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Intestinal Parasitic Infection: Prevalence in Recent Years in a Tertiary Care Hospital

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ABSTRACT

Introduction: Intestinal parasitic infection is a major global health problem, more so in poor and socio-economically deprived communities in the tropics and subtropics. These are among the 10 most common infestations of the world. Intestinal protozoa and helminths flourish in settings characterized by poor sanitation, dirty water, substandard and crowded housing. To determine the prevalence of intestinal parasitic infection in patients, a prospective laboratory analysis of stool samples for intestinal parasites was carried out in a tertiary care hospital.

Aim: To determine the prevalence of intestinal parasitic infection in patients, prospective laboratory analysis of stool samples to study the intestinal parasites.

Methodology: A total of 2700 symptomatic patients were investigated for intestinal parasites in their stool samples. All stool samples were subjected to direct wet mount, concentration techniques and modified acid-fast staining and looked for the presence of ova and cysts.

Results: The prevalence of intestinal parasitosis was 7.2% (195/2700). There was a high prevalence of protozoan parasites (75.4%) than helminthic parasites (24.6%). A total of 8 different parasites were found. *E. histolytica* (39.3%) was the most common parasite found, followed by *G. lamblia* (35.7%) and *A. duodenale* (8.7%).

Conclusion: As these parasitic infections are acquired because of poor personal and environmental hygiene, it is necessary to develop effective prevention and control strategies, the most important being health education. The expansion of health services for an improvement in community health must be enforced.

Key Words: *Ancylostoma duodenale*, *Entamoeba histolytica*, *Giardia lamblia*, *Enterobius vermicularis*, *Necator americanus*, Soil-transmitted helminths

INTRODUCTION

Intestinal parasitic infections continue to be a major global health problem, especially in the tropical and subtropical regions of the world.^{1,2} They are highly prevalent worldwide despite the evolution in sanitation infrastructure and hygiene. As per WHO estimation, one person in every 4 harbours parasitic worms and that 60% of the world's population is infested with them.^{3,4} The prevalence of different parasitic diseases depends on environmental, social and economic factors and varies from one country to another. Poverty, malnutrition, illiteracy, high population density, overcrowding, unavailability of potable water, proximity with animals, poor personal hygiene, low health status, poor sanitary facilities

and hot and humid tropical climate attribute for the growth and transmission of intestinal parasites.^{5,6,7} *Entamoeba histolytica*, *Giardia lamblia*, *Enterobius vermicularis* (pinworm), *Ascaris lumbricoides* (roundworm), *Ancylostoma duodenale*, *Necator americanus* (hookworms) and *Trichuris trichiura* (whipworm) are the most common parasitic infections reported globally.^{8,9} These parasites are transmitted from human to human through the faecal-oral route by contaminated food, water, fingers and nails.¹⁰ Abdominal cramps, nausea, vomiting, diarrhoea, loss of appetite, excessive bowel sound and itching are some of the manifestations of intestinal parasites.¹¹ Roundworm, hookworms and whipworms together are also known as soil-transmitted helminths (STH) or geo-

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helminths and these parasites are prevalent in regions with abundant warmth and moisture.¹² Infection with STH alone affects 1.5 billion people worldwide.¹³ Worms' infestation is one of the major causes of childhood malnutrition, vitamin A deficiency, anaemia, impairment of intellectual and cognitive development.^{13,14} High standards of living and good environmental sanitation have resulted in a reduction in the prevalence of intestinal parasites in developed countries.¹⁵ because of the significance of parasitic infections in developing countries, the present study was undertaken to study the prevalence of parasitic infections in the general population attending outpatient/inpatient department of our hospital.

METHODOLOGY

This cross-sectional study was conducted in the Department of Microbiology for a period of 2 years (June 2018- June 2020). A total of 2700 patients with symptoms suggestive of parasitic infections like persistent diarrhoea, intestinal malabsorption, weight loss and anaemia attending the outpatient/ inpatient department of our hospital were included in this study. Stool samples were collected in wide-mouthed, clean, leak-proof, screw-capped containers and transported to the laboratory and processed immediately.

Processing of specimen

Macroscopic examination: Stool was examined for its consistency, colour, odour, presence of blood, mucus and parasitic structures like scolices, proglottids and adult worm.

Microscopic examination: All samples were subjected to direct wet mount (saline and iodine mount), concentration techniques (formalin-ether concentration technique and saturated salt solution technique) and staining (modified acid-fast stain).

For the preparation of saline wet mount, a drop of saline was taken on a slide and mixed with a small number of faeces with a piece of the wooden stick to prepare a smooth suspension. A coverslip was placed on suspension and examined at low power (10×) and high power (40×) objective under the microscope. Similarly, an iodine mount was prepared in which a drop of saline is replaced by a drop of 1% Lugol's iodine. Both the preparations were examined for the presence of RBCs, pus cells and Charcot- Leyden crystals. The saline mount was used to demonstrate protozoal trophozoites and helminthic ova and larvae. Iodine mount was used for the demonstration of protozoal cysts. Any sample showing oocysts resembling oocysts of coccidian parasites were further confirmed by modified Ziehl- Neelsen staining.

Both floatation (saturated salt solution technique) and sedimentation method (formalin-ether sedimentation technique) of concentration techniques were applied irrespective of the direct wet mount results.¹⁶

Statistical analysis was done by chi-square test using SPSS software.

RESULTS

A total of 2700 stool samples were examined during the study period, out of which 195 samples (7.2%) revealed the presence of intestinal parasites.

Males (117/195, 60%) were more commonly affected than females (78/195, 40%). The majority of the cases belonged to the < 10 years age group (64/195, 32.8%), which was found to be statistically significant at $p < 0.05$. (Table 1)

Protozoal cysts or trophozoites were detected in 147 samples (75.4%) and helminthic eggs or larvae were detected in 48 samples (24.6%).

Only 1 sample showed the presence of > 1 parasite, which was a combination of *S. stercoralis* larva and *A. duodenale* ova. So, altogether 196 parasites were detected.

The most commonly detected intestinal parasite was *E. histolytica* (77, 39.3%), followed by *G. lamblia* (70, 35.7%) and *A. duodenale* (17, 8.7%). (Fig 1)

Coccidian parasite was not detected in any of the samples.

Of 9 patients infected with *S. stercoralis*, 4 were immunocompromised (2 patients were on steroids and 2 were cancer patients).

DISCUSSION

Parasites have been the scourge of mankind for centuries and continue to cause high morbidity, especially in developing countries like India. Intestinal parasites persist and flourish where inadequate health care, inadequate sanitation and overcrowding are ingrained.

The present study included 2700 patients with symptoms suggestive of parasitic infections attending outpatient/inpatient of our hospital.

The prevalence rate of parasitic infections in the present study was 7.2% which is in concordance with a study by Singh R et al and Jad B et al.^{17,18} In contrast, many other studies from India have shown a high prevalence rate such as 22.2% by Manochitra K et al. and 40.3% by Bhattacharya R et al.^{4,19} Low prevalence rate in our study is an indication of highly effective deworming therapy available which is dispensed through healthcare services, school health programmes and community interventions directed at the vulnerable group. Also, better personal hygiene and sanitation could be the reason. The most important problem associated with intestinal parasitic infections is that about 90% of infected individuals

remain asymptomatic, which leads to a lesser number of people reporting to health care setups and therefore, false low prevalence.²⁰

The present study reported a higher rate of infection among males (60%) than females (40%) which concurs with the study by Singh R et al.¹⁷ In contrast, Manochitra K et al. reported 56% parasitosis in females and 44% in males.⁴

In the present study, the majority of the cases (32.8%) were from the < 10 years age group and a similar finding was reported by Jad B et al. and Chakraborty S et al. The lower immunity in children along with pica could be the reason for this.¹⁸⁻²¹

The present study has encountered a very high prevalence of intestinal protozoal parasitic infection (75.4%) compared to helminthic infection (24.6%). Similar findings were reported by many other studies from India, *E. histolytica* (39.3%) was the commonest protozoal parasite reported in this study followed by *G. lamblia* (35.7%) which is consistent with the finding of Rituparna B et al.^{17,18,19} In contrast, Singh R et al. and Jad B et al. reported *Giardia* as the commonest protozoal parasite followed by *E. histolytica*.^{17,18} These parasites are transmitted by the faecal-oral route through ingestion of contaminated drinking water. Low quality of drinking water along with faulty sewage pipes is a common problem seen in India, more so in the rural areas that do not have proper municipal water supplies and sewage systems.

Among helminths, *A. duodenale* (8.7%) was the most commonly found parasite in this study which is in concordance with the finding of Manochitra K et al.⁴ Contrary to our study, other studies have found *A. lumbricoides* and *Hymenolepis nana* as the commonest helminth.^{18,20,21} Among STH, *A. duodenale* was by far the most common in India, as also in our study. However, the prevalence of Hookworm and other STH has decreased in our country compared to other studies from Izmir and Cambodia.^{22,23} This may be due to more use of footwear among farmers, labourers and also improved environmental sanitation, good personal hygiene like washing hands before eating and after using toilets and hygienic preparation of food.

The prevalence of polyparasitism in our study was 0.5% as only 1 sample showed the presence of 2 different parasites. Other studies have found the prevalence of the same as 1.46% and 17.3%.^{4,19}

In this study, 44.4% (4/9) of the patients infected with *S. stercoralis* were immunocompromised. We did not study the immune status of the rest of the patients. In a study by Bora I et al, parasitic infections were present in 53.2% of the immunocompromised patients.²⁴

CONCLUSION

The present study revealed a high prevalence of intestinal protozoan infections. Despite the downward trend of parasitic infections in India, compared to the past decades, intestinal parasites remain a challenging public health problem wherever sanitation and health resources are limited. For control of parasitic infections, few practices are to be implemented like deworming campaigns, provision of potable water, environmental hygiene, consumption of properly cooked food, avoidance of barefoot walking on soil and most importantly, health education should be given to the population. Also, for the diagnosis of parasitic infections, concentration methods should be used routinely as they permit the detection of parasites present in small numbers which may be missed by performing direct wet mounts only.

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Sahu Kundan Kumar: Revised and Final approval of the version to be published

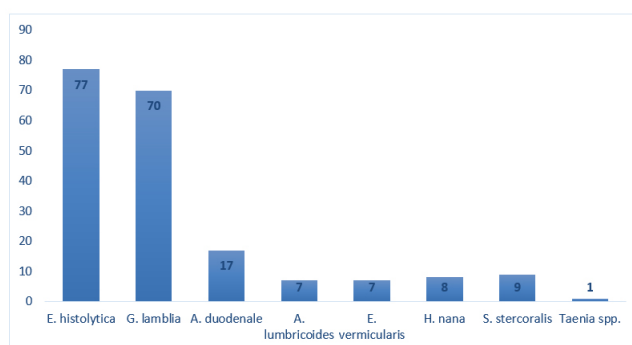
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Table 1: Age and gender-wise distribution

| AGE GROUP (YEARS) | MALES | FEMALES | TOTAL | |
|-------------------|-------|---------|-------|------|
| | | | N | % |
| < 10 | 40 | 24 | 64 | 32.8 |
| 11-20 | 9 | 4 | 13 | 6.7 |
| 21-30 | 16 | 9 | 25 | 12.8 |
| 31-40 | 12 | 10 | 22 | 11.2 |
| 41-50 | 7 | 6 | 13 | 6.7 |
| 51-60 | 15 | 14 | 29 | 14.9 |
| > 60 | 18 | 11 | 29 | 14.9 |
| TOTAL | 117 | 78 | 195 | 100 |

**Figure 1: Distribution of intestinal parasites.**