Research Article

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Prevalence and Distribution of Giardia Lamblia Infection Among Patients of Children Aged 5-11years Treated in Sheno Town Health Centers, North Shoa Oromia Region, Ethiopia

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1. Abstract

The presence of Giardia lamblia in food and water remain to be a major global food safety concern because of its potential to cause illnesses in humans. The main objective of this study was to assess the distribution of Giardia lamblia on children age 5-11 years in Sheno Town, which is located in Oromia regional States, North Shoa Zone kimbibit Woreda 72 kilometers away from Addis Ababa. Three health services in the town were selected using purposive sampling method. Instruments employed were questionnaire, interview and observation and document analysis. Frequency and percentage, were also employed to analyze the data obtained through questionnaire, while the data obtained through open-ended questions and interview were analyzed qualitatively. The study showed that there was a very high prevalence of Giardia lamblia in the target town due to shortage of clean drinking water, lack of awareness, poor sanitation systems that cause food and water contamination. The children infected by G. lamblia by percentage of the infection for the ages 5-8 years old were 53.3% in 2020 and 56% in 2021. To conclude, the communities of Sheno town of kimbibit woreda need awareness creation on Giardia transmission and prevention.

2. Key words:
Children, Distribution, Disease, Giardia lamblia, Health service, Patients

3. Background of the Study

Giardia lamblia, also known as Giardia intestinalis, is a flagellated parasite that colonizes and reproduces in the small intestine causing giardiasis. Giardia lamblia is a microscopic parasite that causes the diarrheal illness known as giardiasis can also be found on surface, food, or water that has been contaminated with feces from infected humans or animals (Gillin and Reiner, 1996). The highest prevalence of Giardia lamblia occurs in tropics and sub tropics where sanitation is poor and it infects 200 million people worldwide and it is common in children than adult (Arora, 2011). About 200 million people in Asia, Africa, and Latin America have symptomatic giardiasis with some 500,000 new cases a year (Östan et al., 2007).

The Infection is transmitted through ingestion of infectious cysts (Minvielle et al., 2008; Heidari and Rokni, 2003). The cyst is hardy, providing protection from various degrees of heat, cold, desiccation and infection from other organisms (Tovar et al., 2003). It can transmit from person to person in condition of fecal oral route, low day care facilities for children (CDC, 2012). Giardia lamblia can cause asymptomatic colonization or acute or chronic diarrheal illness the organisms has been found in as many as 80% of raw water supplies mainly from lakes, streams, ponds and river and in as many as 15% of filtered water samples (Robertson et al., 2009). Giardiasis is characterized by diarrhea, abdominal cramps, bloating, weight loss, and malabsorption (Thompson, 2000).

It is the common cause of chronic diarrhea and growth retardation in children in developing countries. Giardiasis is usually representing a zoonosis with cross infectivity between animal and human. Giardia intestinalis has been isolated from the stools of beavers, dogs, cats and primates. Giardia species are endemic in area of the world that have poor sanitation in developing countries the disease is an important cause of morbidity water borne and food borne diseases. A few Giardia cysts may be sufficient to cause infection.

Diagnosis of Giardia lamblia infection has been carried out using microscopic identification of cysts or Trophozoite in either single or multiple stool specimens. The standard methods used to increase the sensitivity of Giardia detection includes, Iodine stained wet, smear, trichrome-stained cyst concentrate prepared by formalin ethyl acetate centrifugation (Bruke, 1977). The round or oval shaped cysts, which are the infective form of the Giardia, are approximately 11-14µm long and 7-10µm wide (Garcia 1999). The most commonly used anti Giardia drugs includes metronidazole or tinidazole (Ericsson et al., 2001). Metronidazole is used most often in humans for the treatment of Giardiasis worldwide (Gardner and Hill, 2001), but other drugs (e.g., furazolidone or

paromomycin) may be recommended in some cases.

Improper handling of the food, poor hygiene and related other factors have their own influence or impact on the prevalence and distribution of giardiasis. On the other hand, control of Giardia infections due to biological, economic and cultural conditions is faced with serious problems (Furness et al., 2000). In Ethiopia three fourth of the problems of the people are communicable disease emanate from inadequacy of water and sanitation condition. Moreover, there is no detailed study on the prevalence and distribution of giardiasis among people in Sheno town. The distribution of giardiasis in a particular area considered as an indication of poor hygiene. Prevention of giardiasis requires knowledge of the factors responsible for disease. This study will recommend maintaining clean drinking water, free from contamination of food and sanitation.

This study therefore aims to determine the prevalence and distribution pattern among the Sheno town residents as per the data collected from Sheno Hospital Center, Tagan primary clinic and the Biftu primary clinic.

4. Materials and Methods

4.1. Description of the Study Area

Geographically, Sheno town is located in Oromia regional States, North Shoa Zone kimbibit Woreda 72 kilometers away from Addis Ababa. Sheno town is bordered by the North WagnaDega Nesrikebele, south Siba Sheno, East Gogle NesriGodeti and West Horo kebele. It lies at an altitude of 2000-3000m above sea level. The total area of the town is about 600 hectare and the climatic condition of the area is dega (highland). Its average rain fall is 2000-2500mm per year and its average temperature is 18oC. In the town there were five private clinics and one public health center. From the six health services, the public health center and two private clinics were selected using purposive sampling. These are the Sheno Hospital Center, Tagan primary clinic and the Biftu primary clinic. Hence, the sample was accounted 50% of the total health services in the town.

4.2. Study Design

The prevalence of Giardia lamblia was obtained from patients attending Sheno Hospital Center, Tagan primary clinic and the Biftu primary clinic at two year retrospective record view (2020 -2021) of medical Out Patient Disease from log book registration documents. The data were gathered from the recorded documents in the health services. In addition to this, from the total 66 health workers in those health services, 33 of them i.e. 50% of them was selected using random sampling system for data gathering.

5. Results

During 2020-2021 1902 patients had giardiasis disease. Among which the highest frequency of the Giardia lamblia incidence was recorded from Sheno Hospital center which accounted for 699 during September to August 2020 -2021 while 515 giardiasis case was registered in the same year from Tagen clinic (Table 1 and 2).

Table 1: The number of individuals 5-11 years old infected by Giardia from the three health services in each month of the year 2020

Months	Sheno Hospital Center			Tagen Clinic			Biftu Clinic		
	5-8year	9-11year	total	5-8year	9-11year	Total	5-8year	9-11year	Total
Sept	20	20	40	14	10	24	16	15	31
Oct	20	15	35	9	9	18	8	3	11
Nov	15	10	25	12	12	24	13	9	22
Dec.	14	10	24	6	14	20	16	10	26
Jan	10	8	18	8	5	13	16	14	30
Feb	6	4	10	10	16	26	10	20	30
Mar.	7	8	15	7	11	18	14	14	28
Apr.	15	15	30	12	5	17	18	12	30
May.	8	12	20	16	13	29	17	11	28
June	32	28	60	14	8	22	10	10	20
Jul.	30	20	50	18	12	30	38	30	68

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Aug	30	25	55	24	16	40	32	32	64
Total	207	175	382	150	131	281	208	180	388

Summary of giardiasis distribution among the study participants by age is presented in Table 2.

Table 2: The number of individuals 5-11 years old infected by Giardia from the three health services in each month of the year 2021

Months	Sheno Hospital Center			Tagen Clinic			Biftu Clinic		
	5-8year	9-11year	total	5-8year	9-11year	Total	5-8year	9-11year	Total
Sept	25	15	40	10	8	18	13	7	20
Oct	14	10	24	7	7	14	2	9	11
Nov	15	10	25	10	10	20	10	9	19
Dec.	10	10	20	5	10	15	15	5	20
Jan	10	5	15	8	6	14	11	12	23
Feb	6	2	8	10	8	18	15	8	23
Mar.	6	8	14	4	10	14	3	11	14
Apr.	15	10	25	10	6	16	15	5	20
May.	6	10	16	12	10	22	13	7	20
June	20	20	40	12	10	22	18	7	25
Jul.	25	20	45	16	10	26	30	25	55
Aug	25	20	45	20	15	35	30	20	50
Total	177	140	317	124	110	234	175	125	300

The highest frequency of the Giardia lamblia incidence was recorded during June to September 2020-2021 while only 18 giardiasis cases was registered in 2020-2021 from Sheno Hospital Center (Table 3 and 4).

Table 3. Seasonal Distribution of Giardia lamblia in 2020

Seasons	Months	All ages(5-11) Sheno Hospital center	All ages(5-11) Tagen Clinic	All ages(5-11) Biftu Clinic
Wet	May	20	29	28
	June	60	22	20
	July	50	30	68
	August	55	40	64
	Sept	40	24	31
	Oct	35	18	11
	Total	260	163	222

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Dry	Nov	25	24	22
	Dec.	24	20	26
	Jan	18	13	30
	Feb	10	26	30
	mar	15	18	28
	Apr	30	17	30
	Total	122	118	166

The distribution of Gardia lamblia was higher in wet season than in the dry season. In the year 2020 and 2021 the total distribution of Giardia lamblia was 1173 in the wet season and 720 in the dry season (Table 3 and 4).

Table 4. Seasonal Distribution of Giardia lamblia in 2021

Seasons	Months	All ages (5-11) Sheno Hospital center	All ages(5-11) Tagen Clinic	All ages(5-11) Biftu Clinic
Wet	May	16	22	20
	June	40	22	25
	July	45	26	55
	August	45	35	50
	sept	40	15	20
	Oct	24	14	11
	Total	210	137	181
Dry	Nov	25	20	19
	Dec.	20	15	20
	Jan	15	14	23
	Feb	8	18	23
	mar	14	14	14
	Apr	16	16	20
	Total	98	97	119

According to the information from health workers, the distribution of the target disease was high in wet seasons because there was lack of personal, family and group sanitations. In addition to this, lack of drinking water, shortage of treatment for infected individuals, and environmental pollutions had their own contributions for the distribution of the disease. (Table 5).

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Table 5. The awareness of communities about distribution of Giardia lamblia

NO	Question	Measures	Number of respondents	Percentage
1	Do you think the local communities have enough understanding about Giardia lamblia?	A. yes, they have good understanding	0	0
		B. They've some understanding	16	48.48%
		C. They've no understanding at all	10	30.30%
		D. It is difficult to decide	7	21.21%
2	What do you think is/are the main cause(s) of G. lamblia?	A. lack of clean drinking water	8	24.24%
		B. lack of self and environmental hygiene	10	30.30%
		C. poor sanitation systems	11	33.33%
		D. Other causes	4	12.12%
3	In what season does the spread of the disease is very high?	A. in wet season	25	75.75%
		B. in dry seasons	0	0%
		C. both in wet and dry seasons	8	24.24%
		D. impossible to know	0	0%

The finding signifies that the community has very low awareness about the disease (Table 5). Similarly, majority of them have some awareness (48.48%) about Giardia lamblia. From the question 2 above majority of the respondent (33.33%) said that the main cause of G. lamblia is poor sanitation systems. Other respondents about 30.30% responded that it is caused by lack of self and environmental hygiene. Meanwhile, 2 respondents in percent 24.24% said that the disease is caused by lack of clean drinking water whereas only one of the respondents (12.12%) says ''Other causes'.

6. Discussion

People who generally reside in rural or under developed areas are more prone to the ingestion of infective parasites as compared to those who live in urban/suburban or well developed areas where sanitation is presumably better; hence possess a lower chance of infection (Wongjindanon et al., 2005).

In terms of pathogenic importance Giardia lamblia have been shown to be responsible severe diarrheal episode especially in immune compromised and younger children. In the present study total prevalence of giardiasis was 1902.

Giardiasis is transmitted by the fecal-oral through direct person-to person contact or indirect through ingestion of fecally contaminated water or food (Gillin and Reiner, 1996). Therefore anyone can get giardiasis, but it tends to occur more often in international travelers, daycare centers, insufficient water treatment, individuals who drink improperly, treated surface water and with institutional facilities such as nursing homes (Lara, 2002). All age groups are affected in epidemic areas but children are infected more frequently than adults (Al-Saeed and Issa, 2006).). Giardiasis is an important and unresolved health problem in developing countries and has worldwide distribution in warm and moist climates (Escobedo et al., 2010).

Based on this finding, we can conclude that the main causes of Giardia lamblia in the target town are poor sanitation systems and lack of self and environmental hygiene. Boiling suspects water is the most methods to make water safe to drink and kill disease causing microorganisms such as Giardia if in doubt whether water is infected (Betancourt and Rose, 2004).

The results of present study indicate that the prevalence of Giardia lamblia among people of Sheno in case of Sheno hospital was generally high. This may generally suggest that the hygienic condition of the individual' person or their environment are poor. Even though the different is not

statistically significant the proportion of giardiasis diagnosed in the hospital was higher than in the clinics. The higher prevalence of Giardia lamblia in the hospital may be due to large number of patients gone to the hospital because of its accommodation.

There are different factors that contribute to high prevalence of Giardia lamblia infection such as poor environmental sanitation and poor personal hygiene. Prevention based on avoiding the contamination of food or water fecal material, health education in regard to improving personal hygiene, sanitary disposal of faces, improving personal and group sanitation, treating of infected individuals and hand washing are particularly effective.

7. Conclusions

Giardia lamblia was found to be the most prevalent intestinal parasite among individuals of Sheno hospital during 2020 and 2021. The prevalence of giardiasis was more number 699. This finding was significant in terms of planning and implementation control and prevention of parasitic disease such as health education among all Sheno community and the surrounding community giving education about intestinal parasite for all age group is the most advisable way of preventing the parasitic disease. Advising all societies and teaching all people about the risk of parasite is a suggestive way of preventing and combating the Giardia lamblia. This study will recommend maintaining clean drinking water, free from contamination of food and keep sanitation.

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References

1. Al-Saeed AT, and Issa SH. Frequency of Giardia lamblia among children in Dohuk, northern Iraq. EMHJ. 2006; 12(5): 555-61.
2. Arora DR. Intestinal, Oral and Genital flagellates. Medical parasitology CBS Published. 2011; (4) 4:41.
3. Betancourt WQ, and Rose JB. Drinking water treatment processes for removal of Cryptosporidium and Giardia. Vet Parasitol. 2004; 126(1-2): 219-234.
4. Burke JA. The clinical and laboratory diagnosis of giardiasis. CRC Critical Reviews in Clinical Laboratory Sciences. 1977; 7(4): 373-379.
5. Centers for Disease Control and Prevention [CDC]. Giardiasis [online]. CDC; 2010 Nov. http://www.cdc.gov/parasites/giardia/. 2012.
6. Ericsson CD, Steffen R, and Okhuysen PC. Traveler's Diarrhea Due to Intestinal Protozoa. Clinical Infectious Diseases. 2001; 33 (1): 110-114.
7. Escobedo AA, Almirall P, Robertson LJ, Franco RM, Hanevik K, Mørch K, et al. Giardiasis: The ever-present threat of a neglected disease. Infect Disord Drug Targets, 2010; 10(5): 329-348.
8. Furness BW, Beach MJ. and Roberts JM. Giardiasis Surveillance-United states 1992-1997. MMWR CDC Surveillance Summaries. 2000; 49(SS07): 1-13.
9. Gardner TB, and Hill DR. Treatment of giardiasis. Clin Microbiol Rev. 2001; 14(1): 114-128.
10. Garcia LS. Practical Guide to Diagnostic Parasitology (ASM books) 2nd edition. Washington, D.C: American Society for Microbiology, ASM Press. 1999.
11. Gillin FD, Reiner DS. Cell biology of the primitive eukaryote Giardia lamblia. Ann Rev Microbiol. 1996; 50: 679-705.
12. Heidari A. and Rokni MB. Prevalence of intestinal parasites among children in day-care centers in Damghan - Iran. Iranian J Pub Health. 2003; 32(1): 31-34.
13. Lara F. Carolina M. Giardiasis in children. BMC Public health. 2002; 2(1): 5-11.
14. Minvielle MC, Molina NB, Polverino D, and Basualdo JA. First genotyping of Giardia lamblia from human and animal feces in Argentina, South America. Mem Inst Oswaldo Cruz. 2008; 103(1): 98-103.
15. Östan, I Kilimcioğlu AA, Girginkardes¸ler, N. Özyurt, BC, Limoncu ME and Ülgen Z Ok UZ. Health inequities: Lower socio-economic conditions and higher incidences of intestinal parasites. BMC Public Health. 2007; 7(1): 342.
16. Robertson L, Gjerde B, Hansen EF, and Stachurska-Hagen TJ. A water contamination incident in Oslo, Norway during October 2007; a basis for discussion of boil-water notices and the potential for post-treatment contamination of drinking water supplies. Water Health. 2009; 7(1): 55-66.
17. Thompson, RC. Giardiasis as a re-emerging infectious disease and its zoonotic potential. Int. J. Parasitol. 2000; 30(12-13): 1259-1267.
18. Tovar J, León-Avila G, Sánchez LB, Sutak R, Tachezy J, van der Giezen M, Hernández M, Müller M, and Lucocq JM. Mitochondrial remnant organelles of Giardia function in iron-sulphur protein maturation. Nature. 2003; 426(6963):172-176.
19. Wongjindanon N, Suksrichavalit T, Subsutti W, Sarachart T, Worapisuttiwong U, Norramatha P. Current infection rate of Giardia lamblia in two provinces of Thailand. The South east Asian journal of Tropical Medicine and Public Health.2005; 36 (Suppl 4): 21-25.