

## A study of the prevalence of intestinal parasitic infections and its correlation to demography in the eastern Indian population

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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[1]. **Aims:** To find out the prevalence of intestinal parasitic infections and compare and correlate it with gender, age group, and area (rural or urban). **Materials and method:** This prospective study was conducted at the Department of PSM at Government Medical College, Bettiah, and Jan Nayak Karpuri Thakur Medical College & Hospital (JNKTMCH), Madhepura, Bihar, India. The study was approved by the institutional ethical and research committee. The study was conducted from September 2020 to August 2021. The stool samples from suspected patients were collected and subjected to routine stool investigations during the study, i.e., a macroscopical examination was carried out for the presence of adult worms or their body segments and a microscopic examination, such as stool wet mounts (both saline and iodine mounts) after the Formol-ether concentration technique. **Results:** Out of a total of 643 patients, 102 (15.86%) had parasitic infections. The maximum number of patients was in the age group of 0–10 years (277, 43.08%), whereas out of these, 36 patients were found positive (13%). A total of 112 parasites were isolated from 102 positive patients. Mixed infections with two parasites were most commonly seen in the 0–10 year age group (7 out of 10 cases). A combination of *Giardia lamblia* and *Hymenolepis nana* were most commonly isolated (3 out of 10 mixed infections). The parasite most commonly isolated was Hookworm 35 (31.25%), followed by *Hymenolepis nana* 25 (22.32%) and *Giardia lamblia* 19 (16.96%). *Enterobius vermicularis* was the least common isolate (1.78%), followed by *Taenia* species (2.68%). Parasitic infections affect mostly male patients (59.57%), and the majority of the positive patients (72%) were from rural areas (64.28%). **Conclusion:** The prevalence of intestinal parasites was comparatively high owing to poor sanitization and low literacy.

**Keywords:** Formol-ether concentration technique, Macroscopic, Hookworm

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### Introduction

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[1]. The frequency and incidence of intestinal parasites also vary with age, sex, and geography[2]. The WHO (2004) report suggests that approximately 150.9 million people in the world have high-intensity intestinal nematode infections, which is predominant in Southeast Asia with 37.3 million cases[3]. The prevalence of intestinal parasites in India varies from 5.56% to 90% as reported by different workers[4-9]. Intestinal helminths rarely cause death, but they do cause significant morbidity, which has long-term and subtle effects on the host's health and nutritional status[10,11]. They also harm children's physical and mental development, prevent educational achievement, and hamper economic progress[12,13]. Helminths like *Ascaris lumbricoides*, hookworm, *Enterobius vermicularis*, and protozoa like *Entamoeba histolytica* and *Giardia lamblia* are common intestinal parasites that cause significant morbidity in children and adults[14]. This study was undertaken to determine the prevalence of intestinal parasitic infections and the influence of age and sex on the prevalence of infections among patients attending a tertiary care hospital.

### Materials and method

This prospective study was conducted at the Department of PSM at

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Government Medical College, Bettiah, and Jan Nayak Karpuri Thakur Medical College & Hospital (JNKTMCH), Madhepura, Bihar, India. The institutional ethics and scientific committee gave their approval to the project. The study was conducted from September 2020 to August 2021. Prior to the commencement of the study, informed and written consent was obtained from all the participating subjects. A total of 643 clinically suspected, randomly selected cases of intestinal parasitic infections of all age groups and both sexes coming to the patient departments were studied. History was taken in relation to name, age, address, and area (rural-urban). Patients under anti-helminthic treatment were excluded from the study group. The stool samples from suspected patients were collected and subjected to routine stool investigations during the study, i.e., a macroscopical examination was carried out for the presence of adult worms or their body segments, and also consistency, colour, odour, blood and mucous, and further microscopic examination of stool wet mounts (both saline and iodine mounts) were made after the Formol-ether concentration technique. The data was tabulated in Microsoft Excel and was subjected to Statistical analysis using SPSS Software Version 16.0.

### Results

A total of 643 patients clinically suspected of having intestinal parasitic infections were included in the study. The maximum number of patients was in the age group of 0–10 yrs (277, 43.08%), whereas out of these, 36 patients were found positive (13%), followed by the 11–20 yrs age group (153, 23.79%), and out of these, 30 patients were found positive (19.61%) [Table1]. Among the total patients (643), male patients made up 383 (59.57%) of the total patients, while females made up 260 (40.43%) [Table1].

	0-10 yrs	11-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs	>60 yrs	Total
Male	169	83	46	27	26	22	10	383(59.57%)
Female	108	70	27	18	18	11	8	260(40.43%)
Total	277 (43.08%)	153 (23.79%)	73 (11.35%)	45 (7%)	44 (6.84%)	33 (5.13%)	18 (2.8%)	643

A total of 112 parasites were isolated from 102 positive patients. The maximum number of parasites (43) was isolated from 36 positive patients in the 0–10 yrs age group, followed by 32 parasites isolated from 30 positive patients in the 11–20 yrs age group. Of a total of ten cases of mixed infection with two parasites, seven were seen in the 0–10 year age group, two were seen in the 11–20 year age group and one was seen in the 21–30 year age group. The parasite most commonly isolated was Hookworm 35 (31.25%), followed by Hymenolepis nana 25 (22.32%) and Giardia lamblia 19 (16.96%). Enterobius vermicularis was the least common isolate (1.78%), followed by Taenia species (2.68%). The 0–10-year age group had the most isolates (43, 38.38%), followed by 32 (28.57%) isolates from the 11–20-year age group, and the more than 60-year age group had the fewest (2, 1.79%) [Table2].

	0-10yrs	11-20yrs	21-30yrs	31-40yrs	41-50yrs	51-60yrs	>60yrs	Total
Ascaris lumbricoides	9	5	0	0	2	0	0	16 (14.29%)
Hookworm	2	11	6	7	3	4	2	35 (31.25%)
H.nana	12	8	2	0	3	0	0	25 (22.32%)
T.trichura	1	2	1	0	0	0	0	4 (3.57%)
Enterobius	2	0	0	0	0	0	0	2 (1.78%)
Taenia	1	0	1	1	0	0	0	3 (2.68%)
Giardia	10	5	2	1	0	1	0	19 (16.96%)
E.histolytica	6	1	1	0	0	0	0	8 (7.14%)
Total	43 (38.38%)	32 (28.57%)	13 (11.61%)	9 (8.04%)	8 (7.14%)	5 (4.46%)	2 (1.79%)	112

The majority of mixed infection cases (7 out of 10 total cases) were seen in children aged 0–10. The most common isolated combination was Giardia lamblia and Hymenolepis nana (3 out of 10 mixed infections), followed by Ascaris lumbricoides and Hymenolepis nana and Giardia lamblia and Entamoeba histolytica (2 out of 10 mixed infections in each case). Most of the positive patients were from rural areas (64.28%), with the ratio of isolates from rural to urban areas of 1.8. Entamoeba histolytica and Trichuris trichura were isolated from both urban and rural areas in equal numbers[4,17].

#### Discussion

For laboratory diagnosis of intestinal parasite infections, stool testing for parasitic ova, cysts, trophozoites, and larvae remains the gold standard (IPs). Lack of knowledge of the prevalence of parasites in a particular geographic area may lead to misdiagnosis of IPI's as appendicitis and other inflammatory bowel diseases. Only 102 cases were found positive out of suspected 643 cases of intestinal parasitic infections[15,16]. Thus, the prevalence rate in this study was 15.86%. Different studies conducted in rural and urban areas have revealed prevalence rates ranging from 5.56% to 46.7%. In the same period, a similar study in the Bareilly area of western Uttar Pradesh found a prevalence of 22.81% in school children[18]. Few studies, such as studies from Surat, Gujrat and Rohtak, Haryana, showed a prevalence rate of less than 10%. This might be due to improved sanitary practices, reduced slum areas, personnel hygiene, increased awareness, health education, extreme seasonal variations and geographical area[4,19]. Male patients had more positive cases than female patients in this study (male to female ratio: 1.5:1) [Table 1], which is consistent with research from Rohtak, Haryana, and other studies[18,22,23], while female predominance is also seen in many studies[4,9,21]. This high male to female ratio may be because females in rural areas avoid visiting health facilities until their condition begins affecting their work and home-made remedies have failed to provide relief. The age range of patients varied from 1 month to 86 years. The maximum prevalence was in the age group of 11–20 years (13.4%), which is also seen in other studies[22,24]. The reason for the high prevalence in this group may be their more active lifestyle and involvement in outdoor activities. Maximum numbers of positive cases were seen in the age group of 0–10 years, which is also seen in most of the studies[4,17,19,25], [Table 2]. The prevalence rate was higher in the rural population, which is in concordance with other studies from Madhya Pradesh and Karnataka[19,26]. This could be due to low socio-economic conditions and literacy rates prevailing in

rural areas. The most common isolates in this study were Entamoeba histolytica and Giardia lamblia[4,17,18,19,20,21].

This study showed ten cases (9.80%) of mixed parasitic infection, which was in concordance with a previous study[7]. A few studies showed a high prevalence of mixed parasitic infections, while others showed low prevalence[4,20].

#### Conclusion

The prevalence of intestinal parasites is 15.86% due to the low literacy rate, improper drinking water supply, low socio-economic status, and poor sanitation in the rural areas. Entamoeba histolytica or Giardia lamblia are the most common intestinal parasites in most places, but this study shows hookworm and Hymenolepis nana as the most common isolates, which reflects the habit of defecating in open places and a lack of awareness among people. It is of immense importance to accurately diagnose the infestation case, as treatment differs for different groups.

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