

## PREVALENCE OF INTESTINAL PARASITES IN PATIENTS ATTENDING A TERTIARY CARE HOSPITAL IN EASTERN INDIA

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### Abstract

**Background:** Intestinal parasitic infections are a serious public health problem in the world, especially in developing countries, and account for a major cause of morbidity and mortality among different high-risk groups. The prevalence and incidence of intestinal parasites also vary according to age, sex and geography. Millions of people worldwide are affected by high-intensity intestinal nematode infections, with South East Asia alone accounting for 25% of the cases. In India, the prevalence of intestinal parasites ranges widely from 5.56% to 91%. Although fatalities are less common, such infections contribute significantly to morbidity and have chronic and subtle effects on the health and nutritional status of the host. They can also impair the physical and mental development of children, hinder educational achievements and impede economic development. Intestinal parasites which are commonly reported globally are *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Trichuris trichiura*, *Enterobius vermicularis* and protozoa like *Entamoeba histolytica* and *Giardia lamblia*. **Materials & Methods:** This study was conducted in the Department of Microbiology at Jagannath Gupta Institute of Medical Sciences & Hospital, Budge Budge, Kolkata. The duration of study was over a period of one year. A total of 236 cases were included in this study. Stool samples received from the cases were subjected to saline and iodine wet mount examinations both before and after formal-ether concentration technique. The samples were examined under 10 X and 40 X power of the light microscope to detect protozoal trophozoites/cysts and helminthic eggs or larvae. The results were recorded and the data was analyzed in the form of frequency and distribution tables and graphs. **Results:** This study revealed that among the stool samples collected from the study population, 28.9% did not show any intestinal parasites. The remaining samples (71.1%) indicated the presence of various parasites: *Giardia lamblia* was present in 27.3% of samples, *Blastocystis spp.* in 19.6%, *Entamoeba histolytica* in 20.2%, *Ancylostoma duodenale* in 10.1%, *Hymenolepis nana* in 11.9%, and *Ascaris lumbricoides* in 10.7% of the total samples. These findings show the high prevalence of intestinal parasites in the study population. **Conclusion:** The outcomes of this study will help the primary healthcare professionals and family physicians to understand the significance of high burden of intestinal parasitic infection. Interventions like improving the sanitary conditions, periodic de-worming, mass screening, awareness creation programmes and public education regarding fecal contamination of water, the practice of drinking boiled water and adhering to personal & environment hygiene are the necessary measures to bring down the prevalence of intestinal parasitic infections, which could directly improve the overall health and well-being of both the individual and the community.



## INTRODUCTION

Intestinal parasitic infections are a significant public health concern worldwide, particularly in developing countries, and represent a major cause of morbidity and mortality among various high-risk groups.<sup>[1,2]</sup> The prevalence and incidence of intestinal parasites also vary according to age, sex, and geography.<sup>[2]</sup> According to a WHO report from 2020, approximately 1.5 billion people worldwide are affected by high-intensity intestinal parasitic infections, mainly the soil-transmitted helminths (geohelminths), with sub-Saharan Africa and South East Asia together accounting for more than 50% of the cases.<sup>[3]</sup> In India, the prevalence of intestinal parasites ranges widely from 5.56% to 91%, as reported by different researchers.<sup>[4-9]</sup> Although intestinal helminths rarely result in fatalities, they contribute significantly to morbidity and have chronic and subtle effects on the health and nutritional status of the host.<sup>[10,11]</sup> They can also impair the physical and mental development of children, hinder educational achievements and impede economic development.<sup>[12,13]</sup> Common intestinal parasites such as *Ascaris lumbricoides*, hookworms, *Enterobius vermicularis* and protozoa like *Entamoeba histolytica* and *Giardia lamblia* are responsible for considerable morbidity among both young and adult populations.<sup>[14]</sup>

Intestinal Parasitic Infections (IPIs) are a significant health concern in developing countries such as India, affecting an average estimated 15-20% of the population. As reported in various studies, the overall prevalence of IPIs ranges from 12.5% to 66%.<sup>[15]</sup> This prevalence varies greatly across different regions due to factors like socio-economic status, hygiene practices, water quality, sanitation facilities, population density, nutritional status and climatic conditions. In specific settings such as young population particularly children in rural areas, the prevalence may be much higher, even up to 91%.<sup>[16]</sup> Transmission of these infections occurs primarily through ingestion, skin penetration and rarely through inhalation of infective forms.<sup>[17]</sup>

Children are particularly susceptible to IPIs which can result in nutritional deficiencies, anemia, impaired learning abilities and growth retardation. A major challenge with IPIs is that approximately 90% of infected individuals do not show any symptoms.<sup>[7]</sup> Globally, the most commonly reported parasitic infections include *Ascaris lumbricoides* (20%), *Ancylostoma duodenale* (18%), *Trichuris trichiura* (10%) and *Entamoeba histolytica* (10%).<sup>[18,19]</sup>

Good environmental sanitation and high standards of living have resulted in reduction in the prevalence of intestinal parasites in the developed countries. Therefore, in view of significant importance of intestinal parasitic infections in the developing countries, the present study was conducted at a tertiary care hospital in Eastern India to determine

the current prevalence of intestinal parasitic infections and observe any changes in infection trends in the region.

## MATERIALS AND METHODS

**Study Area:** This study was conducted in the Department of Microbiology at Jagannath Gupta Institute of Medical Sciences & Hospital, Budge Budge, Kolkata.

**Study Duration:** The duration of study was over a period of one year.

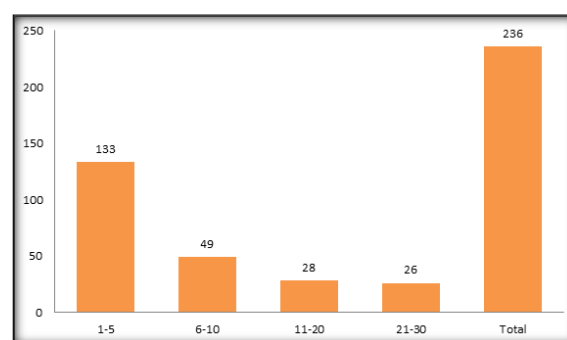
**Study Population:** A total of 236 cases were included in this study.

**Sample collection:** An individual person was given a sterile labeled container and advised to take required amount of stool sample. The samples were transported to the laboratory within 2-4 hours of collection and processed immediately for parasitological examination by the standard methods.

**Methods:** Macroscopic examination was done to identify color, consistency and presence of blood stain. The stool samples were then subjected to saline and iodine wet mount examinations both before and after formal-ether concentration technique. The samples were examined under 10 X and 40 X power of the light microscope to detect protozoal trophozoites/cysts and helminthic eggs or larvae. The results were recorded and the data was analyzed in the form of frequency and distribution tables and graphs.

**Data Analysis:** Data was analyzed using Microsoft excel.

## RESULTS



**Figure 1: Distribution of cases according to age group**

X axis shows Age group in years; Y axis shows number of cases

During the study period, a total of 236 stool samples were collected randomly and processed as per the standard methods. The participants were categorized into four age groups: 1-5 years, 6-10 years, 11-20 years, and 21-30 years. The majority of participants fell into the age group of 1-5 years (133 samples) followed by 6-10 years (49 samples), 11-20 years (28 samples), and 21-30 years (26 samples) [Figure 1]. There was nearly an equal distribution of male

(125) and female (111) participants in the study group. [Table 1]

The study revealed a 71.1% prevalence of intestinal parasites among the participants whereas 28.9% of the samples did not show any intestinal parasites. [Table 2]

Of the total positive cases, 50.2% were from urban areas while 49.7% were from rural areas. This distribution reflects a balanced representation of

both urban and rural populations as regards the prevalence of IPIs, as found in this study. [Table 3]

The positive samples (168) showed the presence of various parasites such as *Giardia lamblia* in 27.3%, *Blastocystis spp.* in 19.6%, *Entamoeba histolytica* in 20.2%, *Ancylostoma duodenale* in 10.1%, *Ascaris lumbricoides* in 10.7% and *Hymenolepis nana* in 11.9% of the samples. [Table 4] These findings highlight the high prevalence of intestinal parasites in the study population.

**Table 1: Gender-wise distribution of cases**

Gender	Number	Percentage
Male	125	52.9%
Female	111	47.1%
Total	236	100%

**Table 2: Distribution of cases according to presence or absence of Intestinal parasites**

Intestinal parasites	Number	Percentage
Present	168	71.1%
Absent	68	28.9%
Total	236	100%

**Table 3: Distribution of positive cases according to rural and urban areas**

Area	Number	Percentage
Rural	77	45.8%
Urban	91	54.2%
Total	168	100%

**Table 4: Distribution of cases according to Intestinal parasites observed**

Intestinal Parasites	Number	Percentage
<i>Giardia lamblia</i>	46	27.3%
<i>Blastocystis spp.</i>	33	19.6%
<i>Entamoeba histolytica</i>	34	20.2%
<i>Ancylostoma duodenale</i>	17	10.1%
<i>Ascaris lumbricoides</i>	18	10.7%
<i>Hymenolepis nana</i>	20	11.9%
Total	168	100%

## DISCUSSION

Intestinal parasitic infections represent a significant social health challenge in all age groups, particularly among children and more so in developing nations such as India. Past studies have focused on the prevalence of parasitic infections in various settings such as tertiary healthcare hospitals and schools.<sup>[19,20]</sup> The present study aims to determine the prevalence of intestinal parasitic infections and observe any changes in infection trends in rural and urban communities, paying special attention to the presence of both intestinal protozoa and helminths. This and other similar studies done in the past are crucial for primary healthcare professionals and family physicians to gain comprehensive knowledge about the substantial burden of intestinal parasitic infections in a region.

Our study analyzed a total of 236 samples, revealing an overall prevalence of intestinal parasites in stool samples among the rural population at 45.8% and the urban population at 54.2%, similar to the nationwide prevalence rate in India. This finding is consistent with the prevalence of intestinal parasites in rural southern India as reported by Kang G et

al.<sup>[1]</sup> Among the stool samples indicating protozoal infections, *Giardia lamblia* (27.3%), *Blastocystis spp.* (19.6%) and *Entamoeba histolytica* (20.2%) exhibited higher prevalence rates compared to helminthic infections such as *Ascaris lumbricoides* (10.7%), *Ancylostoma duodenale* (10.1%) and *Hymenolepis nana* (11.9%). These results are in accordance with the results of similar studies conducted by Fernandez MC et al. and Mareeswaran N et al.<sup>[16, 21]</sup>

In our study, males exhibited a higher prevalence rate of parasites in their stool samples compared to females, consistent with findings of Pal SK et al. and Saraswathi R et al.<sup>[17, 20]</sup> Despite the fact that the risk of intestinal parasitic infection is not inherently gender-dependent, our study observed a predominance among males, which may be attributed to their increased exposure to environmental factors.

The prevalence of intestinal parasites in stool samples collected from the rural population was found to be 45.8% in our study, whereas a similar study by Fernandez MC et al. reported a higher prevalence of 91% amongst the rural people.<sup>[16]</sup> Conversely, in the urban population, the prevalence

was 54.2% in our study, whereas Fernandez MC et al. reported a lower prevalence of 33% among the urban dwellers.<sup>[16]</sup> Our prevalence of IPIs for the rural population (45.8%) is similar to that of Mareeswaran N et al. who reported the prevalence of IPIs in rural population to be 50.8%, however, the value for the urban population in our study (54.2%) is much higher as compared to the said study (23.4%).<sup>[21]</sup> Our prevalence rates of IPIs for urban (54.2%) and rural (45.8%) are higher than those reported in a study by Nitin S et al. (5.4% & 20.8% respectively).<sup>[22]</sup>

Specifically, the prevalence of parasites such as *A. lumbricoides* (10.7%) and *A. duodenale* (10.1%) in the rural population was much lower in our study compared to Fernandez MC et al. who reported 52.8% prevalence for *Ascaris lumbricoides* and 37.6% for *Ancylostoma duodenale* among the rural people.<sup>[16]</sup> The prevalence of *H. nana* (1%) as found in our study was similar to that reported by Fernandez MC et al. (1.6%). However, the prevalence of *Entamoeba histolytica* (6.6%) and *Giardia lamblia* (21.2%) was higher in our study compared to Fernandez MC et al. who reported the prevalence of these protozoans to be 4% & 16% respectively in the rural population, indicating poor sanitary conditions and possible recent fecal contamination of drinking water sources in the region of our study population.<sup>[16]</sup>

Interestingly, no *Ascaris lumbricoides* infestation was found in samples from the urban population in our study, which is similar to Fernandez MC et al. who reported a low prevalence of 0.50% for *A. lumbricoides* in a similar population.<sup>[16]</sup> In contrast, the urban prevalence of *A. duodenale* in our study was 7.3% whereas Fernandez MC et al. did not find a single case of the helminth in their study.<sup>[16]</sup> Hence, our study suggests excellent protection against *Ascaris lumbricoides* in the urban population and against *H. nana* in the rural population.

The higher prevalence of *Giardia lamblia* (27.3% overall) in our study corresponds with the findings of Fernandez MC et al. (22.6% urban & 16% rural) and Nitin S et al. (22%) who reported similar prevalence rates of the parasite.<sup>[16, 22]</sup>

The study revealed an overall prevalence of 71.1% of intestinal parasitic infections among the participants, which is similar to the findings of Fernandez MC et al., but higher than the overall prevalence of IPIs as reported in the studies by Saraswathi R et al., Mareeswaran N et al. and Nitin S et al.<sup>[16, 20, 21, 22]</sup>

## CONCLUSION

The outcomes of this study will help the primary healthcare professionals and family physicians to get adequate knowledge about the significance of the high burden of intestinal parasitic infections. The overall prevalence of IPIs in rural population is comparatively higher than the urban population, but

this may vary from region to region. Hence, interventions like improving the sanitary conditions, periodic de worming, mass screening, awareness creation programs and public education regarding fecal contamination of water, the practice of drinking boiled water and adhering to personal & environment hygiene are the necessary measures to bring down the prevalence of intestinal parasitic infections, which could directly improve the overall health and wellbeing of both the individual and the community.

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