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Research Article

THE SPECTRA OF INTESTINAL PARASITIC INFECTIONS AFFECTING PATIENTS ATTENDING A TERTIARY CARE CENTER IN WESTERN UTTAR PRADESH

PREM PRAKASH MISHRA[1]*, ANIL KUMAR[1], DEEPAK UPADHYAY[2], AMIT GARG[1], SHRISTI SHARMA[1]

[1]Department of Microbiology, LLRM Medical College, Meerut, Uttar Pradesh, India. [2]Department of Preventive and Social Medicine, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India. Email: prem6284@gmail.com

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ABSTRACT

Objective: Intestinal parasitic infection is a burgeoning health issue, especially in developing countries owing to low socioeconomic conditions, poor sanitation, poor personal hygiene, and lack of access to potable drinking water. This study aims to determine the prevalence of different intestinal parasites among the patients.

Methods: This cross-sectional study was conducted among 470 patients attending our hospital from October 2018 to September 2019. Specimens were collected and examined macroscopically and microscopically using concentration methods and modified Ziehl–Neelsen staining for coccidian parasites.

Results: Out of the 470 patients, prevalence of intestinal infections was 4.89%. The helminthic infections were more common (52.17%), which was topped by Hookworm infection (26.09%) followed by Ascariasis (13.04%). Among the protozoa, *Giardia lamblia* (26.09%) was the most common, followed by *Entamoeba histolytica* (17.39%). The parasitic infections were more in female (5.62%) than male (4.19%) and highest in the pediatric age group and between 51 and 60 years.

Conclusion: The prevalence of intestinal parasitic infections is decreasing due to increasing awareness about sanitation, effects of open defecation, safe drinking water, and personal hygiene. However, the need of intervallic monitoring of intestinal parasitic infections is necessary.

Keywords: Parasitic, Hookworm, *Giardia lamblia,* Coccidian, Modified Z-N staining.

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INTRODUCTION

Intestinal parasitic infections are widely strewn throughout the globe, and they are continued to be a cause of health concern in developing countries. The disease-causing parasites may cause serious infections and occasionally death of hosts, especially in immunocompromised hosts. These infections are one of the major health perils which have affected approximately 3.5 billion people and caused disease in around 450 million people and the majority is constituted by children [1]. The reports from the past state that around 2 lakhs deaths per annum are attributed to these infections, chiefly in developing countries [2]. The prevalence of these infections is variable with respect to the different regions of the world, which predominantly depends on factors such as personal and community hygiene, poor sanitary facilities, geographic and socioeconomic factors, relatively humid areas, poverty, malnutrition, and high population density [3]. The infections such as Amoebiasis, Giardiasis, Trichuriasis, Hookworm, and *Hymenolepis nana* infection are the most common infections leading to various complications such as iron deficiency anemia, chronic diarrhea, portal hypertension, and impaired physical development in children along with other comorbidities [4]. Several reports from different parts of India have revealed a variable etiology of intestinal parasitic infection among different groups of population. It has become imperative to be acquainted with the disease burden of parasitic infestation in the population residing in this area. No such studies for intestinal parasitic infections were carried out among the patients attending this tertiary care center. Hence, this study was conducted to determine the spectrum of intestinal parasites affecting the patients attending the tertiary care center.

METHODS

This cross-sectional study was conducted in the Department of Microbiology, LLRM, Medical College, Meerut from October 2018 to September 2019 among 470 patients attending the outpatient and inpatient department of various clinical departments and emergency. The stool specimens from the patients attending our tertiary care hospital were screened after the approval from the Ethics Committee of the institute and obtaining written informed consent from the patient or their guardian. The stool samples were collected in universal container and marked with time of collection, date of sampling, name of the patient, age, and sex. The samples were evaluated for macroscopic as well as microscopic examination within few hours of sample collection. The macroscopic examination included color, consistency, presence of mucus, blood, parasites, or its segments. Microscopic examination was done by examination of normal saline and iodine wet mount to detect the ova and cyst of the parasites as well as erythrocytes and pus cells. Formol-ether concentration technique was adopted for re-examination of negative samples. Protozoa and helminths were identified according to their morphological details [5]. Modified Ziehl–Neelsen (Z-N) staining was done on smears prepared from the fresh stool specimen. The slides were screened under different objectives for identification of the coccidian parasites such as *Cystoisospora belli, Cryptosporidium* spp., and *Cyclospora cayetanensis* [6]. The data analysis and validation were carried out by using SPSS version 24 software. The data were represented in terms of percentage, mean and median. All $p<0.05$ were considered statistically significant, while p value ($p>0.05$) was considered insignificant.

RESULTS

A total of 470 patient's stool specimens were studied in the current study for detection of different pathogenic intestinal parasites. The age group of the patient ranged from 1 day to >90 years. The majority of the patients n = 193 (41.06%) belonged to the pediatric age group (0–18 years) followed by the age group (19–36 years). The positivity

in microscopy was found to be 4.68% which was more (6.22%) in the pediatric (0–18) age group, which is statistically insignificant (p>0.05), as shown in Table 1. The male-to-female ratio was 1.9375:1. The positivity of finding the parasites was more 5.62% (n = 9/160) in females as compared to males 4.19% (n = 13/310) (Table 1). There is no statistical difference in positivity in male and female in relation to distribution in the different age group (p>0.05).

Among the 470 stool specimens, the positivity of occult blood was found to be 13.99% (n = 40/286). The age group with the highest occult blood positivity 50% (n = 3/6) was found to be in 73–90 years followed by 19–36 years, 17.86% (n = 15/84), as shown in Table 2. The intestinal parasites were mostly detected from the pediatric age group (6.22%) and age group 55–72 years (6.25%) (Table 2). Microscopic detection in the different age group was statistically insignificant, whereas a high proportion of individuals of the older age group were found to be statistically significantly positive (p<0.05).

Out of the 23 isolates, the isolation of helminths (52.17%) was more as compared to the protozoan (43.48%) and coccidian parasite (4.35%). *Giardia lamblia* (26.09%) was the most commonly detected protozoa followed by *Entamoeba histolytica* (17.39%). Among the intestinal helminths, Hookworm (26.09%) tops the list followed by *Ascaris lumbricoides* (13.04%). Among coccidian parasites, the only isolate was *C. belli* (4.35%), while mixed infection was observed which was *H. nana* and *Trichuris trichiura.* The distribution of the intestinal pathogenic parasites is depicted in Fig. 1, while (Fig. 2a-d) and (Fig. 3a-d) shows the microscopic view of the isolated parasites.

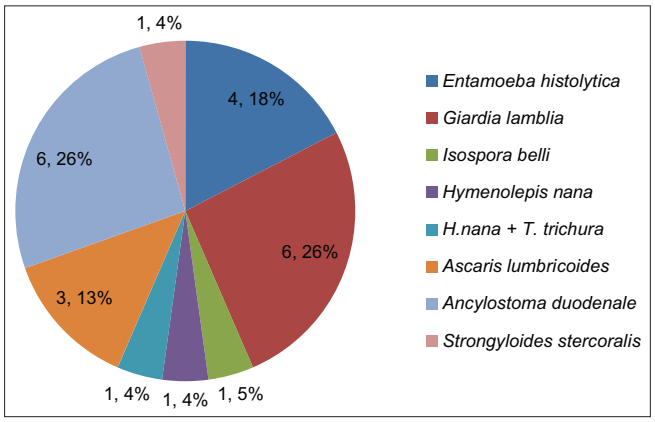

Fig. 1: Frequency of parasites screened from stool specimen

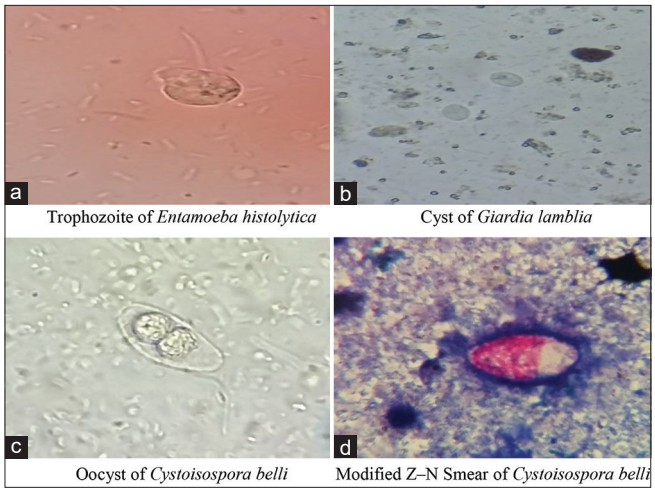

Fig. 2: (a-d) Pictures of different pathogenic enteric amoebae, flagellate, and coccidian

DISCUSSION

The risk of acquiring parasitic intestinal infections by human population varies significantly by region to region, communities, and even seasonal variation is also noticeable. It is well established that intestinal parasitic infections are closely related to poor sanitary habits and improper hygiene. Examination of wet mounts of stool and smears stained with modified Z-N technique is the standard technique used for detecting intestinal parasites but requires an experienced person for identifying the parasites. The current study revealed a prevalence of 4.89% of intestinal parasitic infection among people residing in this area. A quite similar prevalence of 6.68% was observed in a study from Rohtak [7], while a study from south India showed a very higher prevalence rate of 97.4% [8]. A slight higher prevalence of 11.2% has been reported from the neighboring state of Uttarakhand in 2014 [9]. On the other hand, prevalence of intestinal parasitic infections in neighboring countries Nepal and Sri Lanka has been reported as 29.4–34.56%, respectively [10]. The wide range of variation in the prevalence of intestinal parasite infection may be owing to variability in factors such as quality of water supply, sanitation, and other environmental conditions. The low prevalence in the current study can be due to the increasing awareness regarding factors such as improved sanitation and quality of drinking water supply and improved cleanliness by movements like "Swachh Bharat Abhiyan".

The positivity of intestinal parasites was more 5.62% in females as compared to males 4.19%, which is in accordance with the study by Kotian *et al.* [9]. Some studies showed male predominance [11,12]. This variation can be due to more involvement of females in outdoor activities like agriculture as compared to males nowadays. In the current study, the most common age group affected by intestinal parasites was the pediatric age group (6.22%) and age group 55–72 years (6.22%). This finding is in line with the study from Gujarat, in which the most common age group was 6–20 years [13].

In some of the past studies, protozoan infection is more prevalent as compared to helminthic infection [13,14], but in the current study, the helminthic infection (52.17%) is more prevalent in contrast to protozoan (43.48%) or coccidian infection (4.35%) which is similar to the study conducted in Rajasthan and Gujarat [15,16].

G. lamblia was the most common intestinal protozoan detected in our study accounting for 26.09% followed by *E. histolytica,* which were 17.39% which is in agreement with many past studies [7,9,16,17]. The route of transmission is through feco-oral route by ingestion of contaminated water and food as it a frequent environmental contaminant of water supply. Cysts of *Giardia* and *E. histolytica* have been isolated from water supplies in different parts of the world [18].

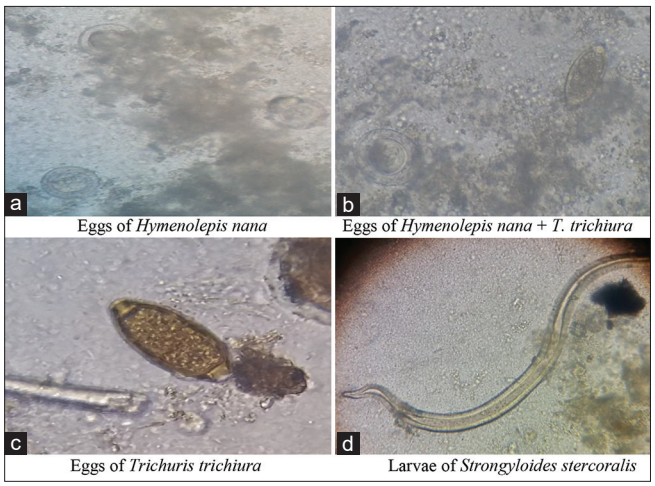

Figure 3: (a-d) Pictures of different eggs and larvae of pathogenic enteric helminths

Table 1: Positivity of stool microscopy among different age group and sexes

Age group	Males			Females			Grand total (%)
	Negative	Positive	Total	Negative	Positive	Total	
0–18	112	5	117	70	6	76	193 (41.06)
19–36	92	3	95	39	1	40	135 (28.72)
37–54	52	3	55	28	1	29	84 (17.87)
55–72	34	2	36	11	1	12	48 (10.21)
73–90	4	0	4	2	0	2	6 (1.28)
>90	3	0	3	1	0	1	4 (0.85)
TOTAL	297	13	310	150	9	160	470 (100.00)

p=0.7096 (p>0.05)

Table 2: Frequency of occult blood positivity and microscopic findings among different age groups

Age group	Total number of patients	Patients with occult blood positive	OVA /Cyst/Oocyst/ Larvae (%)
0–18	193	10	12 (6.22)
19–36	135	15	4 (2.96)
37–54	84	3	4 (4.76)
55–72	48	9	3 (6.25)
73–90	6	3	0 (0.00)
>90	4	0	0 (0.00)
p-value		p=0.008 (p<0.05)	p=0.7186, p>0.05

Among the intestinal helminths, prevalence of hookworm infection (26.09%) was the highest and was significantly more in the adult population followed by *A. lumbricoides* (13.04%). A similar high prevalence of hookworm infection has been reported from past studies [9,19]. The high rate of hookworm infection can be attributed to the fact that most of the people belong to rural areas and the prime occupation is agriculture, in which they have to walk barefooted in the fields. The other parasitic helminthic infections found in this study were trichuriasis, hymenolepiasis, and strongyloidiasis.

This study showed one case of (4.54%) of mixed parasitic infection out of the 22 cases, which shows that the parasites can co-infect the individual causing serious health issues, which is also confirmed by other studies [14,15]. The results in this study showed a case of infection by the coccidian parasite *C. belli*; this is in line with the findings documenting the least diagnosis of *C. belli/I. belli* [20,21]. The disparity in various studies regarding the distribution of intestinal or coccidian parasitic etiology justifies that there is no explicit pattern in causing intestinal parasitic infections in individuals. However, it depends on geographical location, ethnicity, immune status, and the living conditions of the patients.

CONCLUSION

This study highlights a substantially low rate of intestinal parasitic infections, with other studies showing higher rates, which depends upon geographical factors and socioeconomic factors. Therefore, the current study urges the need and importance of intervallic monitoring of intestinal parasitic infections among immunocompetent as well as immunocompromised individuals so as to have an idea about the prevalent etiology of that region to combat morbidity and mortality.

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CONFLICTS OF INTEREST

All authors declare no conflicts of interest.

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