

## Intestinal Parasitic Infestation in School Going Children and its Effect on Their Growth

Desh Nidhi Singh<sup>1</sup>, Ramesh Yadav<sup>2</sup>, Alok Kumar Gupta<sup>3</sup>, Chitra Chauhan<sup>4</sup>, Shrawan Kumar<sup>5</sup>, Pranjal Pankaj<sup>6</sup>, Khutija Sarah<sup>7</sup>

<sup>1</sup>Professor, Microbiology, Rama Medical College Hospital and Research Center

<sup>2</sup>Asso. Professor, Microbiology, Govt. Medical College Jalaun

<sup>3</sup>Assistant Professor Paediatric, Rama Medical College Hospital and Research Center

<sup>4</sup>Asso. Prof, Community Medicine Rama Medical College Hospital and Research Center

<sup>5</sup>Prof. & Head, Medicine, Rama Medical College Hospital and Research Center

<sup>6</sup>Prof, Medicine Rama Medical College Hospital and Research Center

<sup>7</sup>Asstt. Prof., Microbiology Rama Medical College Hospital and Research Center

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Corresponding author: Dr. Alok Kumar Gupta

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### Abstract

**Introduction:** Environment protection has declined due to industrial growth and a population movement from rural to urban areas. Children that reside in these zones in particular struggle with their nutrition due to parasite and helminthic illnesses. One of the most significant social and medical issues is intestinal parasite infections. According to epidemiological research, parasitic infections are one of the most prevalent illnesses and a significant global public health issue. *Entamoeba histolytica*, *Giardia intestinalis*, *Cyclospora cayetanensis*, and *Cryptosporidium* spp. are the most prevalent intestinal protozoan parasites.

**Aims and Objectives:** To investigate intestinal parasitic infestation among children.

**Methods:** This prospective study was conducted on children between 6-12 years of age. The stool samples and necessary information were collected. Stool samples were collected in wide-mouthed containers and delivered in under an hour to the lab. The data was arranged and analyzed according to the distribution of parasites based on the occurrence and age of the patients.

**Results:** The study found pathogenic eggs and cysts made up 74.5% of the total, while nonpathogenic intestinal parasites made up 36.1%. While helminthic infestation made up 42.2% of the total parasite infestation, protozoa made up 59.7% of it. *Entamoeba histolytica* (20%), *Giardia lamblia* (14.4%), *Ascaris lumbricoides* and *Hymenolepis nana* (6.7%). Intestinal parasites were found in 54.2% of children with uneducated moms and 72.4% of children.

**Conclusion:** The study concluded that *A. lumbricoides* was the most prevalent helminthic infestation in our investigation. 32.9% of the participants in our study had two parasite illnesses. Protozoal cyst isolation was higher than helminthic ova isolation. Our research revealed that *E. histolytica* was the most prevalent intestinal parasite found.

**Keywords:** parasite, protozoal cyst, helminthic, stool, cysts

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## Introduction

Among the most common illnesses in humans in underdeveloped nations are parasitic infections brought on by intestinal helminth parasites and protozoans [1]. Compared to helminths, protozoan parasites are more frequently responsible for gastrointestinal illnesses in modern nations. In endemic nations, intestinal parasites significantly increase morbidity and mortality. Worms with numerous cells are called helminths [2]. One of the most frequent helminths seen in the human intestine are nematodes, which are roundworms, cestodes, which are tapeworms, and trematodes, which are flatworms. Helminths are typically unable to reproduce within the human body. One-celled protozoan parasites can proliferate inside humans [3].

*Entamoeba histolytica*, *Giardia intestinalis*, *Cyclospora cayetanensis*, and *Cryptosporidium* spp. are the most prevalent intestinal protozoan parasites. Giardiasis, cyclosporiasis, amoebiasis, and cryptosporidiosis are the diseases brought on by these intestinal protozoan parasites, and they are all characterized by diarrhea. The most frequent parasite cause of diarrhea in affluent nations is *G. intestinalis*, and so this disease is also highly widespread in poor nations. Amoebiasis is the third most widespread parasite disease that results in death worldwide, with developing country residents bearing the brunt of its effects [4]

Environment protection has declined due to industrial growth and a population movement from rural to urban areas [5]. Within Indian cities, it is not uncommon to encounter areas that are underdeveloped and poorly maintained. Children that reside in these zones in particular struggle with their nutrition due to parasite and helminthic illnesses [6]. Due to this morbidity, children are more likely to have negative consequences like slow cognitive and physical growth. Children who live in

rural parts of poor nations are consequently negatively impacted. These illnesses spread quickly because of poor personal hygiene, water supply, and sanitation [7,8].

One of the most significant social and medical issues is intestinal parasite infections. According to epidemiological research, parasitic infections are one of the most prevalent illnesses and a significant global public health issue [9,10]. Compared to other ages, children in their school years had the greatest morbidity rate from intestinal parasites. According to statistics, treating these kids reduces the burden of diseases in the population as a whole by an important 70.5%. The diseases' primary signs and symptoms are gastrointestinal-related. Additionally, it may lead to anemia, mental, and physical issues like delayed child development, weight loss, exhaustion, rash or itching around the vulva and anus, and more [11,12].

Diarrhea is characterized by having watery or loose stools at least three times a day or more frequently than is typical for an individual, according to the World Health Organization (WHO). It is a typical sign of gastrointestinal illnesses brought on by a variety of pathogens, such as viruses, bacteria, and parasites [13]. In impoverished nations, intestinal parasites (IPs) and bacterial infections more frequently cause diarrhea than viruses do. Children in impoverished nations are most frequently infected with intestinal parasite infections (IPs). The most prevalent protozoan parasite that causes acute diarrheal diseases in children is *Giardia duodenalis*, *Entamoeba histolytica*, and *Cryptosporidium parvum*. Diarrhea, along with stomach discomfort, vomiting, flatulence, and weight loss, is the primary clinical symptom of IP infections. Younger children as well as patients who are malnourished and

immunocompromised may experience severe symptoms. The present study aims to evaluate the prevalence of intestinal parasites among school-going children and their effect on their growth [14].

## Methods and Materials

### Study design

This prospective study was conducted on 180 pediatric patients who came to the outpatient department of our hospital from December 2021 to November 2022 in both male and female primary school-going children between 6-12 years of age. The stool samples and necessary information were collected. The patients were considered randomly based on their age and weight. Every child's demographic information was logged, including age, sex, place of residence, mother's degree and work, the number of children living with them, kind of toilet, how often they washed their hands after using the restroom, and clinical symptoms. About 1 gram of stool samples was collected in wide-mouthed containers and delivered in under an hour to the lab. The faeces samples were examined under a microscopic and gross lens. A modified Ziehl-Neelsen stain was used for the identification of coccidian parasites. For *Taenia* species detection, a naked eye examination was done and a microscopic examination was conducted by using normal saline and Lugol's Iodine preparation directly from the stool. The negative samples were examined by formal ether concentration technique.

### Inclusion and Exclusion Criteria

Patients 6-12 years of age, who visited the outpatient department of our hospital were included. Again, those who follow the study protocol and provided consent for the study were only included.

Patients, who did not follow the study or did not provide consent were not included in the study. Children who took anti-helminthic medication within 6 months before starting the study were also excluded from the study.

Applying these inclusion and exclusion criteria, the study considered 180 patients in the study.

### Data Analysis

The study used MS Excel for effective calculation. The data was arranged and analyzed according to the distribution of parasites based on the occurrence and age of the patients. The discrete variables were expressed as counts and their respective percentage.

### Ethical approval

The patients were given a thorough explanation of the study. Written consent has been obtained from the parents of each patient. The study was approved by the Ethical Committee of the hospital.

### Results

The study found that in many cases, there is a combined parasitic presence. Pathogenic eggs and cysts made up 74.5% of the total, while nonpathogenic intestinal parasites made up 36.1%. While helminthic infestation made up 42.2% of the total parasite infestation, protozoa made up 59.7% of it. *Entamoeba histolytica* (20%), *Giardia lamblia* (14.4%), *Ascaris lumbricoides*, and *Hymenolepis nana* (6.7%) were the most prevalent harmful intestinal parasites. *E. histolytica* (54.9%) and *G. lamblia* (40.6%) were the most prevalent protozoans. The most frequent helminths found were *A. lumbricoides* and *H. nana* (24.9%) (table 1).

**Table 1: Parasitic distribution in stool specimen (n = 180)**

	Parasites	Number	Percentage (%)
Pathogenic cyst/ova	<i>Giardia lamblia</i>	26	14.4%
	<i>Entamoeba histolytica</i>	36	20%
	<i>Enterobius vermicularis</i>	10	5.5%
	<i>Ascaris lumbricoides</i>	12	6.7%
	<i>Isospora Belli</i>	3	1.7%
	<i>Ancylostoma duodenale</i>	7	3.9%
	<i>Hymenolepis nana</i>	12	6.7%
	<i>Trichuris trichiura</i>	9	5%
	Non-pathogenic cyst/ova	<i>Endolimax nana</i>	24
<i>Entamoeba coli</i>		25	13.9%
<i>Chilomastix mesnili</i>		4	2.2%
<i>Iodamoeba butschlii</i>		12	6.7%
Total		180	

Among the participants in the study, 66 girls and 114 boys were minors [Table 2]. According to the demographic link between intestinal parasite isolation and the kid population, male children (63.3%) had the highest isolation rate. Children ranged in age from 5 to 14 years, with the

majority (66.7%) of stool samples coming from kids between the ages of 5 and 9. Intestinal parasites were found in 54.2% of children with uneducated moms and in 72.4% of children who did not wash their hands with soap after using the restroom.

**Table 2: Parasitic infestation about age and sex**

Age	Total number of samples (n-180)	Percentage
0-4	22	12.2%
5-9	120	66.7%
10-14	35	19.4%
Male children	114	63.3%
Female children	66	36.7%

*E. histolytica* and *G. lamblia* (26.1%), *Enterobius vermicularis* and *Entamoeba coli* (3.3%), and *G. lamblia* and *H. nana* (2.2%) were the parasites found in the same sample most frequently (table 3).

**Table 3: Distribution of double parasitic infection (n = 180)**

Parasites	Children with a double intestinal infestation (No.)	Percentage (%) of children with a double intestinal infestation
<i>Entamoeba histolytica</i> + <i>Giardia lamblia</i>	47	26.1%
<i>Enterobius vermicularis</i> + <i>Entamoeba coli</i>	6	3.3%
<i>Giardia lamblia</i> + <i>Hymenolopis nana</i>	4	2.2%
<i>Giardia lamblia</i> + <i>Entamoeba coli</i>	2	1.1%

## Discussion

Children are the main victims of intestinal parasitosis, a significant public health concern in poor nations. School pupils have been found to have a higher incidence, mainly in Nepal's hilly areas. The purpose of the study is to figure out the incidence of intestinal parasitosis and its contributing factors among students attending a school in a border town in Nepal. In 17% of schoolchildren, intestinal parasite infection was discovered. The burden of infection may be lessened by raising socioeconomic conditions, promoting better cleanliness, and increasing awareness of infectious diseases [15].

The majority of people with intestinal protozoan parasitosis are youngsters, and it is very common. The study's goal is to determine the incidence of intestinal protozoan disease in Sindhuli schoolchildren. Boys and girls, respectively, had a protozoa prevalence incidence of 17.2% and 22.7%. There were found to be 5 different species of protozoan parasites. Of them, *Entamoeba coli* is the most prevalent. Although this study underlines the need for improved environmental hygiene, such as clean water sources and improved sanitation, it found that intestinal protozoan parasitosis among children is not common [16].

One of the most significant health issues affecting children in Nepal is intestinal worm infestation. This study was conducted in a public high school in Kathmandu, Nepal, on students aged 6 to 16 to assess the incidence of intestinal worm infestations. Intestinal worm infection was shown to be most prevalent in children aged 6 to 8 years, then in those aged 9 to 12 years. Comparatively speaking, those between the ages of 13 and 16 had a much lower infection rate. *Trichuris trichiura*, *Hymenolepis nana*, *Ascaris lumbricoides*, hookworm, and 25% of cases had mixed parasitic

infections found in the ova/cysts of intestinal parasites [17].

Between 2007 and 2008, a community-based study was done to determine the frequency of intestinal parasitosis among primary school students in the Dharan municipality, Sunsari, Nepal. A prevalence rate of 23.1% was discovered. The findings showed that *Giardia lamblia* predominated, followed by *Entamoeba histolytica/dispar*. There were no statistically significant differences in the prevalence according to gender or age. However, there was a significant link between the prevalence of parasite infection and socioeconomic position, the type of toilet used, and hand washing habits. Additionally, there was a significant statistical correlation between abdominal discomfort and the frequency of parasite infection. Participants who did not use filtered or heated water had a proportionately greater infection rate. According to the study, unclean toilets, inappropriate hand-washing habits, and a lack of education among mothers and children all contribute to the spread of intestinal parasite illnesses [18].

Between December 2010 and January 2011, research was conducted to determine the incidence of intestinal parasites amongst school-age children in the Baglung municipality. The study's objective is to determine the prevalence of parasitosis in school-age children and to provide any relevant advice for preventive actions. Data on predisposing were gathered through the use of a standardized questionnaire. Without the individuals' knowledge, nails were examined to determine their hygiene routine. By using the direct wet mount and formal ether concentration techniques, the stool samples were evaluated. Poor personal cleanliness and the educational level of the youngsters were found to be major contributors to the occurrence of parasites, according to the study's findings. As

preventive measures, health promotion and mass treatment are advised [19,20,21].

### Conclusion

The study has made several conclusions from the findings. The study concluded that *A. lumbricoides* was the most prevalent helminthic infestation in our investigation. 32.9% of the participants in our study had two parasite illnesses. Protozoal cyst isolation was higher than helminthic ova isolation. Our research revealed that *E. histolytica* was the most prevalent intestinal parasite seen. In most situations, inadequate sanitation, non-use of toilets (and toilet paper), and an illiterate populace contribute to the spread of intestinal parasite infestation. To reduce the parasite load in rural Indian children, an integrated strategy of medication treatment and targeted participative hygiene education is needed. These actions might lessen the intensity of frequent parasite infection outbreaks. It also draws attention to the fact that these illnesses have not yet been completely eradicated despite the accessibility of anti-helminthic and anti-parasitic medications. Children between the ages of 5 and 9 were more likely to be infected than other age groups, and the majority of these children come from lower social classes and do not have access to sanitary living spaces. The area around major cities need to be closely monitored to prevent it from becoming a constant source of illness, particularly intestinal parasitism.

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