

Original Article

# Detecting Intestinal Parasites in Diarrheal Cases among Children in Dir Lower District

Fazal Shan<sup>1\*</sup>, Arbaz Khan<sup>2</sup>, Hassan Khan<sup>2</sup>, Hamza Ali<sup>1</sup>, Muhammad Khalid Khan<sup>2</sup>, Awais Rahat<sup>2</sup>

<sup>1</sup>Department of Medical Lab Technology, Institute of Health Sciences, Khyber Medical University Dir Lower

<sup>2</sup>Department of Medical Lab Technology, Khyber Medical University

\*Corresponding Author: Fazal Shan; Email: fazalshan.ibms@kmu.edu.pk

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## ABSTRACT

**Background:** Intestinal parasitic infections (IPIs) are a critical health concern globally, causing significant morbidity, especially in low-resource settings. Factors such as poor sanitation, limited access to clean water, and suboptimal hygiene practices contribute to their spread. These infections are known to disproportionately affect children in underdeveloped regions, leading to chronic health issues and impeding socio-economic development.

**Objective:** The study aimed to determine the prevalence of intestinal parasites in children presenting with diarrhea in the Dir Lower district of Pakistan and to analyze the distribution of these infections across different age groups and genders. The study also sought to evaluate the knowledge and attitudes towards diarrhea management among mothers of affected children.

**Methods:** A prospective observational study was conducted in THQ hospitals in Samarbagh, Dir Lower. Stool samples were collected from 350 children under surveillance, with 150 positive cases identified for further analysis between October and December 2023. Stool Routine Examination (RE) and microscopy were the primary diagnostic techniques used. Ethical considerations adhered to the Helsinki Declaration. Statistical analysis was performed using SPSS version 25.

**Results:** Out of 350 children surveyed, 38% (n=112) tested positive for at least one intestinal parasite. *Giardia lamblia* (47.32%) and *Entamoeba histolytica* (23.21%) were the most prevalent protozoa. The helminths *Ascaris lumbricoides* (4.46%) and *Hymenolepis nana* (9.82%) were also detected. The highest incidence of IPIs was among females (78 cases) and children under four years (61 cases).

**Conclusion:** The study confirmed a high prevalence of IPIs among children with diarrhea in Dir Lower, with *Giardia lamblia* being the most common parasite. The findings underscore the need for improved public health strategies focusing on sanitation and hygiene education, especially in young children and females.

**Keywords:** Intestinal Parasitic Infections, *Giardia lamblia*, *Entamoeba histolytica*, Diarrhea, Children, Public Health, Pakistan, Epidemiology, Hygiene, Sanitation.

## INTRODUCTION

Intestinal parasitic infections (IPIs) represent a significant public health concern, particularly in underdeveloped regions where they contribute to substantial morbidity and mortality, especially among children. These infections, caused by a variety of helminths and protozoa, are closely associated with socio-economic status, environmental conditions, and access to clean water and sanitation (1-3). The transmission of these parasites is often facilitated by inadequate hygiene practices, including the handling of food, and is exacerbated by living conditions that are overcrowded and lack proper sanitation infrastructure (4-7). The manifestations of these infections are varied, including symptoms such as diarrhea, weight loss, abdominal pain, nausea, vomiting, reduced appetite, abdominal distention, and even the development of iron deficiency anemia (8, 9). Given the global prevalence of IPIs, with studies indicating rates ranging from 52 to 54%, and the variation in prevalence within specific contexts such as Pakistan, where rates have been reported between 18% and 81%, the need for targeted research and intervention is evident (10-12).

Diarrheal diseases, in particular, pose a critical challenge, being a leading cause of death among children under five, accounting for approximately 9% of global deaths annually, or 5.26 million fatalities. The burden of these diseases is especially pronounced in countries like Pakistan, Bangladesh, and India, where factors such as a humid climate, inadequate sanitation, and poor hygiene

practices in displaced camps contribute to the increased incidence of intestinal parasites(7,8). The World Health Organization underscores the widespread nature of parasitic infections globally, highlighting the ongoing threat they pose to community health due to the significant number of asymptomatic carriers who facilitate the continued transmission of these pathogens(9,11).

The present study aims to explore the prevalence and primary causes of diarrheal diseases among children in the Dir Lower district of Pakistan, with a focus on understanding the knowledge and attitudes of mothers with children under the age of five towards diarrhea management. This investigation is crucial for developing effective strategies to combat the spread of intestinal parasites and improve public health outcomes in underdeveloped regions where the risk of infection is heightened by socio-economic and environmental factors. By examining the specific context of the Dir Lower district, this study seeks to contribute to the broader understanding of IPIs and their impact on child health, thereby informing targeted interventions that can reduce the morbidity and mortality associated with these infections.

## MATERIAL AND METHODS

A comprehensive observational study was conducted to assess the prevalence and types of intestinal parasites in children exhibiting symptoms of diarrhea. This research was carried out by collecting stool samples from patients at THQ hospitals in Samarbagh, Dir Lower, and subsequently analyzing these samples at the Khyber Medical University Dir Lower laboratory. The primary objective was to utilize Stool Routine Examination (RE) and microscopy techniques to identify the various intestinal parasites present in these samples.

In the initial phase of the study, a total of 350 children displaying signs and symptoms of diarrhea were placed under surveillance. Following this, stool samples were meticulously collected from each participant on a one-time basis, culminating in the acquisition of 150 isolates between October 2023 and December 2023. These samples were then transported to the laboratory for further analysis. Each sample was carefully placed in a clean, screw-top container, which was duly labeled with the patient's name, gender, and date of collection, to ensure accurate tracking and identification.

The laboratory processing involved several critical steps. Initially, samples were transferred into sterile bottles designed for laboratory use. The samples were then prepared on slides, washed with distilled water, and left to dry. A small quantity of each sample was placed on a slide, to which one or two drops of normal saline were added. This mixture was spread evenly within the designated area on the slide for optimal examination. The prepared slides were scrutinized under a microscope at 20X magnification to identify trophozoites, cysts, eggs, larvae, and worms indicative of intestinal parasitic infections.

Data collection was methodical, ensuring the integrity and reliability of the research findings. The assessment of intestinal parasites was thorough, employing both Stool RE and detailed microscopic examination to ensure the accurate detection and characterization of these organisms.

Ethical considerations were paramount throughout the study. All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study, or from their guardians in the case of minors.

The data analysis was conducted using SPSS version 25. This involved statistical techniques to assess the prevalence of various types of intestinal parasites among the children studied. The analysis provided insights into the distribution and characteristics of these parasites, contributing valuable information to the body of knowledge on intestinal parasitic infections in the region.

## RESULTS

In analyzing the data from Table 1, it was observed that *Giardia lamblia* is the most prevalent intestinal parasite, with 53 cases accounting for 47.32% of the positive samples. *Entamoeba histolytica* was the second most common, representing 23.21% with 26 detected cases. Other parasites, such as *Entamoeba coli* and *Ascaris lumbricoides*, were present to a lesser extent, constituting 6.25% and 4.46% of the cases, respectively. *Hymenolepis nana*, albeit less common, was found in 11 cases, comprising 9.82% of the total positive samples. Parasites with the lowest prevalence included *Blastocystis hominis*, *Iodamoeba butschlii*, *Ancylostoma duodenale*, and *Taenia saginata*, each contributing to 1.17% of the cases. In total, 112 cases were found positive for at least one of the intestinal parasites tested (Table 1).

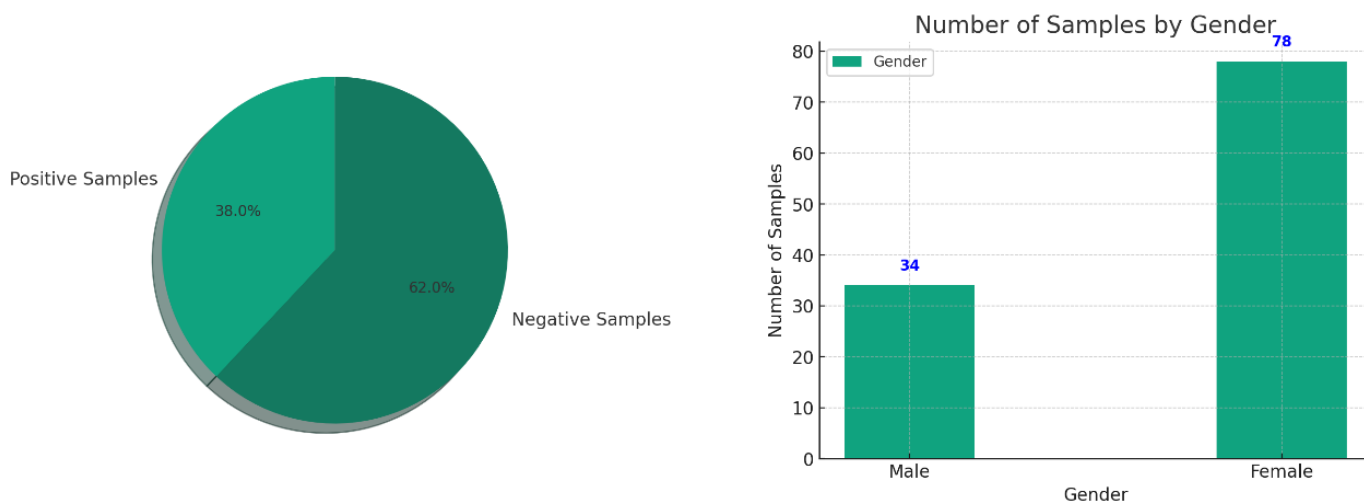


Figure 1 Gender and Intestinal Parasites

Table 1: Distribution of Intestinal Parasites Among Positive Cases

Parasite	Prevalence (n)	Percentage
Giardia lamblia	53	47.32%
Entamoeba histolytica	26	23.21%
Entamoeba coli	7	6.25%
Ascaris lumbricoides	5	4.46%
Blastocystis hominis	2	1.17%
Hymenolepis nana	11	9.82%
Iodamoeba butschlii	2	1.17%
Ancylostoma duodenale	4	3.57%
Taenia saginata	2	1.17%
Total	112	

Table 2: Age-Wise Prevalence of Intestinal Parasites

Parasite	<4 years (n)	5-8 years (n)	8-12 years (n)
Giardia lamblia	28	17	8
Entamoeba histolytica	15	8	3
Entamoeba coli	4	2	1
Ascaris lumbricoides	5	3	0
Blastocystis hominis	0	0	2
Hymenolepis nana	7	3	1
Iodamoeba butschlii	0	2	0
Ancylostoma duodenale	0	2	2
Taenia saginata	2	0	0
Total	61	37	17

The age-wise distribution of these parasites, as shown in Table 2, reveals that Giardia lamblia had the highest incidence in children under four years, with 28 cases, followed by 17 cases in the 5-8 years category, and 8 cases in children aged 8-12 years. Entamoeba histolytica infections were also more frequent in younger children, with 15 cases in those under four years old, decreasing to 8 and 3 cases in the subsequent age brackets. For Ascaris lumbricoides, all 5 cases occurred in children younger than 8 years. Notably, Blastocystis hominis was only found in the oldest age group (8-12 years), with 2 cases identified. Hymenolepis nana had 7 cases in

children under four, which then tapered off in older age groups. *Ancylostoma duodenale* was found exclusively in children over four years old, with 4 cases reported. The distribution indicates a total of 61 cases in children under four, 37 cases in the 5-8 years age group, and a smaller number, 17, in children between 8-12 years old (Table 2).

Complementing these tables, the pie chart (Figure 1) and bar chart (Figure 2) provide a visual representation of the data. The pie chart delineates the proportion of positive to negative samples, with positive cases constituting 38% of the samples tested, while negative samples comprised the majority at 62%. The bar chart further elucidates the gender distribution among the positive cases, showing a higher number of affected females (78) compared to males (34), out of the total 112 positive cases.

## DISCUSSION

Intestinal parasitic infections (IPIs) have long been recognized as a major global health concern, affecting an extensive portion of the population with a significant burden on both developing and developed countries. Such diseases are closely linked to various socio-economic factors, including overcrowding, climate, access to healthcare, poverty, and at times, political instability. These conditions facilitate the spread of parasitic diseases, which persist in all nations regardless of the advancements in healthcare infrastructure (13).

In this context, IPIs due to helminths and protozoa are known to be some of the most common causes of morbidity, affecting an estimated 1.5 billion people worldwide (15). Our study, focusing on a cohort from Karachi, revealed that protozoan parasites *Giardia lamblia* and *Entamoeba histolytica* were the most frequently encountered, consistent with previous research indicating these as common in the region (16). Among the 98 positive cases, these protozoans were highly prevalent, with *G. lamblia* constituting 47.32% and *E. histolytica* comprising 23.21% of the positive samples. The study also recorded cases of helminth infections caused by *Ascaris lumbricoides* and *Hymenolepis nana*, although less frequently.

Interestingly, *G. lamblia* maintained predominance across different genders, pointing to its ubiquitous presence and reinforcing its role in the epidemiology of intestinal parasites. Moreover, the study's findings on the distribution of parasites like *E. histolytica*, *A. lumbricoides*, *H. nana*, *E. coli*, *A. duodenale*, *T. saginata*, *B. hominis*, and *I. butschlii* align with survey-based reports from Pakistan that identify these pathogens as notable contributors to the IPIs burden (17). It is evident that the incidence of IPIs was higher among females, and this gender disparity in infection rates necessitates focused public health strategies.

Additionally, the observed infection rates were disproportionately high among children under the age of four and those between five to eight years. This demographic showed a pronounced vulnerability, potentially due to insufficient handwashing and inadvertent geophagia, which are common in economically disadvantaged communities. Given the transmission routes of these parasites through contaminated sources, it highlights the critical need for public health education that targets these specific behavioral risk factors.

Reflecting on the study's strengths, the systematic approach and significant sample size offer valuable insights into the prevalence of IPIs in the region. However, the research also encounters certain limitations, including its cross-sectional nature which does not account for temporal changes in infection rates or potential seasonal variations. Furthermore, the focus on a single geographic area may limit the generalizability of the findings to broader populations.

For future research, a longitudinal study design could provide a more comprehensive understanding of IPI dynamics over time. It is also recommended to incorporate a wider range of geographic settings to enhance the representativeness of the data.

## CONCLUSION

In conclusion, the burden of intestinal parasitic infections remains substantial, particularly in settings marked by socio-economic challenges. The study highlights the need for targeted public health interventions to improve sanitation and hygiene practices, with a special focus on children and women. Addressing these issues through education and infrastructure development could significantly reduce the incidence of such infections, ultimately leading to better health outcomes for vulnerable populations.

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