Original Article

Prevalence of Intestinal Parasitosis among Under-Five Children in a Rural Community of Purba Bardhaman District, West Bengal

Saptarshi Banerjee, Soumalya Ray, Prabha Shrivastava, Dilip Kumar Das

Department of Community Medicine, Burdwan Medical College, Purba Bardhaman, West Bengal, India

Abstract

Context: Intestinal parasitosis (IP), a group of diseases caused by one or more species of protozoa and helminths, is still considered a neglected tropical disease and a public health concern in India. Poor sanitation and unhygienic conditions largely contribute to sustained transmission, primarily among children, adversely affecting health and development. The problem needs area-specific assessment and interventions. **Aims:** The present study aimed at determining the prevalence of IP and its correlates among under-five children in a rural community of Purba Bardhaman district, West Bengal, India. **Settings and Design:** A descriptive cross-sectional study was conducted in Bhatar Block of Purba Bardhaman district. **Subjects and Methods:** Mothers/caregivers of 294 under-five children (selected through multistage sampling) were interviewed for background characteristics at the household level, and stool samples from each child were collected, transported, and examined for ova/parasite/cysts following standard guidelines. **Statistical Analysis Used:** Statistical analysis of the data obtained was done using SPSS (V20). **Results:** The overall prevalence of IP was 17.0%. Majority of the intestinal parasites were protozoa (42, 84%), of which the most common was *Giardia lamblia* (24, 48.0%). Age of the child and practice of defecation showed a significant association with IP on logistic regression. **Conclusions:** Protozoa, mainly *G. lamblia*, contributes for majority of intestinal parasitic infections among the study population, and children belonging to the age group of 25–60 completed months and with open-field defecation practice have higher risk of acquiring them.

Keywords: Helminths, neglected tropical disease, parasitosis, sanitation

Introduction

Intestinal parasitosis (IP) are a group of diseases of public health concern, caused by different species of protozoa and helminths, resulting in substantial morbidity and mortality globally.[1] The World Health Organization estimates that 241 million children are at risk of acquiring soil-transmitted helminths in India,[2] resulting from poor sanitation and environmental conditions. Anemia and undernutrition are debilitating outcomes of chronic worm infestations among children. Stool examination remains the gold standard for the diagnosis of IPs.[3] The present study was planned to generate evidence on the burden of the disease among under-five children in rural areas of a district in West Bengal.

Subjects and Methods

A descriptive-type cross-sectional study was conducted in 14 villages, one village from each of the 14 gram panchayats in the Bhatar Block of Purba Bardhaman district, West Bengal, India, from November 2018 to April 2019. Considering the prevalence of intestinal parasitic infestations to be 23% among rural children according to a study by Reddy and Basha,[4] the calculated sample size was 294. The study adopted a multistage random sampling technique in which one village from each of the 14 gram panchayats was selected randomly in the first step, and an equal number of under-five children, i.e., 21 (294/14 = 21), and their mothers/caregivers were included as the study participants. Verbal consent was

Access this article online

Quick Response Code:

Website: www.ijcm.org.in

DOI: 10.4103/ijcm.IJCM_461_19

Address for correspondence: Dr. Soumalya Ray, Department of Community Medicine, Burdwan Medical College, Purba Bardhaman, West Bengal, India.
E-mail: drsoumalya@gmail.com

How to cite this article: Banerjee S, Ray S, Shrivastava P, Das DK. Prevalence of intestinal parasitosis among under-five children in a rural community of Purba Bardhaman District, West Bengal. Indian J Community Med 2020;45:425-8.

Received: 11-11-19, **Accepted:** 26-05-20, **Published:** 28-10-20

obtained. Those who were not willing to participate were excluded.

Two visits were made to each village. The study was conducted on a household level. On the first visit, the mothers/caregivers were interviewed using a pretested and predesigned questionnaire about socioeconomic, demographic, and behavioral characteristics. They were provided with a clean, dry, leak-proof container labeled with the name of the child and a questionnaire-specific serial number for stool collection and explained in detail on how to collect the stool in the container. On the subsequent visit, the stool samples were collected; transported to the laboratory; and examined for ova, parasites, and cysts following standard operating procedures. Samples with even one ova/parasite/cyst or all were considered as positive for intestinal parasitic infection.

The collected data were analyzed using Statistical Package for the Social Sciences (IBM SPSS statistics for Windows, version 20.0. Armonk, New York (US): IBM Corp. 2011).

Results

Background characteristics of the study population

A total of 294 children were studied, of which 166 (56.5%) were in the age group of 25–60 completed months; 165 (56.1%) were boys, 184 (62.6%) were Hindus, and 213 (72.4%) belonged to nuclear families. Majority (149/294, 50.7%) of them belonged to Class-III socioeconomic status (according to modified B.G. Prasad Scale updated on January 2019). Majority of the study participants' mother's education level was primary to upper primary level, i.e., 151 (51.4%) and 265 (90.1%) of the mothers were homemakers by occupation.

Behavioral characteristics of the study population

Open-field defecation had been practiced by 170 (57.8%) participants, followed by 124 (42.2%) who used sanitary latrines for defecation. Standpoint tap was the source of drinking water for majority (65.3%) of them; 252 (95.1%) of them did not use any footwear while roaming or playing and 191 (65.0%) of them used only water while handwashing [Table 1].

Prevalence of intestinal parasitosis

Among the 294 participants, the overall prevalence of IP was 17.0% in the area, with a sex distribution of 13.9% among boys and 20.9% among girls. The proportion of parasitosis among those who practiced open-field defecation was 22.9%, families using tube well as their source of drinking water was 23.4%, families using intermittent piped water supply was 14.6%, children who walk barefoot was 17.9%, those who used shoes was 23.1%, children who use soap for handwashing was 12.6%, and those who did not use soap was 19.4%.

Majority of the intestinal parasites were protozoa, i.e., 42 (84%), followed by helminths, i.e., 8 (16%). The most common intestinal parasite was found to be *Giardia lamblia,* i.e., 24 (48.0%), followed by *Entamoeba histolytica* (18, 36%). Other less commonly detected parasites were ova of *Trichuris*

Table 1: Distribution of the study participants according to some behavioral characteristics (n=294)

Behavioral characteristics	n (%)
Practice of defecation	
Open defecation*	170 (57.8)
Sanitary latrine	124 (42.2)
Source of collection of drinking water	
Tube well	94 (32)
Ponds	1 (0.3)
Standpoint tap**	192 (65.3)
Household taps***	7 (2.4)
Child foot care (n_1=265)$^{+}$	
Plays/roams barefooted	252 (95.1)
Uses footwear	13 (4.9)
Handwashing practice^{++}	
Uses soap	103 (35.0)
Uses only water	191 (65.0)

*Open defecation includes practice of defecation by both the child and the other family members in and around fields, bushes, forests, ditches, streets, canals, or other open spaces for defecation, **Standpoint tap is a common community tap with intermittent water supply at fixed time, ***Household taps are present inside the home premises, and the water is collected through pumps, $^{+}$Child foot care was not applicable for 29 (9.9%) children who were less than 12 months of age, and hence, they have been excluded from the total frequency, $^{++}$Handwashing practice included the habits of children and their mothers/caregivers after defecation and before food handling

Table 2: Distribution of the study participants according to different parameters of intestinal parasitosis[a] (n=294)

Parameter	Frequency (%)
Symptoms of intestinal parasitosis*	
Abdominal symptoms^{+}	42 (14.4)
Allergic manifestations^{++}	6 (2.0)
Visible worms in stool	1 (0.3)
Pallor^{+++}	1 (0.3)
>2 symptoms	5 (1.7)
No symptoms	239 (81.3)
OPC in stool	
Present	50 (17.0)
Absent	244 (83.0)
Parasites	
Protozoa	42 (14.3)
Helminths	8 (2.7)
None	244 (83.0)
Species (n_2=50)**	
Entamoeba histolytica	18 (36.0)
Giardia lamblia	24 (48.0)
Trichuris trichiura	5 (10.0)
Ascaris lumbricoides	3 (6.0)

[a]Intestinal parasitosis has been defined as the presence of any ova/parasite/cyst or all of them in any one of the two slides checked per stool sample with or without any symptom, *Symptoms of intestinal parasitosis in the last 1 month were inquired about, $^{+}$Abdominal symptoms include episode/s of diarrhea (loose stool), pain abdomen, nausea, dysentery, visible blood in stool, and loss of appetite, $^{++}$Allergic manifestations include pruritus, wheals, flares, sudden-onset breathlessness, redness of face and visible spots on the body, $^{+++}$Pallor was elicited on the field after the complaint of whitening of the generalized skin by the mother, **Species were identified only in fifty stool samples. OPC: Ova, Parasites, Cysts

Table 3: Bivariate and multivariate analyses of demographic and behavioral characteristics with intestinal parasitosis (*n*=294)

Factors	Parasitosis (%)		OR (95% CI)	AOR (95% CI)	*P*
	Present	Absent			
Age (completed months)					
0-24	13 (10.2)	115 (89.8)	0.394 (0.200-0.778)	0.427 (0.214-0.852)	0.016*
25-60	37 (22.3)	129 (77.7)		Ref**	
Practice of defecation					
Open defecation	39 (22.9)	131 (77.1)	3.058 (1.496-6.251)	2.856 (1.388-5.878)	0.004*
Sanitary latrine	11 (8.9)	113 (91.9)		Ref**	

*P<0.05, significant, **Ref: Reference category for multivariate analysis, Cox and Snell's: 0.056 and Nagelkerke R^2: 0.094 (9.4% variance is explained). OR: Odds ratio, CI: Confidence interval, AOR: Adjusted OR

trichiura in five children (10%) and *Ascaris lumbricoides* in three children (6.0%) [Table 2].

Risk factors and their association with IP: on binary logistic regression, age of the child (adjusted odds ratio [AOR]: 0.427, 0.214–0.852) and practice of defecation (AOR: 2.856, 1.388–5.878) showed statistically significant association with IP. Children in the age group of 0–24 completed months were in lower odds of acquiring IP with respect to older age group, whereas children with open-field defecation practice had higher odds of acquiring the infection with respect to those practicing it in the sanitary latrines [Table 3].

Discussion

The prevalence of IP among under-five children in this area (17.0%) was similar to that of studies done by Mekonnen and Ekubagewargies (18.7%) and Zemene and Shiferaw (17.4%) in similar settings of Ethiopia.[5,6] Studies done by Mondal *et al*.[7] among primary schoolchildren of Nadia district, West Bengal, also found similar prevalence (22.3%). In contrast, higher prevalence has also been consistently reported from several studies by Fernandez *et al*. (91% in rural), Jeevitha *et al*. (75.7%), Wani *et al*. (75.28%), Rayan *et al*. (62% in rural and 54.7% in urban), and Padmaja *et al*. (49%) in different parts of the country.[8-12] These variations in the prevalence within the country and between different countries are also likely to occur due to the difference in the disease transmission pattern, socioeconomic and environmental factors, study timings, and methods used.[13]

While considering the sex distribution, 13.9% of the boys were infected with intestinal parasites, which was lower than the infection rate in girl children (20.9%). However, the difference is not statistically significant. This statement goes in line with most of the studies which have also failed to show an association between sex and IP.[13-15]

Studies by Padmaja *et al*., Al-Megrin, Regmi *et al*., Doni *et al*., Abossie, and Seid and Escobedo *et al*. showed that parent characteristics, especially mother's low educational status and poverty, have a significant association with the increased risk of parasitosis in their children,[12,14-18] which also corroborates to this study finding.

Open-field defecation has been shown to be statistically significant in the present study, which is in line with studies by Regmi *et al*., Doni *et al*., Endris *et al*., and Abate *et al*.[15,16,19,20] This can be clearly explained due to the fact that these infections are mainly transmitted by feco–oral route. However, handwashing habit among the children or their playing barefooted had no significant association with intestinal parasitosis. This is in contrast to some other study findings.[19,20]

G. lamblia (48%) was most commonly seen, followed by *E. histolytica* (36%), which was consistent with many studies.[8,14,16,17,20,21]

Among the children in different age groups, children in the 24–60 months of age groups were at more risk of contracting these infections. The increased frequency of playing outside houses and their unhygienic practices such as eating mud and not washing hands before eating pose the children in this age group to be more commonly infected, whereas the exposure is less in younger age group due to less exposure to external environment and more care-seeking behavior among the mothers and other family members. This is in line with the works of Schmidlin *et al*.[22]

On the other hand, children who had open-field defecation practices were 2.8 times more likely to harbor intestinal parasites, which is in line with a study conducted in Madhya Pradesh.[23]

The current study possesses the following limitations: *E. histolytica* was not differentiated from *Entamoeba dispar* and *Entamoeba moshkovskii* due to the lack of antigen testing or molecular facilities. Modified acid-fast staining was not done to detect coccidian parasites.

Conclusions

This study concludes that protozoal infection, principally *G. lamblia*, contributes for majority of intestinal parasitic infections among the study population, and children belonging to the age group of 25–60 completed months and with open field defecation practice have higher risk of acquiring them. Practices of handwashing was found not to be significantly associated with intestinal parasitosis.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Anteneh T, Giday A, Alano A, Awoke A, Chirkos A. Intestinal parasitosis for the Ethiopian Health Center Team Desta Hawassa University. Available from: https://www.cartercenter.org/resources/pdfs/health/ephti/library/modules/Degree/Intestinal%20Parasitosis%20final.pdf. [Last retrieved on 2017 Mar 28].
2. Pillai DR, Kain KC. Common intestinal parasites. Curr Treat Opt Infect Dis 2003;5:207-17.
3. WHO. Basic Laboratory Methods in Medical Parasitology. Geneva: WHO; 1991. https://www.who.int/malaria/publications/atoz/9241544104_part1/en/. [Last retrieved on 2018 Dec 12].
4. Reddy NR, Basha R. A study of intestinal parasitic infestations among School Children in Bagepalli Taluk, Chikkaballapur District, Karnataka – A cross-sectional School Survey. J Evol Med Dent Sci 2013;2:1416-20.
5. Mekonnen HS, Ekubagewargies DT. Prevalence and factors associated with intestinal parasites among under-five children attending Woreta Health Center, Northwest Ethiopia. BMC Infect Dis 2019;19:256.
6. Zemene T, Shiferaw MB. Prevalence of intestinal parasitic infections in children under the age of 5 years attending the Debre Birhan Referral Hospital, North Shoa, Ethiopia. BMC Infect Dis 2018;11:58.
7. Mondal S, Ghosh S, Pal K, Kumar S. Study of intestinal parasitic infection among Primary School Children from A Tribal Community in Nadia district of West Bengal. JMSCR 2018;6:317-22. [doi: https://dx.doi.org/10.18535/jmscr/v6i4.52].
8. Fernandez MC, Verghese S, Bhuvaneswari R, Elizabeth SJ, Mathew T, Anitha A, *et al*. A comparative study of the intestinal parasites prevalent among children living in rural and urban settings in and around Chennai. J Commun Dis 2002;34:35-9.
9. Wani SA, Ahmad F, Zargar SA, Dar PA, Dar ZA, Jan TR. Intestinal helminths in a population of children from the Kashmir valley, India. J Helminthol 2008;82:313-7.
10. Rayan P, Verghese S, McDonnell PA. Geographical location and age affects the incidence of parasitic infestations in school children. Indian J Pathol Microbiol 2010;53:498-502.
11. Dhanabal J, Selvadoss PP, Muthuswamy K. Comparative study of the prevalence of intestinal parasites in low socioeconomic areas from South Chennai, India. J Parasitol Res 2014;2014:630968.
12. Padmaja N, Swaroop SP, Nageswararao P. Prevalence of intestinal parasitic infections among school children in and around Amalapuram. J Pub Health Med Res 2014;2:368.
13. Houmsou RS, Amuta EU, Olusi TA. Prevalence of intestinal parasites among Primary School Children in Makurdi, Benue State-Nigeria. Internet J Infect Dis 2010;8:80-6.
14. Al-Megrin WA. Assessment the prevalence of intestinal parasites and associated risk factors among Preschool Children in Riyadh, Saudi Arabia. Res J Parasitol 2015;10:31-41.
15. Pooja RG, Rai KR, Mukhiya RK, Tamang Y, Gurung P, Mandal PK, *et al*. Prevalence of intestinal parasites and associated risk factors among school children of Kalaiya in Bara District, Nepal. JSM Microbiol 2014;2:1009.
16. Doni NY, Gurses G, Simsek Z, Zeyrek FY. Prevalence and associated risk factors of intestinal parasites among children of farm workers in the southeastern Anatolian region of Turkey. Ann Agric Environ Med 2015;22:438□42. [doi:10.5604/12321966.1167709].
17. Abossie A, Seid M. Assessment of the prevalence of intestinal parasitosis and associated risk factors among Primary School Children in Chencha Town, Southern Ethiopia. BMC Public Health 2014;14:166.
18. Escobedo AA, Cañete R, Núñez FA. Prevalence, risk factors and clinical features associated with intestinal parasitic infections in children from San Juan Y Martínez, Pinar del Río, Cuba. West Indian Med J 2008;57:378-82.
19. Endris M, Lemma W, Belyhun Y, Moges B, Gelaw A, Angaw B. Prevalence of intestinal parasites and associated risk factors among students of Atse Fasil General Elementary School Azezo, Northwestern Ethiopia. Ethiop J Health Biomed Sci 2010;3:25-33.
20. Abate A, Kibret B, Bekalu E, Abera S, Teklu T, Yalew A, *et al*. Cross-sectional study on the prevalence of intestinal parasites and associated risk factors in Teda Health Centre, Northwest Ethiopia. ISRN Parasitol 2013;2013:1-5.
21. Mehraj V, Hatcher J, Akhtar S, Rafique G, Beg MA. Prevalence and factors associated with intestinal parasitic infection among Children in an Urban Slum of Karachi. PloS one 2008;3:E3680.
22. Schmidlin T, Hürlimann E, Silué KD, Yapi RB, Houngbedji C, Kouadio BA, *et al*. Effects of hygiene and defecation behavior on helminths and intestinal Protozoa Infections in Taabo, Côte d'Ivoire. PLoS One 2013;8:E65722.
23. Patil SR, Arnold BF, Salvatore AL, Briceno B, Ganguly S, Colford JM Jr., *et al*. The effect of India's total sanitation campaign on defecation behaviors and child health in rural Madhya Pradesh: A cluster randomized controlled trial. PLoS Med 2014;11:e1001709.