

## Original Research Article

# Intestinal parasitic infection in adult patients attending tertiary care hospitals: a retrospective study

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## ABSTRACT

**Background:** Intestinal parasitic infections (IPI) are recognized as neglected tropical diseases. Inadequacy of epidemiological data reporting the prevalence of intestinal parasites among the general population prompted this retrospective study conducted among the Departments of Medicine and Microbiology of two medical colleges.

**Methods:** All the symptomatic patients were examined for IPI. 831 parasite positive stool samples were included for the study. The age range of the patients were above 18 years. Stool specimens were processed using formol-ether concentration technique. Routine microscopic examination (saline and Lugol's iodine mounts) were carried out for ova, cysts or parasites. The sample was partly preserved in 10% formal saline and later concentrated and fixed with methanol before staining by modified Ziehl Neelsen stain.

**Results:** Out of the 831 positive samples, *E. histolytica* was predominant with 337 (40.55%) of all cases. The next in order were *Giardia lamblia* 216 (25.99%), *A. lumbricoides* with 173 (20.81%), *E. vermicularis* with 43 (5.17%), *A. duodenale* with 23 (2.76%), *H. nana* with 19 (2.28%), *S. stercoralis* with 17 (2.04%) and *Taenia* with 3 (0.36%). 134 patients had double parasites isolated, while only 3 had triple parasitic infestation.

**Conclusion:** Present study showed a preponderance in gender towards males (59.4%) than females (40.5%). Larger sample size and more surveillance studies will help to establish effective measures and evidence-based approaches to curb the parasitic proliferation in this region.

**Keywords:** Adult patients, Intestinal parasitic infections, Retrospective study

## INTRODUCTION

Intestinal parasitic infections (IPI) are recognized as neglected tropical diseases. They are a global health problem causing morbidity in 450 million people.<sup>1</sup> About one third of the world is infected with intestinal parasites.<sup>2</sup> These infestations are prevalent in disadvantaged communities, particularly in tropical and subtropical areas, mainly due to faecal contamination of water and food, hot and humid climate and environmental and socio-cultural factors like climate, hygiene and age enhancing parasitic

transmission.<sup>3</sup> The prevalence of the intestinal parasitic infections vary from one region to another and it also depends largely on the diagnostic methods employed and the number of stool examinations done.<sup>4</sup>

These parasites reside in the gastrointestinal tract in humans and other animals. In urbanized countries, protozoan parasites commonly cause IPI in contrast to helminths.<sup>3</sup> The most common parasitic infections reported globally are *A. lumbricoides* (20%), *A. duodenale* (18%), *T. trichiura* (10%) and *E. histolytica* (10%).<sup>2</sup> The

intestinal parasitic infections are acquired by ingestion, inhalation, penetration of intact skin by infected forms and the high incidence is closely correlated to low socioeconomic status and poor environmental hygiene of affected persons.<sup>5</sup> These factors directly contribute to the frequency of IPIs and consequently the prevalence of infection varies with different states of India.<sup>6</sup>

Studies highlighting the true parasitic burden from the land-locked state of Bihar have been scanty in the past. Two studies, one among the school children and another from Eastern Bihar reported helminthic infestations to be greater in prevalence than protozoal infestations.<sup>7,8</sup> One recent study from a tertiary care centre in Bihar reported both protozoan and helminthic infestations along with polyparasitism.<sup>9</sup> A second study from Bihar done on seasonal variations of intestinal parasitosis showed monsoon to have the highest load.<sup>10</sup>

Another study among the paediatric population of two medical colleges from Eastern India showed the predominance of helminths (*E. vermicularis*) in comparison to that of protozoan parasites.<sup>11</sup>

There is inadequacy of epidemiological data regarding the prevalence of intestinal parasites among the general population in this part of India. This prompted such a retrospective study conducted among the departments of Medicine and Microbiology of two medical colleges whereby all the symptomatic patients from the Medicine Outpatient Department were referred to the Microbiology Department for routine stool examination.

## METHODS

This study being a retrospective one was undertaken at two Departments, Medicine and Microbiology of two medical colleges and tertiary care hospital located at Kishanganj, and Malda - in the eastern part of India. Patients reported to the Medicine OPD of the hospital during the period of January 2015 to May 2017 with gastrointestinal symptoms were chosen for the study. A total of 831 patients of both sexes were able to fulfill the criteria of inclusion. The age range of the patient population was taken as above 18 years. Written consent was taken from the patients prior to the study. Those who did not give their consent were excluded from the study.

### Specimen processing

Single fresh morning stool sample (10-50 g) was collected from each patient in a clean, wide-mouthed container. Freshly voided stool specimen was processed using formol-ether concentration technique and microscopically examined for ova, cysts or parasites using saline and Lugol's iodine mounts on grease free slides.

Part of the stool specimen was preserved in 10% formal saline and from this a concentrated smear was made on a grease free slide, fixed with methanol and stained by

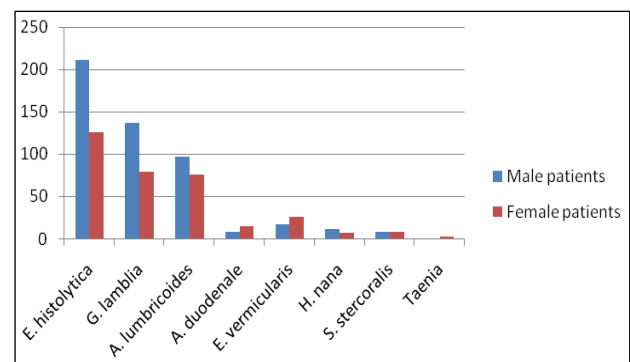
modified Ziehl Neelsen stain. The data was collected and analysed by using simple statistical methods.

## RESULTS

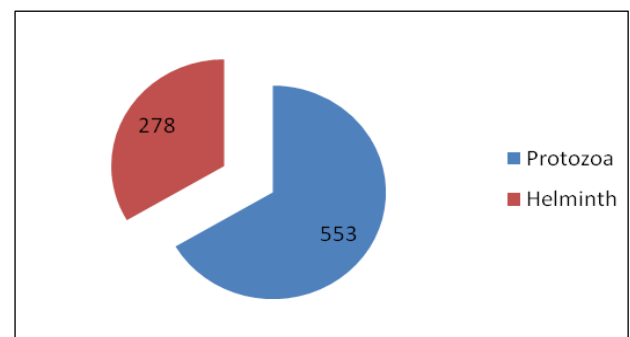
Total 831 stool samples were included in the study. Age group of the patients ranges from 18 to 71 years. We had used simple statistical methods for data analysis. Table 1 depicted the distribution of parasites and the Figure 1 depicted gender wise distribution of parasites. Figure 2 showed the protozoa and helminthic distribution and the Figure 3 depicted the number of patients with single, double and triple parasites.

**Table 1: Distribution of parasites in total.**

Name of parasites	Total number isolated	Percentage (%) isolated
<i>E. histolytica</i>	337	40.55
<i>G. lamblia</i>	216	25.99
<i>A. lumbricoides</i>	173	20.81
<i>E. vermicularis</i>	43	5.17
<i>A. duodenale</i>	23	2.76
<i>H. nana</i>	19	2.28
<i>S. stercoralis</i>	17	2.04
<i>Taenia spp.</i>	3	0.36
Total	831	100



**Figure 1: Gender-wise distribution of parasites.**

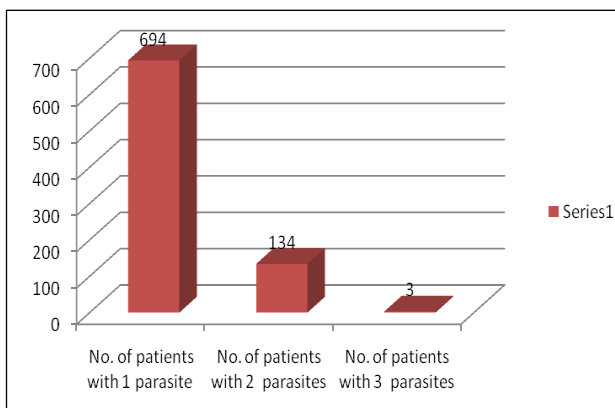


**Figure 2: Protozoa and helminthic parasite distribution.**

Among the single parasites isolated (Table 1), *E. histolytica* was found to lead with 337 (40.55%) of cases.

Next in frequency of isolation was *Giardia lamblia* with 216 (25.99%) cases. Apart from the above, the parasites in their order of isolation were *A. lumbricoides* with 173 (20.81%), *E. vermicularis* with 43 (5.17%), *A. duodenale* with 23 (2.76%), *H. nana* with 19 (2.28%), *S. stercoralis* with 17 (2.04%) and *Taenia* with 3 (0.36%) cases respectively. The overall protozoal prevalence was 553 cases (66.54%) whereas that of the helminths was 278 cases (33.45%) (Figure 2).

Among the dual parasite infestations, a combination of *E. histolytica* and *G. lamblia* was the most common one with 96 cases (71.64%). The next but quite lower in number was *A. lumbricoides* and *E. histolytica* with 18 cases (13.43%). Other combinations observed were that of *G. lamblia* and *E. vermicularis* with 11 cases (8.21%), *A. lumbricoides* and *G. lamblia* with 6 cases (4.47%) and *E. histolytica* and *A. duodenale* with 3 cases (2.23%). The triple parasite combination that was greater is one that included *E. histolytica*, *A. lumbricoides* and *E. vermicularis* with 2 cases (67%). The next combination is that of *G. lamblia*, *A. lumbricoides* and *E. vermicularis* with just 1 case (33%).



**Figure 3: Number of patients with single, double and triple parasites isolated.**

## DISCUSSION

Present study included the stool examination of 831 parasites positive patients, that included both the sexes and aged above 18 years. Situations often showed certain clinical signs and symptoms raising the suspicion of gastrointestinal infection. Out of the 831 cases, 494 were male and 337 were female patients. They attended the Medicine Out Patient Department of our medical college and were referred from there to the Microbiology Department for routine stool examination, detection of ova, cysts and adult forms of several parasites. The study was done for the period of 2 years and 4 months starting from January 2015 upto May 2017. Now, among the 831 positive parasitosis cases, 134 had double parasite infestations and only 3 cases were found to have triple parasite infestation. The remaining 694 parasite positive patients had single parasite infestation.

One study done by a group of researchers in JIPMER, Puducherry included 1508 samples in 5 years, whereas we had a total of 831 cases in a span of 2 years and 4 months.<sup>12</sup> They also included children in their study which we did not. Apart from wet mount, their techniques covered Wheatley's modified trichrome staining for better detection of different types and forms of parasites. However, they observed certain uncommon parasite species like *Entamoeba moshkovskii*, *Entamoeba dispar*, *Blastocystis*, *Balantidium coli* and also some members of coccidian parasites like *Cystoisospora*, *Cyclospora* and *Cryptosporidium*, none of which were detected in this study. We on the other also observed certain number of *H. nana* (19) and *S. stercoralis* (17), which were absent in Puducherry study. *Entamoeba* emerged as the commonest intestinal parasite (39.7% in Puducherry study and 40.55% in Bihar study) and which was consistent with other studies as well.<sup>3,13</sup> The next common parasite was *Blastocystis* in the south study, whereas in the present study it was *Giardia*. They also observed a gender bias, more (56%) females than males (44%), quite different from that of ours (59.4% males and 40.5% females).

Among the helminthic isolates in this study, the prevalence of *Ascaris* was 20.81% followed by *Enterobius* with 5.17%, hookworm 2.76%, *H. nana* 2.28%, *S. stercoralis* 2.04% and *Taenia* with 0.36% each. The global ranking of soil transmitted helminths (STH) by WHO states *Ascaris* to be the most frequent parasite followed by hookworm and *T. trichiura*. We could not isolate any *T. trichiura* in this study. The prevalence of hookworm was grossly decreased in the present study, similar to another study from Bihar.<sup>9</sup> The incidence was significantly greater in the Puducherry study (8.7%) as also a study by Parija and Rao where it was 10.5%.<sup>14</sup> This decrease could be attributed due to greater use of footwear among farmers and labourers and also due to commendable use of sanitary latrines in villages and among people of poor socioeconomic community.

The isolation of *Blastocystis* was the second most common in the Puducherry study, and also two such studies from Chennai.<sup>3,15</sup> The prevalence of *Blastocystis* in western countries ranged from 0.5% to 62%.<sup>16</sup> Other studies from India also reported a significant incidence of *Blastocystis*.<sup>17-19</sup> However, we did not isolate *Blastocystis* in this study. Such limitation in isolation could be due to our techniques, and also collection of a single specimen rather than multiple specimens which could have increased sensitivity. Another reason could be due to the suggestion that *Blastocystis* is more common in the coastal regions and Bihar being quite far from coast probably lacked isolation.<sup>20</sup>

The study showed a preponderance in gender towards males (59.4%) than females (40.5%). This is in contrast to other studies which showed increased prevalence towards females rather than males.<sup>12,3</sup> A study from Ethiopia, however, showed equal numbers of infected cases among both the sexes.<sup>21</sup> This male predominance could be due to

more field work, farming and manual labour by males than females, along with walking barefoot while working that lead to infection. Overcrowding and open defecation are other causes which could lead to rapid spread and outbreak of parasitic diseases. Our results were concomitant to a study from Ghana.<sup>22</sup> Although the risk of parasitic infestation does not depend on the gender, the study showed a predominance towards males which is noteworthy.

Certain differences were observed in the results of another study from the same setting in comparison to the present study. Out of a much larger population of patients examined (3343), the parasite positive samples were 1346 (40.26%).<sup>9</sup> However, in both their study and ours, the most common parasite prevalent was *E. histolytica*. They also excluded the gender distribution among the patients which we have covered in this study. Another study from Bihar analyzed the seasonal variations in parasitosis over a 3-year period.<sup>10</sup> They found that, out of total of 2672 parasite positive cases, the monsoon bore the highest brunt (698, i.e. 26.12%), whereas winter showed the lowest number (251, i.e. 9.39%). A third similar study conducted among the paediatric population included 1000 parasite positive samples collected over a 2-year period.<sup>11</sup> However, they noted a predominance of helminthes (*E. vermicularis*, 28.7%) over the protozoans which is in contrast to the present study. The distribution of parasites was heavier among the 5 to 12-year group (74.6%) than among below 5-year age group (25.4%) with single parasites only. Limitation of this study in comparison to their study was the exclusion of paediatric group from our study population in order to gauge the helminthic load.

## CONCLUSION

To conclude, this study depicts that intestinal parasitic infections are a major public healthcare problem which is associated with poor personal hygiene and low socioeconomic conditions of Bihar. The consistent parasitic isolation in this part as well as other parts of India proves the endemicity of Indian subcontinent with enteric parasites. The study was limited by single sample observation and exclusion of children that attended our tertiary care hospital. Larger sample size and more surveillance studies will help to establish effective measures and evidence-based approaches to curb the parasitic proliferation in this region.

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