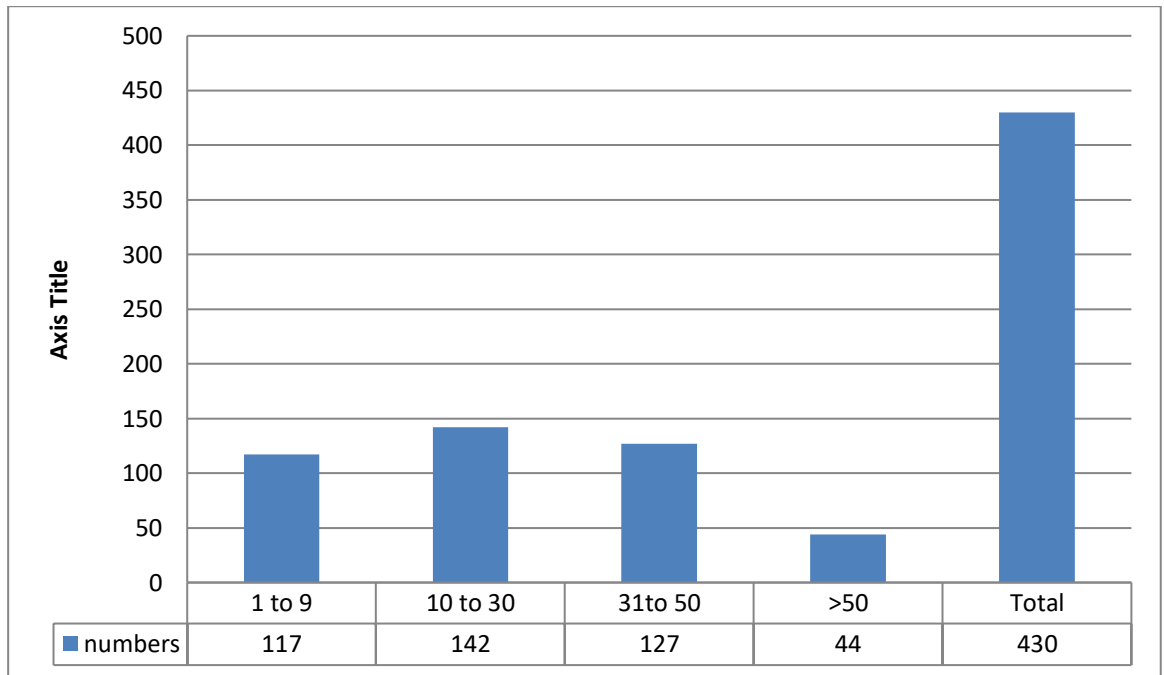


Table:-2 Distribution of cases according to Socioeconomic status

Occupation	No.	Percentage
Housewife	111	25.8
Children	81	18.8
Student	101	23.4
Farmer	78	18.1
Employed	35	8.1
Unemployed	12	2.7
Others	12	2.7
Total	430	100
Educational level		
Illiterate	343	79.7
literate	87	20.2
Total	430	100
Source of drinking water		
Tap water	279	64.8
Well water	151	35.1
Total	430	100
Animal contact		
Yes	280	65
no	150	35
Total	430	100

Table:3 Distribution of cases according to Parasites

Parasite	No.	Percentage
Protozoa		
<i>Blastocystis hominis</i>	143	33.2
<i>Entamoeba histolytica</i>	43	10
<i>Entamoeba hartmanni</i>	38	8.8
<i>Giardia lamblia</i>	82	19.1
Helminthes		
<i>Hymenolepis nana</i>	48	11.1
<i>Enterobius vermicularis</i>	38	8.8
<i>Ascaris lumbricoides</i>	38	8.8
Total	430	100

Discussion

In the current study, one-third (37.3%) of the inhabitants have been found to be infected by intestinal parasites. This finding is supported by the studies carried out in healthy inhabitants in rural and tribal areas. Infection rate of 28% was reported by Barkhori et al. [20]. Similarly, a relatively high prevalence of infection was reported in nomadic tribes of Ethiopia [21–24]. 32.7% of the infection was reported by Hemmati et al. [25] in their study of Iran. The findings of all these studies revealed the poor arrangements for controlling the intestinal parasites especially protozoans that poses a significant public health problem in rural and tribal areas despite the advancements in personal and public health measures. We can understand the value of this issue only when we find why the reported prevalence is lesser than the actual one as in most studies only one stool specimen of subjects was examined while for accurate diagnosis three sequential specimens in three alternate days should be collected and subsequently examined [26]. It was also observed that specific diagnostic methods such as Gram and modified acid-fast staining for *E. vermicularis* and coccidian respectively were not tested. In the present study, *Blastocystis* sp., *H. nana*, and *G. lamblia* were found to be the most common intestinal parasites just similar to other studies [20–22]. The mode of transmission in all of them was assessed to be feco-oral indicating poor hygiene practices. The prevalence of *Blastocystis* sp. infection was 33.2% in the present study. Thus, it was within reported range (7.5 to 28.4%) of *Blastocystis* infection in the apparently healthy populations [25]. An association between carrying the parasite and some clinical manifestations has been shown in several studies though it is controversial [27–29]. The highest prevalence of *Blastocystis* infections was found to be in age group of 30 to 39 year, in the present study. It has been found that the incidence of *Blastocystis* infection increases with increasing age [25, 30]. But, more evidences are required to prove association between these because there is not a very clear aspect of zoonotic mode of transmission and potential host factors important for colonization. In the present study, the prevalence of *E. histolytica* was observed to be 10% which is higher than other study carried out in recent decade on apparently healthy people where the prevalence was reported to be 18.9% . In the present study, *A. lumbricoides* as a soil transmitted helminthes (STH) infection was reported to be 8.8% . After going through the literature, it has been observed

that the prevalence of *A. lumbricoides* decreased from 46.7% in 1987 [31-32], 17.8% in 1992 [33], and 16.3% in 1996 [34] to 8.8% in the present study. This fall can be ascribed to the effective measures of improving public health. Results of the present study showing low prevalence of intestinal helminthes infections were found to be consistent with the results of other recent studies. [25]. Various possible causative determinants associated with intestinal parasitic infections were investigated in the present study and a significant association was found between intestinal parasitic infections and source of drinking water as well as residencies in rural areas. For infection with intestinal protozoa, source of drinking water was found to be a so important determining factor that a waterborne transmission of all detected protozoa was found to be possible in the present study. It was assessed in the present study that most of the participants were not having availability of safe drinking water. Many of these participants were found to develop intestinal parasite infection. This much high prevalence in the participants who were not having availability of safe drinking water advocates the odds of waterborne transmission. Other studies have been found to provide comparable results about the importance of sources of drinking water [25].

80% of the study population is living in the rural area and needs improved public health facilities. Socioeconomic status and access to proper health facilities of this area were not appropriate in comparison to Urban population, therefore, the prevalence of intestinal parasites is high in rural areas.[35] Association between socioeconomic status of rural areas and higher incidence of parasitic infection has been observed in various studies [36].

Association of intestinal parasitic infections with age, educational status, sex, occupation, and animal close contact was not found in the present study. In the current study, intestinal parasitic infections showed no significant association with sex, age group, occupation, education level, and animal close contact. In less than nine years old kids, the prevalence of parasitic infections 27.2%. Though, it was higher than other groups but it was not statistically significant. In this age group, *G. lamblia* is the most common intestinal parasite and a significant association between *Giardia* infection and age group was demonstrated by univariate analysis. Children with low personal hygiene have increased level of intestinal parasitic infections. Though, no association was found between intestinal parasitic infections and participant's education level, but it was observed in the present study that the rate of parasitic infections decreased with increase in the level of literacy. Well educated people may take appropriate steps to avoid the transmission of intestinal parasitic infections as they are more alert in comparison to uneducated. There were no differences in the odds ratio of the parasitic infections in participants with and without close contact with the animals in the present study. Thus, it can be advocated that there was no role of domestic animals in the transmission of intestinal parasitic infections diagnosed in the study population.

Conclusion

High prevalence of intestinal protozoan infections was observed among the inhabitants of the study area as compared to helminthes. Though, in comparison to previous studies, a decreasing trend of intestinal parasitic infections was

found in the population but intestinal parasites especially protozoans were still a difficult public health issue due to poor sanitation and public health measures.

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