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Original Article

Prevalence of Intestinal Parasites in a Tertiary Care Hospital in Rural Bihar

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Abstract

Background: That intestinal parasitosis is a major health problem in developing countries including India is well known. Many a studies have been done in our country on this issue, but most of them are from South India and a few from North and Central India. However, very few studies in recent years have been done from Bihar. Ours being a rural medical college in Bihar, we have ventured to study the epidemiology of intestinal parasites to find the recent changes in trend and differences from other parts of India and from other developing countries.

Materials and Methods: An institution-based retrospective study was done on the stool examination reports of the past 2 years. All symptomatic patients clinically suggesting intestinal parasitosis in the Medicine Outpatient Department were referred to the Microbiology Department for routine stool examination to detect the intestinal parasites in that population. Only adults above 18 years were included in the study irrespective of sex. Apart from naked eye observation, each sample was examined microscopically for ova, parasites, and cysts, after preparing the sample with saline wet mount and Lugol's iodine wet mount.

Results: Out of 3343 samples examined, 1346 (40.26%) were positive for parasites. The rest 1997 were parasite negative. Out of those positive, 1113 had only one parasite in their stool specimen, 221 had two parasites, and only 12 had three parasites. The prevalence of *Entamoeba histolytica*, *Giardia lamblia,* and *Ascaris lumbricoides* was the highest in that order.

Discussion: The prevalence of *E. histolytica* (~40%) was almost common throughout India. *G. lamblia* was the next common in Bihar, but *Blastocystis* was the second most common in South Indian studies and those in all coastal regions of the country. Incidences of hookworm have reduced throughout India compared to that in 1980s studies.

Conclusion: Our studies reveal that the situation of intestinal parasitosis is a matter of concern and drastic steps should be taken to minimize the gravity of this malady.

Key words: Intestinal parasites, Prevalence, Rural Bihar

INTRODUCTION

Intestinal parasitic infections are one of the major health problems in several developing countries including India.[1] They constitute the greatest universal cause of morbidity and mortality. It is estimated that 60% of the world population is infested with enteric parasites.[2] The WHO estimates that one person in every four harbors parasitic worms.[3] Intestinal parasitic infections persist and flourish wherever poverty, inadequate sanitation, insufficient health care, and overcrowding are entrenched.[4]

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The prevalence of parasitic diseases depends on environmental, social, and economic factors.[5] Poverty, illiteracy, high population density, proximity with animals, and poor hygiene conditions along with unavailability of safe and potable water attribute to the higher prevalence of intestinal parasites in developing nations.[6] Moreover, certain environmental factors such as pollution, global warming and the tropical hot, and humid weather conditions also contribute to disease. Consequently, the epidemiological pattern of the parasite varies with geographic location.

The most common parasitic infestations reported globally are *Ascaris* (20%), *Ancylostoma duodenale* (18%), *Trichuris*

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trichiura (10%), and *Entamoeba histolytica* (10%).[7] The WHO estimates that approximately 50 million people worldwide endure insidious amoebic infection, resulting in 40-100 thousand yearly deaths. Current estimates suggest that *Ascaris lumbricoides* can infest more than 1 billion and *T. trichiura* and hookworms can infest 795 and 740 million people, respectively.[8] In India, overall prevalence rate of intestinal parasitic infestation ranges from 12.5% to 66%, with varying prevalence rate for individual parasite.[9]

Studies reporting the overall parasitic load in the state of Bihar have been scanty, whereas a study related particularly to soil-transmitted helminths (STHs) among school children in Bihar have been published in the recent past.[10] Another study reported the prevalence of helminthic infestations to be greater than protozoal infestations in the eastern part of Bihar.[11] The most important drawback of intestinal parasitic infestations is that about 90% infected individuals remain asymptomatic.[12]

Pertaining to our knowledge, no recent study, taking into account the overall prevalence rate of intestinal parasites, has been reported from north-eastern part of Bihar. Therefore, a retrospective study was undertaken by the Department of Medicine and Microbiology, MGM Medical College and Lions Seva Kendra Hospital, Kishanganj, whereby all symptomatic patients from Medicine Outpatient Department (OPD) were referred to Microbiology Department for routine stool examination to detect the intestinal parasites in that population. The study also aims to analyze the prevalence rate of multiple parasitic infestations in this community.

MATERIALS AND METHODS

The present study is a retrospective study undertaken at a rural medical college and hospital in the eastern region of India. Adult patients who reported to medical OPD of the hospital during the period of January 2015 - December 2016 with gastrointestinal symptoms and were subjected to routine stool examinations were included in the study. A total number of 3343 patients of both sexes were found to fulfill the criteria of inclusion. The age range of the patient population was 18-76 years.

Routine macroscopic examinations were carried out for consistency, color, presence of mucous and blood, and presence of adult worms, scolices, and proglottids.

For microscopic examinations, saline wet mount and Lugol's iodine wet mount were prepared as per standard protocol. Each sample was examined under microscope for the presence of ova, parasites, and cysts.

RESULTS

A total of 3343 stool samples received, 1346 were positive and 1997 were negative. The results of the study are given in Tables 1-3 and Figures 1-3.

DISCUSSION

Overall, our study included examination of stool specimens of 3343 persons, inclusive of both sexes and aged above 18 years. These patients had some clinical signs and symptoms raising the suspicion that they might be suffering from gastrointestinal parasitic infestations. They all attended the Medicine Outpatient Department of our Medical College and were referred from there to the Microbiology Department for examination of stool, detection of ova, and cysts and adult forms of different infesting parasites. The study was done for a period of 2 years beginning from January 1, 2015, and ending on December 31, 2016. Out of the 3343 specimens examined, only 1346 stool specimens were found to be parasite positive whereas the rest 1997 specimens happened to be parasite negative. Now, from among the 1346 parasitosis cases, 221 had 2 parasite infestations and only 12 had infestations with three parasites. The rest 1113 parasite positive patients had only one parasite in their stool specimens.

Among all, *E. histolytica* leads the group covering 40.49% of all parasitosis cases. The second place was occupied by *Giardia lamblia* (24.44%). The next in order were *A. lumbricoides* (21.09%), *Enterobius vermicularis* (4.9%), *A. duodenale* (2.82%), *Hymenolepis nana* (2.3%), *Strongyloides stercoralis* (1.93%), *T. trichiura* (1.26%), and *Taenia* (0.74%).

Among dual parasite infestation cases, a combination of *E. histolytica* and *G. lamblia* is by far the most common (68.33%). The nearest but quite at a lower rank is the combination of *A. lumbricoides* and *E. histolytica*, the percentage being 9.05%. The leading combination in the triple infestation group is one of *E. vermicularis, A. lumbricoides,* and *G. lamblia* (34%). The next combination is that of *E. histolytica, A. lumbricoides,* and *E. vermicularis* (25%). The rest triple parasite combinations are equally distributed.

A similar retrospective study was done in JIPMER, Puducherry, wherein a 5-year study, a total of 1508 samples were obtained and studied, compared to the 3343 samples in our study in just 2 years, even if they also included children in their study which we did not.[2] However, in their study method apart from direct wet mount, they also used stool concentration techniques along with Wheatley's modified trichrome staining and also modified acid-fast staining for better detection of the different types and forms of

Table 1: Intestinal parasites in stool specimens

Name of the parasite	*n* (%)
A. lumbricoides	284 (21.09)
E. histolytica	545 (40.49)
G. lamblia	329 (24.44)
A. duodenale	38 (2.82)
E. vermicularis	66 (4.90)
T. trichiura	17 (1.26)
H. nana	31 (2.30)
S. stercoralis	26 (1.93)
Taenia	10 (0.74)

A. lumbricoides: Ascaris lumbricoides, E. histolytica: Entamoeba histolytica, G. lamblia: Giardia lamblia, A. duodenale: Ancylostoma duodenale, E. vermicularis: Enterobius vermicularis, T. trichiura: Trichuris trichiura, H. nana: Hymenolepis nana, S. stercoralis: Strongyloides stercoralis

Table 2: Double parasitic infestation

Name of the parasites	Number
E. histolytica+G. lamblia	151
A. lumbricoides+E. histolytica	20
E. vermicularis+G. lamblia	13
E. histolytica+H. nana	3
A. lumbricoides+G. lamblia	8
E. vermicularis+A. lumbricoides	4
A. lumbricoides+A. duodenale	6
A. lumbricoides+T. trichiura	1
E. vermicularis+Taenia	2
A. duodenale+H. nana	1
A. lumbricoides+H. nana	4
E. vermicularis+H. nana	1
G. lamblia+T. trichiura	2
E. vermicularis+A. duodenale	1
E. histolytica+Taenia	1
G. lamblia+S. stercoralis	1
A. lumbricoides+S. stercoralis	1
E. vermicularis+S. stercoralis	1

E. histolytica: Entamoeba histolytica, G. lamblia: Giardia lamblia, A. lumbricoides: Ascaris lumbricoides, E. vermicularis: Enterobius vermicularis, H. nana: Hymenolepis nana, A. duodenale: Ancylostoma duodenale, T. trichiura: Trichuris trichiura, S. stercoralis: Strongyloides stercoralis

Table 3: Triple parasitic infestation

Name of the parasites	Number
E. vermicularis+A. lumbricoides+G. lamblia	4
E. histolytica+E. vermicularis+A. lumbricoides	3
E. histolytica+G. lamblia+S. stercoralis	1
E. vermicularis+A. lumbricoides+A. duodenale	1
A. lumbricoides+A. duodenale+G. lamblia	1
A. lumbricoides+E. histolytica+G. lamblia	1
E. vermicularis+H. nana+T. trichiura	1

E. histolytica: Entamoeba histolytica, G. lamblia: Giardia lamblia, A. lumbricoides: Ascaris lumbricoides, E. vermicularis: Enterobius vermicularis, H. nana: Hymenolepis nana, A. duodenale: Ancylostoma duodenale, T. trichiura: Trichuris trichiura, S. stercoralis: Strongyloides stercoralis

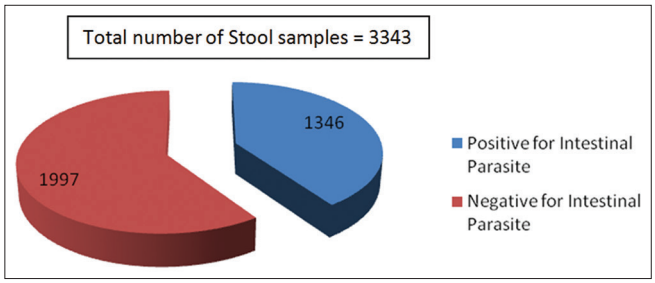

Figure 1: Number of patients who had shown the presence of parasite in stool sample

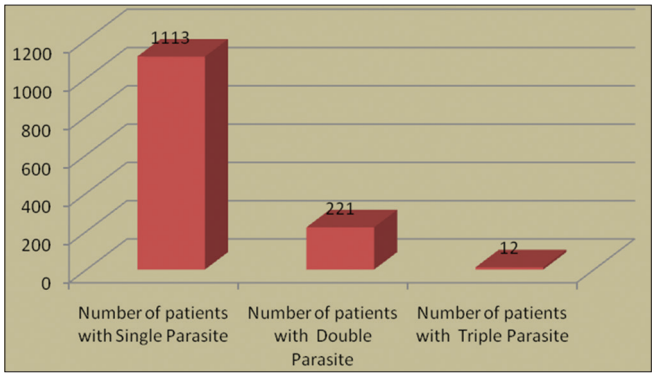

Figure 2: Number of patients with single, double, and triple parasites in the stool samples

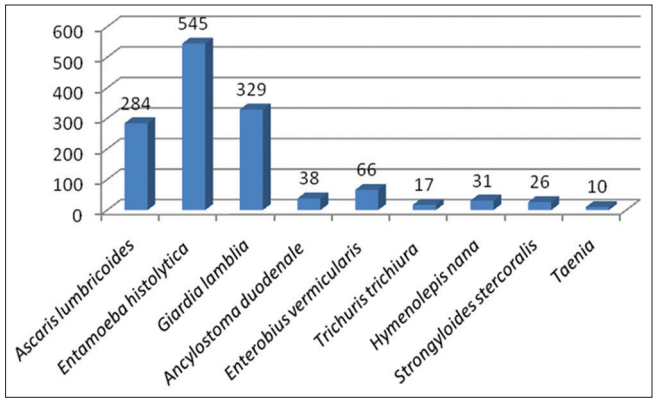

Figure 3: Number of different intestinal parasites detected in stool samples of patients with single parasite

parasites. In this study in southern India, there were some differences noted in the pattern of parasites compared to ours in eastern state of Bihar. They observed in their population some parasite species such as *Entamoeba dispar*, *Entamoeba moshkovskii, Entamoeba coli, Blastocystis*, *Balantidium coli,* and also some members of coccidian parasite genera such as *Cystoisospora*, *Cyclospora,* and *Cryptosporidium*, none of which was observed in our study in a rural background. On the contrary, we noted quite a significant number of cases of *H. nana* (31) and *S. stercoralis* (26), even a single number of these parasites were not found in Puducherry study. However, both in theirs and our study, *E. histolytica* was the most common intestinal parasite (39.7% in South India and 40.49% in Bihar) proving that the percentage of population suffering from this type of parasitosis, namely *E. histolytica* is almost exactly the same. Interestingly, this was consistent with other Indian studies also.[8,13,14] However, the second most common parasite is *Blastocystis* in South

India, compared to that being *G. lamblia* in Bihar. They also noted a gender bias, i.e., parasitosis in 56% of females and only 44% of the affected persons were males. We did not include this in our study.

Regarding prevalence, Puducherry study showed a prevalence rate of 22.21%, ours in Bihar was 40.26%, and in another study in Vellore, it ranged from as low as 12.5% to as high as 67%.[15]

Even if we did not get any *Blastocystis* case in our study, it was the second most common in Puducherry study and was one of the most frequent intestinal parasites in other studies such as another from Puducherry[16] and two from Chennai.[8,14] In Western countries, *Blastocystis* ranges from 0.5% to 62% (Clark *et al.*, 2013).[17] Studies from other parts of India showed a high prevalence of *Blastocystis* also.[3,18,19] The absence of *Blastocystis* could be due to our techniques, but there has been a suggestion that *Blastocystis* infestation is more common in coastal regions mainly which could be a cause of non-infestation with *Blastocystis* in Bihar which is quite far from sea coast.[15]

Among the STH, *A. duodenale* (hookworm) is by far the most common in India, as also in our study (4.9%), leading to intractable anemia in rural people who are accustomed to walking barefoot in contaminated soil. However, the prevalence of hookworm infestation is now grossly decreased in our country compared to that in the 1980s, as shown by our study (2.82%), Puducherry study in 2016 (8.7%) compared to study by Parija and Rao in 1987 where it was 10.5%. This may be due to more use of footwear among farmers, laborers, and other common people in the present days and also gross improvement of sanitation and a commendably higher use of sanitary latrines in villages and among people of poor socioeconomic status due to vigorous campaigning, financial and technical helps by the government in recent years.

One study in rural Cote d'Ivoire showed that polyparasitism is very common in that place (30%).[20] In our study, the prevalence of this was 17.3% and that in Puducherry study, it was 1.46%.

In a study in Thailand, *G. lamblia* was the most frequent parasite (18.4%).[21] Furthermore, it was more common in the asymptomatic population than the symptomatic ones. The next most frequent parasite in that report was *Cryptosporidium* oocysts. This also was more common in asymptomatic individuals (2.5%) than in symptomatic patients (0.8%). Two other Thailand studies showed the prevalence of said parasite to be 9.1%.[22,23]

In a study from north-east India, Shillong, Meghalaya, it was shown that parasite infestations were present in 53.2% of all immunocompromised patients.[24] We did not do any separate study for this population. A study from Morocco showed a peculiar finding that 65.7% of all pregnant women had one or more parasites when their stool was examined.[25] In a similar study from Venezuela, the prevalence rate was 73.9%.[26]

In a guideline by the US Department of Health, 2013, it is suggested that the people from developing countries of Asia, Africa, and others are highly susceptible to parasitic infestations, but among them, STH is the most important and to be looked after seriously as they lead to significant illness and even death.[27]

CONCLUSION

It has been revealed from the present study that there is a gross burden of parasites in the gastrointestinal tract which leads to morbidities ranging from minor symptoms to major maladies. Although it is suggested by a guideline of the US Department of Health to first screen the population with simple differential count of WBC in blood and then to screen the stool in a large population only in those with some degrees of eosinophilia, yet the process is not based on significant evidences and a direct stool examination of all cases even the asymptomatic ones in a susceptible community is the best method of intestinal parasite detection. Our study also suggests that steps need to be taken rigorously to prevent health damage through intestinal parasitosis in the state of Bihar, or for all developing countries as a whole, for that matter.

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