Original Research Article

Spectrum of Intestinal Parasitic Infections (IPIs) in Pediatric Population in a Tertiary Care Hospital

Yogita Rai*, Ravinder Kaur, Gaurav Dhaka, Sikandar Hayat and Imsensenba

Department of Microbiology, Lady Hardinge Medical College, New Delhi, India

*Corresponding author

A B S T R A C T

Parasitic infections are among the most common infections and one of the biggest health problems of the society worldwide. Pediatric age group have the highest morbidity compared with other age groups and by treating these children, the disease burden in the total population is reduced. The aim of this study was to determine the spectrum of intestinal parasitic infections in pediatric population attending the pediatric tertiary care hospital. Study was performed on 1029 stool specimens of pediatric age group from February 2017 to July 2017. Specimen were collected and examined with saline and iodine wet mount preparations. The negative samples were subjected to further screening by formal ether concentration technique. Prevalence of intestinal parasitic infections was 10.39%. Among the protozoa, *Giardia lamblia* (58%) was the most common, followed by *Entamoeba histolytica* (9.8%). *Ascaris lumbricoides* (24%) was the most common helminth found. Health education, good sanitation and availability of clean drinking water supply will go a long way in decreasing the global burden of intestinal parasitic infections.

Keywords
Spectrum, Population, Tertiary care hospital, IPIs.

Introduction

Intestinal parasitic infections are among the most common infections worldwide\(^1\). It is estimated that some 3.5 billion people around the world are affected asa result of these infections, the majority being children\(^2\). Intestinal parasitic infections (IPI’s) are a serious health problem affecting mainly the developing countries\(^3,4\). These infections can lead to anemia, malnutrition and cognitive impairment in pediatric population\(^1,4-6\).

The widespread nature and global impact of these infections is revealed by the fact that infections by Soil Transmitted Helminths (STHs) have been included as ‘Neglected Tropical Diseases’ (NTDs) in the initiative taken by WHO\(^7\).

While *Giardia* is the most common water borne parasite infecting man worldwide\(^8\), roundworms (*Ascaris lumbricoides*) are the most prevalent STH in the country\(^9\). Several studies have dealt with the prevalence and risk factors associated with IPIs by mass survey of specific population in a localized area\(^10-12\).

As an outcome, IPIs were detected mostly in asymptomatic carriers.

This study was conducted to determine the Spectrum of IPIs among symptomatic pediatric population attending a Tertiary Care Hospital, New Delhi over a period of 6 months.
Materials and Methods

The study was conducted in the Department of Microbiology, Lady Hardinge Medical College, New Delhi from February 2017 to July 2017. A total of 1029 stool samples from 1029 pediatric patients attending the various outpatient departments and admitted in indoor wards were processed for detection of ova and cysts as per physician’s request. Samples were collected in wide mouthed containers having no preservative and were transported to the laboratory within 2 hours of collection. The stool samples were observed macroscopically for the presence of adult worms and segments of Tinea species. The same samples were also screened microscopically for the presence of ova, cysts and trophozoites by saline and iodine preparations. The samples negative were subjected to further screening after formal ether concentration technique.

Statistical analysis

Patient details and all the relevant data were analysed and recorded in Microsoft Excel 2010. Cases were divided in three age groups, 0-5 years, 6-10 years and 11-14 years (Table 1).

Results and Discussion

A total of 1029 cases were studied comprising of 610 (59.28%) males and 419 (40.7%) females. The prevalence of IPIs was 10.39% (107 cases). The parasitic infection was highest in the age group of 6-10 years (10.37%) (Table 1). The spectrum of different IPIs has been shown in (Table 2). The most common parasite was cyst of *Giardia lamblia* (58%) followed by *Ascaris lumbricoides* (24%). Mixed infections were seen in 4 cases (3.73%) (Table 3). Prevalence of IPIs were more in outpatients (11.49%) compared to inpatients (9.38%) (Table 4). Prevalence of *Giardia lamblia* and *Ascaris lumbricoides* infection was highest in the age group 0-5 years (Table 5).

The present study showed the occurrence of different intestinal parasites of public health importance in a pediatric population. Poor socio-economic and unhygienic conditions have been largely associated with this global burden, as has been demonstrated in studies from rural and urban slum areas. We found a prevalence of 10.39% which is in accordance with the studies by Manish Kumar et al., Kotian et al., Ragunathan et al., and Davane et al., but low when we compare it with the studies by DS Shubha et al., Bora D et al., and Nasir Salam et al.. In all the above studies, a certain population/group with associated risk factors like poverty, poor sanitation has been studied whereas in our study, prevalence of IPI among symptomatic patients attending the tertiary care hospital have been considered which is the probable reason for the low prevalence, highlighting the fact that asymptomatic carriers of IPIs might make up the bulk of the global burden.

Table 1 Age groups

| Age group (in years) | Total | Positive no. (%) |
|---------------------|-------|------------------|
| 0-5                 | 502   | 46 (9.16%)       |
| 6-10                | 347   | 36 (10.37%)      |
| 11-15               | 180   | 25 (13.8 %)      |
Table 2: Intestinal parasites isolated from stool samples

| Agents causing IPIs         | No. (%) |
|---------------------------|---------|
| Giardia lamblia           | 65 (58%)|
| Entamoeba histolytica     | 11 (9.8%)|
| Ascaris lumbricoides      | 27 (24%)|
| Hymenolepis nana         | 05 (4.4%)|
| Ancylostoma duodenale     | 03 (2.6%)|
| Trichuris trichiura       | 01 (0.89%)|
| **TOTAL**                 | 112     |

Table 3: Multiple Parasitic infections

- Ascaris lumbricoides + Giardia lamblia: 1
- Ascaris lumbricoides + Hymenolepis nana: 1
- Trichuris trichiura + Ascaris lumbricoides + Giardia lamblia: 1
- Entamoeba histolytica + Giardia lamblia: 1

Table 4: Distribution of intestinal parasites in outpatients and inpatients

|          | Positive no. (%) | Negative no. (%) | Total |
|----------|------------------|------------------|-------|
| Inpatient| 50 (9.38%)       | 483 (90.61%)     | 533   |
| Outpatient| 57 (11.49%)     | 439 (88.50%)     | 496   |

Table 5: Prevalence of IPIs in various age groups (age in years)

| Agents                          | 0-5 no. (%) | 6-10 no. (%) | 11-15 no. (%) |
|---------------------------------|-------------|--------------|---------------|
| Cyst of Giardia lamblia (65)    | 32 (49.23%) | 26 (40%)     | 7 (10.77%)    |
| Cyst of Entamoeba histolytica (11)| 5 (45.45%) | 5 (45.45%)   | 1 (9.09%)     |
| Ascaris lumbricoides (27)       | 10 (37.04%) | 7 (25.93%)   | 10 (37.04%)   |
| Hymenolepis nana (05)           | 2 (40%)     | 2 (40%)      | 1 (20%)       |
| Ancylostoma duodenale (03)      | 2 (66.67%)  | 1 (33.33%)   | 0 (0.00%)     |
| Trichuris trichiura (01)        | 1 (100%)    | 0 (0.00%)    | 0 (0.00%)     |

Also the wide variation in the prevalence of intestinal parasites may be due to variations in factors like local quality of drinking water supply, sanitation and other environmental conditions. In the present study, it was observed that prevalence of intestinal parasitic
infection among females (10.5%) and males (10.3%) were comparable. *Giardia lamblia* was the most prevalent protozoa in this study which is in accordance with many studies conducted previously.\(^20, 25, 26\) It gets transmitted by feco-oral route by drinking contaminated water as it is a common environmental contaminant of water supply. The most common STH seen in our study was *Ascaris lumbricoides* which was also observed in other studies.\(^10, 27, 28, 29\)

**Limitations**

Firstly, we missed asymptomatic patients as it was not a prevalence study. About 90% of infected individuals remain asymptomatic and hence do not present to the hospital.\(^10\) Secondly, single stool examination was done while optimal laboratory diagnosis of intestinal parasitic infection requires the examination of at least three stool specimens collected over several days.

The study revealed the widespread distribution of intestinal parasites among symptomatic pediatric patients. It highlights the need for deworming, integrated drug treatment and hygiene education in children and their parents. Good hygiene and sanitary condition, availability of clean drinking water supply and education will play an important role in reducing the prevalence of IPIs in the near future.

**References**

Kang, G., Mathew MS, Rajan DP, Daniel JD, Mathan MM, Mathan VI, *et al.*, Prevalence of intestinal parasites in rural Southern Indians. Trop Med Int Health. 1998; 3:70–5. [PubMed]

Ogunlesi, T., Okeniyi J, Oseni S, Oyelani O, Njokanme F, Dedekte O, Parasitic etiology of Childhood diarrhea. Ind J Pediaitr 2006; 73; 1081-4.

Quihui, L., Valencia ME, Crompton DWT, Phillips S, Hagan P, Moreles G etal. Role of employment status and Education of mothers in the prevalence of intestinal parasitic infections in Mexican School Children. BMC pubhealth 2006; 6: 225-32.

Okyay, P., Ertug S, Gultekin B, onen O, Beser E. Intestinal parasites prevalence and related factors in school children, a western city sample –Turkey, BMC pub health 2004; 4: 64-9.

Ostan, I., Kilimciu, lu AA, Girginkarde, lei N, Ozyurt CB, Limoncu ME, OK UQ Health Inequities: Lower socio-economic conditions and high incidence of intestinal parasites. BMC pub Health 2007; 7: 342-50

WHO. Disease covered by NTD Department. Available from: http://www.who.int/neglected_diseases/diseases/en

Halliez, M.C.M., Buret AG. Extra-intestinal and long term consequences of *Giardia*duodenalis infections. World J Gastroenterol. 2013; 19(47):8974-85.

Jain, S.K., Dwivedi A, Shrivastava A, Vijayananth P, Vidyavardhini R, Venkatesh S. Prevalence of soil transmitted helminthic infection in India in current scenario: A systematic review. J Commun Dis. 2016; 48(2):24-35.

Bisht, D., Verma AK, Bharadwaj HD. Intestinal parasitic infestation among children in a semi-urban Indian population. Trop Parasitol.2011; 1:104-07.

Kattula, D., Sarkar R, Rao Ajjampur SS, Minz S, Levecke B, Muliyil J, *et al.*, Prevalence & risk factors for soil transmitted helminthes infection among school children in south India. Indian J Med Res. 2014; 139:76-82.

Wani, S.A., Ahmad F, Zargar SA, Ahmad Z, Ahmad P, TakH. Prevalence of Intestinal parasites and associated risk factors among school children in Srinagar city, Kashmir, India. J Parasitol. 2007; 93:1541-43.

Petri, W.A., Jr, Singh V. Diagnosis and Management of amoebiasis, clin infect Dis 1999; 29: 1117-25.

Pullan, R.L., Smith JL, Jasarasaria R, Brooker SJ. Global numbers of infection and disease burden of soil transmitted
helminth infections in 2010. Parasites & vectors. 2014; 7(37):01-09.
Shubha, D.S., Fatima F. A coprological survey for assessing intensity of parasitic infection in school children: Cross-sectional study. Trop Parasitol.2011; 1:88-93.
Bora, D., Meena VR, Bhagat H, Dhariwal AC, Lal S. Soil transmitted helminthes prevalence in school children of PauriGarhwal district, Uttaranchal State. J Commun Dis. 2006; 38:112-14
Misra, S., Duttaroy B, Shroff B. The prevalence of intestinal parasitic infections in the urban slums of a city in Western India Journal of Infection and Public Health. 2013; 6:142-49.
Sehgal, R., Reddy GV, Verweij JJ, Rao AVS. Prevalence of intestinal parasitic infections among school children and pregnant women in a low socio-economic area, Chandigarh, North India. Reviews in Infection. 2010; 1(2):100-03
Manish Kumar Purbey, Tuhina Banerjee. Spectrum of Intestinal Parasitic Infections (IPIs) in a Tertiary Care Hospital in Varanasi: Need to Protect School aged Children from Giardia Infection. National Journal of Laboratory Medicine. 2017 Jan, Vol-6(1): MO01-MO05
Swapna Kotian, Munesh Sharma, DeepakJuyal, Neelam Sharma. 2014. International Journal of Medicine and Public Health, 4(4).
Ragunathan, L., Kalivaradhan SK, Ramadass S, Nagaraj M, Ramesh K.Helminthic infections in school children in Puducherry, South India. J Microbiol Immunol Infect 2010; 43:228-32.
Davane, M.S., Suryawanshi NM, Deshpande KD. A prevalence study of intestinal parasitic infections in a rural hospital. Int J Recent Trends SciTechnol2012; 2:1-3.
Shubha, D.S., Fatima F. A coprological survey for assessing intensity of parasitic infection in school children: Cross-sectional study. Trop Parasitol. 2011; 1:88-93.
Nasir Salam, and Saud Azam Prevalence and distribution of soil transmitted helminth infections in India BMC Public Health (2017) 17:201
Gujarathi, U.P., Goyal RC, Aher AR. Prevalence of intestinal parasitic infections in a rural community. Ind Med Gaz1997; 131:277-9.
Dongre, A.R., Deshmukh PR, Boratne AV, Thaware P, Garg BS. An approach to hygiene education among rural Indian school going children. Online J Health Allied Sci 2007; 6:1-6.
Marothi, Y., Singh B. Prevalence of intestinal parasites at Ujjain, Madhya Pradesh, India: Five-year study. Afr J Microbiol Res 2011; 5:2711-4
Singh, C., Zargar SA, Masoodi I, Shoukat A, Ahmad B. Predictors of intestinal parasitosis in school children of Kashmir: A prospective study. Trop Gastroenterol 2010;31:105-7.
Panda, S., Rao UD, Ramasankaran K. Prevalence of intestinal parasitic infections among school children rural area of Vizianagaram. IOSR JPharmBiolSci2012; 3:42-5.
Reed, S.L., Amoebiasis and infections with free living amoeba in: Harrison TR, Fauli AS, Braunwald E, et al., Editors. Harrison’s principles of Internal medicine 15th Ed. New York. McGraw-Hill; 2001. Pp. 1199-202.
WHO. Control of tropical diseases. WHO, Geneva. 1998; 1: 1-5.

How to cite this article:
Yogita Rai, Ravinder Kaur, Gaurav Dhaka, Sikandar Hayat and Imsensenba. 2017. Spectrum of Intestinal Parasitic Infections (IPIs) in Pediatric Population in a Tertiary Care Hospital. Int.J.Curr.Microbiol.App.Sci. 6(10): 179-183. doi: https://doi.org/10.20546/ijcmas.2017.610.023

183