

Spectrum of Intestinal Parasitic Infections in Paediatric Population in A Tertiary Care Hospital

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ABSTRACT

Objectives: To determine the frequency of parasites detected in stool samples of children with symptoms of parasitic infections.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of Microbiology, Armed Forces Institute of Pathology, in collaboration with Paediatrics Department of Pak Emirates Military Hospital, Rawalpindi Pakistan, from Jan to Jul 2020.

Methodology: A Total of 138 stool samples were collected from children who were admitted or presented in the outdoor department and had symptoms of intestinal parasitic infections. Youngsters who had been dewormed within the previous six months or whose samples arrived at the lab more than three hours after the collection were not included. Stool samples were examined visually and by using a saline preparation followed by a method that involved the concentration of formal ether. This was done to determine the different kinds of trophozoites, adult worms, and eggs or cysts that parasites produce.

Results: The study found that intestinal parasites were moderately prevalent (26.81%) among the pediatric population, with *Giardia lamblia* (54.05%) being the most frequent, followed by *Entamoeba histolytica* (35.14%) and *Ascaris lumbricoides* (5.41%).

Conclusion: It is recommended to guarantee the accessibility of purified drinking water to decrease the incidence of parasitic infections within our populace.

Keywords: Children, *Giardia lamblia*, Parasitic infections.

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INTRODUCTION

Infections caused by parasites that affect the intestines are one of the leading health issues, mainly in the paediatric age group.¹ Around two million fatalities per year are attributed to these illnesses, primarily in underdeveloped nations. More than 1.5 billion individuals are affected with soil-transmitted helminthic diseases, including 270 million preschoolers and more than 600 million schoolchildren.^{2,3} Numerous studies on parasite infections transmitted through the digestive route and the factors that put people at risk for contracting them have led researchers to the conclusion that the spectrum of these infections varies depending on geographical location, level of hygiene and socioeconomic status, as well as the availability of clean drinking water.⁴⁻⁶ The frequency of soil-transmitted helminth infections was found to be exceptionally high in India, coming in at 54.8% in research that was carried out there. The most prevalent helminth species identified was *Ascaris lumbricoides*, which accounted for 54.4% of the total, followed by *Trichuris trichura*, which accounted for 4.8%.^{7,8}

The accuracy of identifying parasites in stool samples can be influenced by various factors, such as the diagnostic methods used and the number of samples examined. Therefore, it is essential to carefully consider the procedures employed to achieve reliable and accurate results. The current diagnostic guidelines for detecting stool parasites typically involve collecting a stool sample and examining it microscopically for the presence of parasites, their eggs, or other diagnostic structures. Depending on the suspected parasite, specific staining techniques may enhance visualization.^{9,10}

Several prior studies carried out in various regions of the country indicate that infections are prevalent among the younger population in Pakistan. This study was undertaken to determine the frequency of different intestinal parasites in symptomatic children to help establish the cause of the underlying infections. Due to a lack of data on intestinal parasitic infections in our hospital, this study will help identify the cause and treat these infections.

METHODOLOGY

The study was conducted at the Department of Microbiology, Armed Forces Institute of Pathology, in collaboration with the Pediatrics Department of the

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Pak Emirates Military Hospital, Rawalpindi Pakistan, from January to July 2020, with the approval of the Institutional Ethical Committee (Ethical Review Board number 43). The sample size was determined with the help of the WHO sample size calculator, taking prevalence of intestinal parasitic infection as 10.39%.⁹

Inclusion Criteria: Children of either gender, aged 6 months to 12 years were included.

Exclusion Criteria: Stool samples of children who were already dewormed in the last six months and those received in the lab after 3 hours of collection time were excluded from the study.

After taking informed consent, one hundred thirty-eight samples were collected from paediatric patients attending outpatient departments or admitted to the hospital. The stool was contained in a container having no preservatives. The samples were transported to the lab within 3 hours. Stool samples were inspected visually in the laboratory and then studied using a saline preparation followed by a formal ether concentration approach to identify trophozoites, adult worms, and eggs or cysts of parasites.

The data was initially recorded in Microsoft Excel 2010 and subsequently analyzed using Statistical Package for the social sciences (SPSS) version 24:00 for descriptive statistics evaluation. Frequencies and percentages were calculated for gender, socioeconomic status, use of clean water and parasite infection.

RESULTS

Most of the patients (84,60.87%) were between 6 months and six years old (Table-I). In this study, the frequency of parasites detected in stool samples of children having symptoms of parasitic infections was 37 (26.81%). Among the parasites, *Giardia lamblia* (54.05%) and *Entamoeba histolytica* (35.14%) were the most prevalent parasites, followed by *Ascaris lumbricoides* (5.41%), *Hymenolepis nana* and *Taenia species* (2.70%) (Table-II). The frequency of parasites showed a correlation with socioeconomic status. The samples obtained from children belonging to the middle class exhibited the highest number of parasites, indicating a significant association between socioeconomic status and parasitic infection (Table-III).

Of all the received samples, 102(73.91%) were from individuals who consumed clean water, while 36(26.09%) were from those who consumed unclean water. The analysis revealed that among all the detected parasites, 26(70.27%) were found in children who consumed unclean water whereas only 11(29.72%)

were found in children who consumed clean water (Table-IV).

Table-I: Association of Parasites Detected according to Age groups (n=138)

Age(years)	Total	Parasites Detected n(%)		p-value
	n(%)	Yes	No	
6 months-6 years	84(60.87)	28(33.34)	56(66.66)	0.031
7-12 years	54(39.13)	09(16.66)	45(83.34)	

Table-II: Frequency of Parasites Detected (n=138)

Parasites	Frequency n(%)
<i>Giardia lamblia</i>	20(54.05)
<i>Entamoeba histolytica</i>	13(35.14)
<i>Ascaris lumbricoides</i>	2(5.41)
<i>Hymenolepis nana</i>	1(2.70)
<i>Taenia species</i>	1(2.70)
Total	37(100)

Table-III: Association of Parasites detected according to Socioeconomic Status (n=138)

Socioeconomic Status	Total	Parasites Detected n(%)		p-value
	n(%)	Yes	No	
Lower	40(28.98)	07(17.5)	33(82.5)	
Middle	98(71.02)	30(30.61)	68(69.39)	
Upper	0(0)	0(0)	0(0)	

Table-IV: Association of Parasites detected with respect to use of Clean Water (n=138)

Use of Clean Water	Total	Parasites Detected n (%)		p-value
	n(%)	Yes	No	
Yes	102(73.91)	11(10.78)	91(89.22)	0.0001
No	36(26.09)	26(72.22)	10(27.78)	

DISCUSSION

This study aimed to know the frequency of parasitic agents detected in the stool of children having symptoms of parasitic infections in our setup. The age range in this study was from 6 months to 12 years, with a mean age of 5.72±2.99 years. Most of the patients, 84(60.87%), were between 6 months to 6 years of age. Out of the 138 patients, 55(39.86%) were male, and 83(60.14%) were females, with male to female ratio of 1:1.5. In the present study, the prevalence of IPIs in females (22%) was similar to males (24%), which is similar to the previous studies,^{11,12} but in contrast, to one study by which indicated that more females have (30.9%) have IPIs than males (16.5%).¹³ The difference might be due to cultural and behavioural differences between the two countries.

The frequency of parasites detected in stool samples of children having symptoms of parasitic infections in our study was 37(26.81%) samples. A

plausible reason for this high percentage of parasitic infestation may be due to poor sanitary facilities in Karachi as compared to this region.^{14,15} Similarly, another study conducted in the hamlet of Bhudni in Peshawar discovered that the overall incidence of parasitic infestations was 41%.¹⁶ This figure is significantly higher than what we discovered during our investigation. If we look at the prevalence of enteric parasite infection in South Asian nations, for instance, in Nepal, the prevalence of enteric parasitic infection reached 60 per cent in one of the studies in the district of Ruphandi.¹⁷ In contrast, the research results by Gupta and colleagues found that 33 per cent of the school-aged children living in the Saptari district of Nepal were infected by intestinal parasites, leading to infections.¹⁸ This was found to be true in the research presented by Khanal *et al.*¹⁹ in which they carried out two further studies in Nepal, both of which led them to conclude that the prevalence of intestinal parasites was 17.6%. In contrast, in one study done in a rural area of Pakistan, the prevalence is relatively high, at 82%.²⁰

Among the protozoa, *Giardia lamblia* (54.05%) and *Entamoeba histolytica* (35.14%) were the most prevalent parasites identified in our study; this sheds light on the variety of parasites observed, while *Ascaris lumbricoides* was the most prevalent helminth (5.41%).

Regarding socioeconomic status, the highest prevalence was in the middle-class group, according to our study, and using clean water reduced the incidence of parasitic infections. The association of personal hygiene and sanitary habits with parasitic infections in found to be strong in a study done in rural areas.²¹ Similar results were obtained in a study conducted in Karachi on the prevalence of helminthic infections, which underscores the significance of maintaining hygienic conditions and utilizing clean drinking water as preventative measures against intestinal parasitic infections.

CONCLUSION

Among children, parasitic infection is common in the six months to 6 years. *Giardia lamblia*, followed by *Entamoeba histolytica* and *Ascaris lumbricoides*, are the most common parasites detected and were associated mainly with the use of unclean water. Therefore, we recommend providing clean drinking water to minimize the burden of parasitic infestation in our population.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

IS: & IAM Conception, study design, drafting the manuscript, approval of the final version to be published.

UK: & RI Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

FS: & MA Critical review, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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