

Original article

Giardiasis in Ethiopia

Hailu Birrie and Berhanu Erko¹

Abstract: A countrywide survey of giardiasis, using formal-ether concentration method, among school children and residents showed overall prevalence rates of 8.9% and 3.1 % , respectively. The corresponding rate for non-school children (5-19 years of age), however, was 4.4% showing that the school children are more significantly infected than their non-school counterparts ($P < 0.005$). There were no significant differences between overall male and female infection rates in both populations ($P > 0.01$). However, by age, children are more infected than adults in both populations. Infection rates did not vary with altitude. In this paper, the possible mode of transmission and factors influencing it are discussed. [Ethiop. J. Health Dev. 1995;9(1) :77-80]

Introduction

Giardia lamblia is a flagellate protozoan referred to as *Giardia duodenalis* or *Giardia intestinalis*. It inhabits a variety of mammals including man, reptiles, and possibly birds (1). For centuries *Giardia* was thought to be a commensal organism that had little relevance to human disease (2). It was very recently that it was recognized as a pathogen from human infection viewpoint (3).

Infection by *Giardia lamblia* has a cosmopolitan distribution both in developed and developing nations. Infection rates ranging from 1% to 50% or so have been reported from various parts of the world (4). In African, Asian and Latin American countries, about 200 million cases of *Giardia lamblia* infections have been estimated to occur annually (5). The infection may be endemic as in the tropics where it is a familial infection passed around by faecal-oral route, sporadic as in travellers, or epidemic as in waterborne or institutional outbreaks (6).

Hitherto, parasitological surveys in Ethiopia did not directly focus on this parasitic infection. Only fragmentary reports have been made in a few surveys in conjunction with other parasitic infections. In fifty communities of the Central Plateau of Ethiopia, McConnell and Armstrong (7) reported an overall, giardiasis prevalence of about 11.4% by Merthiolate-Formalin-Concentration (MIFC) technique. Kloos et al. (8) and Seyoum Tatischeff et al. (9) have also reported varying degrees of prevalence rates in different communities. However, these surveys by no means give the giardiasis picture of the country as they were limited to few regions and were of fragmentary nature. The communities are also lying all in the same direction. The present survey, however, involves more communities situated in different regions of the country. Besides presenting the prevalence rate, the paper attempts to discuss risk factors for giardiasis

Methods

The investigation was made in conjunction with countrywide surveys of schistosomiasis nlansoni conducted between 1979 and 1993. The survey covered a total of 93 communities in various parts of the country. Stool

specimens were procured from both school and non-school populations by a systematic sampling method, i.e., where the sampling units were school children, the first child was selected by casting lots while the second child, the third child, and so on had been chosen by adding a constant factor until the required number

¹From the Institute of Pathobiology, Addis Ababa University, P.O. Box 1176, Addis Ababa, Ethiopia.

of children was obtained. In non-school population the same sampling procedure was applied to collect stool specimens. Schistosomiasis survey and accessibility of the communities to highways were the two factors that governed the survey coverage. About one-third 10% formalin-filled 10ml labelled vials were handed out to the selected individuals who were instructed to transfer about 2 gram of freshly voided stool into the vials. On handing over the specimen vials to the technicians, they were interviewed to provide information on their sex, age, and occupation. The preserved specimens were then carried to the laboratory of the Institute of Pathobiology where they were processed and examined by qualified technicians using the Formol-Ether-Concentration (FEC) technique (10).

Results

The infection rates of *Giardia Lamblia* by age and sexes are presented in Table 1 while prevalence of infection by altitude are presented in Table 2. The overall prevalences of giardiasis among the school children (5-19 years of age) and residents were 8.9% and 3.1%, respectively.

The corresponding prevalence among the non-school children (5-19 years of age) was 4.4%, showing that school children are more significantly infected than their non-school counterparts ($P < 0.005$). The overall difference in infection rates between males and females in both the school population and residents is not statistically significant ($P > 0.01$).

Table 1: *Giardia lamblia* infection by age and sex among school children in Ethiopia

Age group(yrs)	Number examined			Percent infected		
	Male	Female	Total	Male	Female	Total
School children						
5-9	979	802	1781	12.1	12.5	12.5
10-14	1355	750	2105	8.4	8.8	8.6
15-19	194	46	240	3.6	4.3	3.8

Total	2528	1598	4126	9.5	8.5	8.9
Non-school population						
0-4	472	453	925	2.8	4.9	3.8
5-9	806	701	1507	5.2	3.4	4.4
10-14	773	516	1289	6.1	3.9	5.2
15-19	439	320	759	2.5	4.1	3.2
20-24	311	297	608	1.0	1.4	1.2
25-29	295	313	608	2.7	1.3	2.0
30-34	241	256	497	3.3	2.3	2.8
35-39	218	206	424	0.5	1.0	0.7
40-44	169	141	308	2.4	0.7	1.6
45-49	104	77	181	3.8	0	2.2
50+	322	271	693	3.1	1.1	2.2
Total	4148	3551	7699	3.6	2.8	3.1

Both sexes combined, there is a general tendency of decline in prevalence of giardiasis with rise in age both the school and residents, although more pronounced in the former . Among residents, females had the highest infection rate in 0-4 years of age while in males, highest infection rate was observed in the age group 5-14 years. Communities surveyed were located at altitudes of 380 and 3000 m above sea level. A closer observation of giardial infection at various altitudes shows that giardiasis is almost equally prevalent at all elevations.

Discussion

Giardia LambLia infection was generally found to be more prevalent in children than in adults (Tables I & 2). Among children of school population (Table I), those in their first decade of life were more affected. This is perhaps due to greater exposure to Giardia cysts because of less

awareness of hygiene or due to gradual development of immunity with exposure that later reaches a protective level in young adults. The higher infection rate in school children (9%) than in non-school children of the same age group (5-19 years) (4.3%) indicates that direct person-to-person transmission in non-hygienic situations a very important route of transmission.

Infection rates reported here cannot represent the actual prevalence rate of giardiasis in Ethiopia as stool examination alone is not reliable to rule out infection of *Giardia* the cysts of which are excreted episodically (12). Also, since the studies were conducted at different times, prevalence rates may not be comparable by communities. However, some clues about risk factors and distribution can be deduced from the data generated.

In all communities surveyed at different elevations, giardiasis seems to have no correlation with the altitude. It is prevalent at all elevations within the study ranges (380- 3000 meters above sea level). This suggests that risk factors such as crowding in poor hygienic situations and sanitation are more important than altitude and climatic conditions Table 2: *Giardia lamblia* infection in Ethiopia by altitude.

Table 2: ***Giardia lamblia* infection in Ethiopia by altitude**

altitude (m)	No. Community	No. Examined Positive	No.	Prevalence (%)
School children				
300-500	2	37	3	8.1
501-1000	2	77	7	9.1
1001-1500	10	832	53	6.4
1501-2000	15	1986	186	9.4
2001-2500	11	1044	108	10.3
2501-2800	2	150	12	8.0
Total	42	4126	369	8.9
Non-school population				
400-500	4	138	2	1.5

501-1000	11	1230	31	2.5
1001-1501	9	856	24	2.8
1501-2000	20	3785	126	3.3
2001-2500	3	115	47	4.2
2501-3000	4	575	5	0.9
Total	51	7699	235	3.1

in the transmission of giardia in Ethiopia. Giardiasis can cause diarrhoea, maldigestion and malabsorption of nutrients such as carbohydrates and vitamins A and B12 (13). Thus, as the infection is more prevalent among children who may be affected mentally and physically, giardiasis should not be neglected. Improvement of personal hygiene, especially among children, is very essential in reducing transmission. Children do not only suffer the infection but also, by virtue of excreting large numbers of cysts, are important sources of infection as opposed to adults (6).

Acknowledgements

This survey was conducted in conjunction with a countrywide survey of schistosomiasis which was financially supported by WHO, TOR and RPO of Addis Ababa University. We also appreciate the assistance provided by the technical staff of the Institute of Pathobiology .

Reference

1. Koudela B, Nohynkova E, Vitovec J, Pakandl M, Kulda J. Giardia infection in pigs: detection and in vitro isolation of trophozoites of the Giardia intestinalis group. Parasitology 1991;102:1636.
2. Stevens OP. Giardiasis: Host-pathogen biology. Rev Infect Ois 1982;4(4):851-8.
3. WHO Technical Report Series. Intestinal Protozoan and Helminthic Infections: Report of a WHO Scientific Groups; 1981. No.666.
4. WHO Expert Committee. Public health significance of intestinal parasitic infections. Bull Wld Hlth Org 1987; 65(5):575-88.
5. Warren KS, Mahmoud AAF. Tropical and Geographical Medicine. New York, McGraw- hill Book Company, 1984.
6. Manson -Bahr PEC, Bell DR. Manson's Tropical Diseases, 19th ed., Bailliere Tindal, London, 1987.
7. McConnell E, Armstrong IC. Intestinal parasitism in fifty communities on the central plateau of Ethiopia. Eth Med I 1976;14:159-68.
8. Kloos H, Lemma A, Kirub B, Gebre A, MazengiaB, Feleke G. Intestinal parasitism in migrant farm labourer populations in irrigation schemes in the Awash valley, Ethiopia, and in major labour source areas. Eth Med I 1980; 18:53-62.

9. Tatischeff S, Abdulahi Y, Haile-Meskel F . Intestinal parasitic infection in pre-school children in Addis Ababa. *Eth Med I* 1981;19:35-40;
10. Ritchie LS. An ether sedimentation technique for routine stool examinations. *Bull US Army Med Dept* 1948;8:326-9.
11. Ormiston G, Taylor I, Wilson GS. Enteritis in a nursery home associated with *Giardia lamblia*. *Br Med I* 1942;2:151-4.
12. Danciger M, Lopez M. Numbers of *Giardia* in the faeces of infected children. *Am I Trop Med Hyg* 1975;24:237-42.
13. Solomons NW. Giardiasis: Nutritional implications. *Rev Infect Dis* 1982;4(4):859- 69.