PREVALENCE OF *GIARDIA LAMBLIA* AMONG RURAL FARMERS IN UHUNMWONDE LOCAL GOVERNMENT AREA, EDO STATE

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Abstract

Background: *Giardia lamblia* is a common cause of diarrheal disease in Nigeria. It is a highly infectious protozoan parasite capable of causing gastrointestinal illness in humans. **Aim**: This study was aimed at determining the prevalence of *Giardia lamblia* and its correlation with demographic characteristics among farmers in Uhunmwonde Local Government Area, Edo State, Nigeria. **Method**: This study was carried out between March to June, 2016. Formal ether concentration technique was applied to determine the presence of cysts and trophozoites of *Giardia lamblia* in 150 stool samples. After obtaining informed consent and Ethical clearance, questionnaires were administered to obtain information on age and sociodemographic data. **Results:** A total of 150 numbers of samples were used out of which Iguole community had a prevalence rate of 20(71.4%) while Isi community had a prevalence of 8(28.6%). The result also showed that, the prevalence of *giardiasis* was higher in males 17(60.7%) than females 11(39.3%). Age-related prevalence showed 4(28.6%) for farmers ≥40 years, 13(26.0) for 11-20 years of age, followed by 4(21.1%) for ≤10 years age group. Sex and Age infection rate when related showed no statistical significant difference (P>0.05). Stream/River had the higher prevalence rate 24(85.7%) but did not strongly affect the prevalence of giardiasis (P>0.05). Socio-economic factors such as education, toilet facilities and washing of hands and fruits were not significantly (P>0.05) associated with the observed prevalence. **Conclusion:** The study showed that the prevalence of *Giardia lamblia* was higher among farmers of different ages. Hence there was need for government intervention program for sustainable elimination of this parasitic disease

Keywords: Giardiasis, Iguole, Isi, Socio-economic factors

Introduction

Infection by *Giardia lamblia* is one of the most frequent parasitic infections worldwide and causes diarrheal disease in humans and other mammals (Ankarklev *et al*., 2010). *Giardia lamblia* is a flagellated unicellular eukaryotic microorganism that commonly causes diarrheal disease throughout the world with about 280 million people suffering from symptomatic *giardia*sis every year (Eisenstein *et al*., 2006).

It is a major cause of acute and chronic diarrhoea, particularly among children in underprivileged communities, with a prevalence range of 10% to 50% in developing countries (Nishi *et al*., 2009). The ingestion of *Giardia* cysts through contaminated food or water is the most common mode of transmission (Nishi *et al*., 2009).

Giardiasis is associated with poor sanitary conditions, insufficient water treatment, among other factors which mostly affects day-care centers and with institutional facilities such as nursing homes (Heyworth, 2014). The World Health Organization reported that, 200 million people in Asia, Africa and Latin America presents with symptoms of giardiasis with some 500,000 new cases yearly, especially among children. The infection may produce severe acute diarrhoea in children less than five years of age with chronic infections resulting in weight loss and growth retardation (Heyworth, 2014). Furthermore, *Giardia* infection contributes substantially to the 2.5 million annual deaths from diarrheal disease (Escobedo *et al*., 2016). Several studies have revealed that, a chronic infection of *Giardia* during childhood contributes to protein-energy malnutrition, vitamin A deficiency, iron deficiency anaemia, zinc deficiency and poor cognitive and Educational performance (Escobedo *et al*., 2016). Socioeconomic factors such as poverty, lack of adequate sanitation and good water treatment systems, illiteracy and poor hygienic practices have been identified as significant risk factors associated with *Giardia* infection in different communities (Eisenstein *et al*., 2006).

Giardia lamblia has been documented to be transmitted either from person to person, animal to person or from the environment to person. These transmission modes are more favoured by high temperature and moist, climatic conditions; poor personal hygiene and unsanitary habits of individuals (Kaur *et al*., 2002; Wongjin *et al*., 2005; Noor *et al*.,2007 and Ayeb-Kumi *et al*., 2009).

Materials and Methods
Study Area
This study was carried out in Eguaeholor and Isi Communities, both located in Uhunmwonde Local Government Area, of Edo State, Nigeria. Uhunmwonde has an area of $2033km^2$ with a population of 120,813 people (National Population Commission, 2006) and lies between Longitude 06 04'E and 06 43'E, Latitude 05 44'N and 07 34'N. Uhunmwonde Local Government Area shares borders with Ovia North East, Owan West, Igueben, Orhionmwon, Esan West and Ikpoba Okha Local Government Areas. The main occupation of the residents includes trading and farming. Their main source of water for farming is rain water that is usually characterized by heavy rain between July and August.

Study Population
The study was conducted in Eguaeholor and Isi communities between March and June, 2016. The community heads were contacted and informed of the essence of the study in order to receive their supports. A total of 150 participants that consisted of 82 males and 68 females were recruited for this study. The age of participants ranged from ≤10 to ≥40 years. A structured questionnaire on socio-demographic characteristics was administered to the participants. Informed consent was obtained from study participants or guardians/parents. The protocol for this study was approved and permission granted to carry out the work by Ethics and Research Committee, Ministry of Health, Benin City, Edo State.

Stool Sample Collection and Examination
Stool samples were obtained from the participants using a clean, wide mouthed universal containers. The samples were analyzed using a previously described method (Cheesbrough, 2006). Briefly, 1g of the stool sample was emulsified in 4ml of 10% formol saline using an applicator stick in a plastic tube. The tube was capped and the mixture was mixed. and sieved. To the resultant filtrate, 3ml of diethyl ether was added and mixed.

The mixture was spun at 3000rpm for 3 mins. Using an applicator stick a layer of faecal debris on the inner side of the tube was detached and the supernatant discarded.

The deposit was resuspended. Both saline and iodine preparations were made and examined using x10 and x40 objectives (Cheesbrough, 2006).

Statistical Analysis

The data obtained were analyzed using SPSS version 20, frequency data were analyzed using Chi-square while odd ratio was calculated on each potential risk factor.

Results

An overall prevalence of 18.7% *Giardiasis* was obtained in this study with Iguole having 71.4% while Isi community had 28.6% .There was no significant correlation in the prevalence of *giardiasis* in Iguole and Isi communities (OR=1.567; 95% Cl=0.6385, 3.844; P=0.3885) (Table 1). Age and gender of farmers did not strongly affect the prevalence of *giardiasis* in this study (P= 0.200; OR=1.355; 95% Cl = 0.5863, 3.133; P = 0.5323) (Table 2). Educational status, source of water, none washing of hands and fruits, and type of toilet did not also significantly affect the prevalence of *giardiasis* (P> 0.05) (Table 3).

Table 1: Prevalence of *G. lamblia* among farmers in each of the community

Community	No. Examined	No. Infected (%)	OR	95% Cl	P-value
Iguole	95	20(71.4)	1.567	0.6385, 3.844	0.3885
Isi	55	8(28.6)			

KEY: OR = odd ratio, 95% Cl = Co-efficient level

Table 2: Relationship between sex, age and *giardiasis* among farmers

Farmers	No. Examined	% Infected	OR	95% Cl	P-value
Gender					
Male	82	17(60.7)	1.355	0.5863, 3.133	0.5323
Female	68	11(39.3)			
Age (Years)					
1-10	19	4(21.1)			0.200
11-20	50	13(26.0)			
21-30	25	3(12.0)			
31-40	42	4(9.5)			
>40	14	4(28.6)			

KEY: OR = odd ratio, 95% Cl = Co-efficient level

Table 3: Socio-demographic Characteristics among farmers in both communities

Risk factors	No. Examined	% Infected	OR	95% Cl	P-value
EDUCATION					
Primary	35	6 (21.4)			0.400
Secondary	100	21 (75.0)			
Tertiary	15	1 (3.6)			
SOURCE OF WATER					
Borehole	9	1 (3.6)			0.358
Rain/Well	19	1 (3.6)			
Stream/River	111	24 (85.7)			
Satchet water	11	2 (7.1)			
WASHING OF FRUITS					
Yes	83	15 (53.6)	1.091	0.479 – 2.488	0.835
No	67	13 (46.4)			
TOILET					
Bush	53	10 (35.7)			0.982
Pit Latrine	77	14 (50.0)			
Water cisterm	20	4 (14.3)			
WASHING OF HANDS					
Yes	134	24 (85.7)	1.528	0.453 – 5.147	0.492
No	16	4 (14.3)			

KEY: OR = odd ratio, 95% Cl = Co-efficient level

Discussion

An overall prevalence of (18.7%) *giardiasis* with 28.6% in Isi and 71.4% in Iguole communities were observed. The prevalence observed in our study was higher than the 3.0% and 0.15% reported by Mordi and Ngwodo (2007) and Asemota *et al*., (2012), in Edo and Delta State, Nigeria respectively. There was no signifiacant correlation in prevalence of *giardiasis* between Iguole and Isi communities (P>0.05). More males (60.7%) than females (39.3%) were infected, however, there was no significant association between gender and *giardiasis*. This finding is inconsistent with previous reports of Ranjan *et al*., (2004), Laupland and Church (2005), and Dwivedi *et al*., (2007) that reported an association between gender and *giardiasis*. This higher prevalence could be attributed to behavioural differences in gender in terms of personal hygiene, sanitation, and recreational activities; as the male go to farm and end up going to bed without a bath with soap and water. The age related prevalence rate of farmers did not strongly associate with the prevalence of *Giardia lamblia* infection, but 40 and above years age had the highest prevalence (28.6%) followed by the 11-20 years (26.0%) age group. This is in agreement with the reports of Yoder and Beach (2007) stating that the greatest number of reported cases of *giardiasis* occurs between 35-44 years. The prevalence rate was also high in age group 1-10 years (21.1%). This is in line with the study of Caccio and Ryan (2008) that reported prevalence rate of 15-20% in children less than 10 years of age. This study indicates that the prevalence of *G. lamblia* is not dependent on different age groups (John 2007) though the values obtained were not statistically significant (P> 0.05)

Socioeconomic factors such as education, washing of fruits and hands, and toilet facilities were not significantly (P> 0.05) associated with the prevalence.

This agrees with reports by Dawson (2005), that food-borne epidemics could occur, but infection is mostly secondary to contamination by infected food-handlers. Ayeb-Kumi et al., (2009) reported that many infected persons can be asymptomatic leading to difficulties in the eradication and control of the parasite due to the number of potential carriers such as food vendors.

Sources of water had no significant association with *G. lamblia* infection, as stream/river had the highest prevalence rate (85.7%) followed by satchet water(7.1%). This is in agreement with the reports of Hill, (1993) and Abdul-Wahid and Faubert (2008), where *Giardia lamblia* was found as high as 80% in raw water supplies from lakes, streams and ponds, also as 15% in filtered water samples. The study area possesses conditions that are favourable for the transmission of *Giardiasis*, as farming and animal husbandry are the major occupations of the persons in the area, also most household have domestic animals such as sheep, goats, dogs etc which often roam outdoors either unsupervised or in the company of children. As the farmers lack potable water in their farms, they drink from streams and rivers which are sometimes also used by these animals, thus got infected.

Conclusion
The findings of this study indicate that *Giardia lamblia* is a leading cause of acute and chronic diarrheal disease; affecting farmers in both Iguole and Isi communities of Uhunmwonde Local Government Area, Edo State. The infection rate is independent of sex and age.

Recommendation
More research should be carried out in other communities in Uhunmwonde Local Government Area of the State, to ascertain the prevalence of the parasite and other parasitic infections.

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