

Intestinal parasitic infections in pediatric patients with diarrhea with special emphasis to opportunistic parasites and predisposing factors

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Abstract

Background: Intestinal parasitic infections are among the most common infections worldwide. About 3.5 million people around the world are estimated to be affected as a result of these infections, the majority being children. Opportunistic parasitic infections cause severe diarrhea, especially in infants, and can be fatal in acute diseases.

Objectives: To investigate the prevalence of intestinal parasitic infection with special emphasis to opportunistic parasites in pediatric age group.

Materials and Methods: This study was conducted at the Department of Microbiology, CU Shah Medical College and Hospital, Gujarat, India, on stool samples received from children from January 2011 to January 2012. Detailed clinical history along with details of sociodemographic factors, literacy level, and hygiene habits were obtained. Saline and iodine mount and modified Ziehl–Neelsen stained preparation were examined microscopically.

Result: Of 180 patients enrolled in the study, 99 (55%) were males and 81 (45%) were females. In this study, prevalence of intestinal parasites was 13.3%; among these, 3.33% were *Entamoeba histolytica*, 5% were *Giardia lamblia*, 3.33% *Cryptosporidium parvum*, 1.11% *Ascaris lumbricoides*, and 0.55% *Ancylostoma duodenale*. Highest number of parasitic infections was seen in the age group of 6–10 years and opportunistic parasites were more prevalent in the age group of <1 year. Majority of patients having parasitic infection were illiterate, living in kutcha house, having open source of drinking water, and having unhygienic sanitary habits.

Conclusion: The study indicates that parasitic infections are still major public health problems in tropical countries such as India. These infections were found to be due to low standards of housing, faulty technique of hand washing, nonusage of sanitary latrine, and illiteracy. As found in this study, higher rate of parasitic infection in school-going children requires hygiene education to students and parents. The study reaffirms and confirms the previously held view that opportunistic parasites can cause diarrhea in pediatric patients. All children found to have opportunistic parasites must be screened for HIV infection and other causes of immunodeficiency.

KEY WORDS: Parasitic infection in children, opportunistic parasites, predisposing factors

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Introduction

Intestinal parasitic infections are among the most common infections worldwide. It is estimated that some 3.5 million people worldwide are affected as a result of these infections, the majority being children.^[1] The main clinical manifestation of the disease caused by these parasites is diarrhea.^[2] Diarrhea is defined as an increased loss of stool with a

Table 1: Prevalence of intestinal parasites

Total number of patients	Intestinal parasites detected	<i>Entamoeba histolytica</i>	<i>Giardia lamblia</i>	<i>Cryptosporidium parvum</i>	<i>Ascaris lumbricoides</i>	<i>Ancylostoma duodenale</i>
180	24	6	9	6	2	1

frequency and fluidity greater than the usual habit for each individual.^[3] It has a devastating effect particularly on infants, annually killing at least 4–5 million of those aged less than 5 years in Africa, Asia, and Latin America.^[4] Problems in the tropics, particularly in developing countries such as India, where humid climate, the insanitary environment, and poor socioeconomic conditions contribute to the problem. Chronic infections impair physical and mental growth and development of children in general.^[6] Opportunistic parasitic infections cause severe diarrhea, especially in infants, and can be fatal in acute diseases.^[5] Previously only bacteria and viruses were considered as pathogens but now parasites, especially opportunistic parasites, are also found to be causative agents of such diarrhea.

This study was aimed to investigate the prevalence of intestinal parasitic infection with special emphasis to opportunistic parasites and predisposing factors in pediatric age group. We also compared age- and sex-wise distribution of opportunistic and nonopportunistic parasitic infections.

Materials and Methods

This cross-sectional study was conducted from January 2011 to January 2012. A total of 180 patients visiting pediatric OPD or admitted at pediatric ward at CU Shah Medical College and Hospital, Surendranagar, Gujarat, India, and having complaints of diarrhea, weight loss, anorexia, and other conditions, which may raise suspicion of intestinal parasitic infection, were included in this study. Detailed clinical history along with questionnaire form containing various details of sociodemographic factors, literacy level, and hygiene habits were obtained.

Single stool specimen before starting the treatment was collected. Stool samples were inspected for the presence of parasitic worms. Saline and iodine mount preparations were examined microscopically under a 400× magnification to detect ova and/or parasites before and after concentration of the sample by formal ether technique. The modified Ziehl–Neelsen staining was used for detecting coccidial parasites.

Result

Of 180 patients enrolled in the study, 99 (55%) were males and 81 (45%) were females (Table 1).

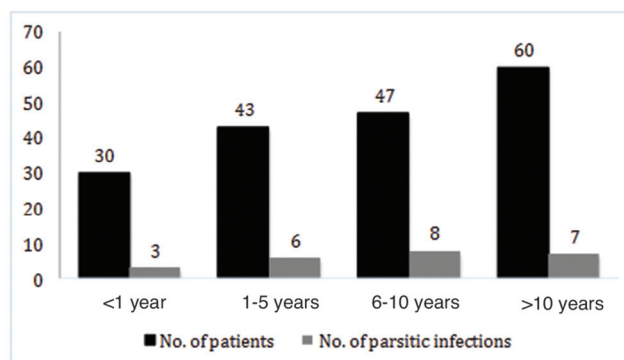
As shown in Table 2, highest number of parasitic infections was seen in age group of 6–10 years. This can be attributed to the school-going age and higher outdoor activities. In addition, parasitic infections were found to be more in males.

Table 2: Age group wise distribution of each parasite

Parasites	Age groups (years)				Total
	<1	1–5	6–10	>10	
<i>Giardia lamblia</i>	0	2	4	3	9
<i>Entamoeba histolytica</i>	0	2	3	1	6
<i>Cryptosporidium parvum</i>	3	2	0	1	6
<i>Ascaris lumbricoides</i>	0	0	1	1	2
<i>Ancylostoma duodenale</i>	0	0	0	1	1

Table 3: Gender-wise distribution of parasitic infections

	Total	Male	Female
Samples	180	99	81
Parasites found (number)	24	18	6
Parasites found (%)	13.33	18.18	7.40

**Figure 1:** Age group-wise distribution of parasitic infections.

As shown in Tables 2 and 3, opportunistic parasites were more prevalent in females and particularly in the age group of <1 year.

Discussion

Intestinal parasitic infections are endemic worldwide and remain a major public health concern in many tropical and subtropical countries. The prevalence rates of intestinal parasitic infections and type of parasite exhibit wide variation from country to country, between geographical areas, communities, and even seasons.^[9]

In this study, prevalence of intestinal parasites is 13.3%; among these 3.33% are *Entamoeba histolytica*, 5% are *Giardia lamblia*, 3.33% *Cryptosporidium parvum*, 1.11% *Ascaris lumbricoides*, and 0.55% *Ancylostoma duodenale*.

Table 4: Sociodemographic, environmental, and sanitary factors

Sociodemographic/environmental/sanitary factors	Number (n = 180)
Literacy status of the head of family	
Literate	72 (40%)
Illiterate	108 (60%)
Type of housing	
Kutchha	117 (65%)
Pucca	63 (35%)
Source of drinking water	
Open well	101 (56.11%)
Borewell	18 (10%)
Municipal water supply	61 (33.89%)
Defecation	
Open field	105 (58.33%)
Sanitary latrine	75 (41.67%)
Hand washing after defecation	
Mud and water	100 (55.56%)
Soap and water	80 (44.44%)

These results are less as compared to those obtained from other studies as shown in Table 6. Low prevalence of parasites in this study may be due to multifactorial etiology of diarrheal infections. Prevalence of intestinal parasite in pediatric patients varies by geographical area as different studies at different places have found different prevalence of parasitic infection.

Infections with *C. parvum* among children aged less than 5 years are known to be more prevalent in developing countries (5%–10%). Diarrhea caused by opportunistic intestinal parasites could be life threatening particularly for infants during the course of acute diseases.^[5]

Sociodemographic, environmental, and sanitary factors were also studied, which are described in detail in Table 4. It clearly shows that majority of patients were illiterate, living in kutchha houses, their source of drinking water was open, and their sanitary habits were unhygienic. In Table 5, distribu-

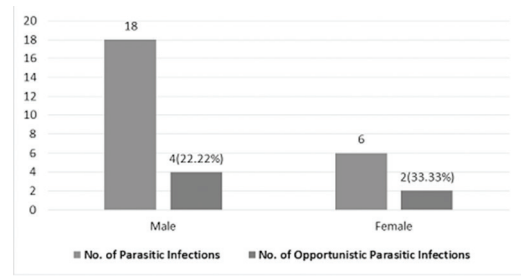


Figure 2: Prevalence of opportunistic parasites.

tion of main associated factors particularly in positive cases is shown. In 60% cases, heads of family were found to be illiterate. Illiterate father cannot be hired for skilled jobs and tend to have lower income, which lead to poor living conditions and poor sanitary habits, ultimately increasing the risk of parasitic infections. In a study conducted by Celiksöz et al.,^[10] higher percentage of children born to uneducated mothers were found positive for intestinal parasites (69%). Okyay et al.^[11] observed that mother’s education was crucial for the proper guidance of growing children.

About 65% cases were living in kutchha (nonconcrete) houses. Such type of houses tends to be in vicinity without proper sanitation and drainage measures. This can contribute to higher prevalence of parasitic infection.^[8,12] It was also noted that 56.11% cases were having drinking water from open well and 10% were using water from borewell. Because these wells are constructed at shallow level, they can come in contact with outer atmosphere and provide optimum condition for survival and development of eggs like *A. lumbricoides*.^[13] Stephenson et al.^[14] and Oyewole et al.^[15] have also found association of parasitic infections with intake of ring-well water and river water. Different studies have proved that untreated water is the main cause of intestinal infections.^[16,17]

Table 5: Distribution of associated factors in positive cases

Total No.	Illiteracy	Kutchha House	Open well water	Borewell	Municipality water supply	Open field defecation	Faulty hand washing
24	13	11	5	7	2	6	4

Table 6: Comparison of prevalence of intestinal parasites with various studies

Study	Intestinal parasites	<i>Cryptosporidium parvum</i>	<i>Entamoeba histolytica</i>	<i>Giardia lamblia</i>	<i>Ascaris lumbricoides</i>	<i>Ancylostoma duodenale</i>
Adamu et al. ^[5]	27.5%	8.1%	1.4%	6.3%	11.6%	0%
Kaur et al. ^[6]	46.5%	18.9%	11%	11%	1.7%	0%
Wellington et al. ^[7]	27.6%	17.1%	9.5%	4.8%	0%	0%
This study	13.3%	3.33%	3.33%	5%	1.11%	0.55%

Conclusion

The prevalence of parasitic infection (13.33%) suggests that parasitic infections are still major public health problem in tropical countries such as India. These infections were found to be due to low standards of housing, faulty technique of hand washing, nonusage of sanitary latrine, and illiteracy. As found in this study, higher rate of parasitic infection in school-going children requires hygiene education to students and parents.

The study reaffirms and confirms the previously held view that opportunistic parasites can cause diarrhea in pediatric patients. All children found to have opportunistic parasites must be screened for HIV infection and other causes of immunodeficiency. Better diagnostic methods such as having high sensitivity must be used to diagnose parasitic infections in patients with diarrhea. The cause of diarrhea in pediatric patients in absence of identifiable parasitic infection suggests that other infectious agents must be responsible for diarrhea.

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