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Point Prevalence of *Giardia Lamblia* among Out- Patients Attending Sioport Sub-County Hospital, Busia County, Kenya

Anne Naliaka Mutsami[1] and Vincent Omondi[2]

[1]School of Biomedical sciences, Department of Microbiology, Jomo Kenyatta University of Agriculture and Technology.

[2]School of Health Sciences, Department of Medical laboratory sciences, Mount Kenya University.

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ABSTRACT

Giardiasis is a diarrheal disease caused by a flagellate protozoan *Giardia lamblia* infecting both human and animals. These parasites live in the intestines and are passed in feces. Outside the body, *Giardia* can survive for weeks or months. *Giardia* may be found in every region around the world. Mode of spreading is mainly through oral route mostly via contaminated water. Symptoms include diarrhea, gas or flatulence, greasy stool that can float, abdominal cramps, nausea, and dehydration accompanied by weight loss. WHO estimates that over 90% of diarrheal cases can be prevented by enhancing the availability of clean water and improving hygiene and sanitation measures. Some people with *Giardia* infection may remain asymptomatic hence acting as reservoirs for the parasite. Lack of safe water as a sanitation hazard has not been comprehensively studied. This cross section study was carried out to determine the point prevalence of *G. lamblia* amongst out-patients who attended Sio port sub-county hospital between the period of May-July 2014. To determine the point prevalence of *G. lamblia* and to determine the most affected gender and age-group(s).: Simple random sample method were used, to enroll three hundred and fifty three (353) participants. Stool was microscopically studied to identify presence of a trophozoite (in case the stool is diarrhoeic) and for a cyst of a *G.lamblia* (in case it is formed or semi-formed stool). Data was collected and analysed by discriptive statistics and presented in form of tables, pie charts and graphs. Female were the most affected (78.2%) as compared to male (21.8%). The most affected age-group was 26-30 years (21%), followed by 0-5years (18.5%) and the least affected was 41years and above (3.4%). Point prevalence of *G.lamblia* was concluded to be 33.7%. Prevalence of *G. lamblia* among out-patients was 33.7% with the highest being in the age-bracket of 26-30 (21%) and female being the most affected sex with the prevalence rate of 78.2%. Therefore giardiasis is a health problem in areas where proper personal hygiene is not taken into consideration.

Introduction

Background to the study

Giardia lamblia is a microscopic parasite that belongs to the group of protozoa and causes the diarrheal illness known as giardiasis (CDC 2011). It is transmitted through the faecal-oral route following direct or indirect contact with the infective stages of the parasite from three sources: anthroponotic, zoonotic and sapronotic (Wegayehu 2014) Giardiasis refers to the infectious condition of the small intestine caused by protozoa known as Giardia lamblia that belongs to the class of protozoa (CDC 2011). Giardia was originally observed by von Leeuwenhoek in 1681, in his own diarrheal stool, and was described by Vilem Dusan Lambl in 1859 and by Alfred Giard in 1895 (Chatterjee 2009).

Infection occurs by the ingestion of cysts in contaminated water, food or by fecal-oral route (hands or fomites). In the small intestine, excystation releases trophozoites (each cyst produces two trophozoites). Trophozoites multiply by longitudinal binary fussion, remaining in the lumen of the proximal small bowel where they can be free or attached to the mucosa by ventral disk. Encystation occurs as the parasites transit toward the colon. The cysts are the stage found most commonly in non-diarrheal feaces. (CDC 2011) the prepatent period is generally 3–10 days. Cyst shedding may be continuous over several days and weeks but is often intermittent, especially in the chronic phase of infection. The cyst is the infective stage, and can survive for several weeks in the environment, whereas trophozoites cannot (Kumar and Clark 2011). G. lamblia affects people of all ages with the prevalence being generally higher in low-income countries where access to clean water and basic sanitation is lacking. Nearly all children in these settings will be infected by Giardia at some point in their childhood, and the prevalence of the parasite in young children can be as high as 10%-30% (Hill. and Nash 2006). There are an estimated 280 million symptomatic cases per year, with some variation in estimate but about 20% of the world's population has giardiasis most of whom are asymptomatic (Thiongo et al., 2011). Many individuals excreting Giardia cysts have no symptoms while others become ill within 1-3 weeks after ingestion of cysts (Kumar and Clark 2011).

Tele:

E-mail address: annemutsami@gmail.com

Children are more frequently affected than adults, although all ages may exhibit symptoms ranging from mild diarrhoea, flatulence, anorexia, crampy abdominal pains and epigastric tenderness due to steatorrhea and full-blown malabsorption syndrome (John and Petri 2006). It is estimated that about 200 million people are infected each year in Africa, Asia and Latin America (Nordberg 2011) In Ethiopia the prevalence of G. lamblia infection is significantly higher among children who had close contact with cattle compared to those who had no contact (Wegayehu 2013). Epidemiological surveys done in Kenya's poor peri urban and urban school children revealed a high prevalence of intestinal parasitic infections with G.lamblia standing at (30%) (Nyarango et al., 2008). Infection is rare during the first 6 months of life in breastfed infants, but infants and young children have an increased susceptibility to giardiasis. Age-specific prevalence of giardiasis continues to rise through infancy and childhood and begins to decline only in adolescence (Gelanew et al., 2007). The disease usually affects IgA deficient persons and anti-IgA antibody can be detected on surface of Giardia trophozoites obtained from jejunal fluid and jejunal biopsies (Chatterjee 2009). 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 well favored by high temperatures and moist climatic conditions, poor personal hygiene and unsanitary habits of individuals, Again, domestic animals such as dogs which serve as reservoir hosts for Giardia lamblia provide the utmost risk of the infection (Nordberg 2011). High-risk groups for giardiasis include travelers to highly endemic areas, immunocompromised individuals, and certain sexually active homosexual men. Cyst passage rates as high as 20% have been reported among certain groups of sexually active homosexual men and were frequently symptomatic (Kliengman et al.,2007). In terms of seasons, endemic infection occurs most commonly from July through to October among children younger than 5 years and adults aged 25-39 years. Carrier rates of as 30-60% has been documented in day care center (John and Petri 2006). This was a cross-section study design whereby the primary data was collected by performing stool analysis in the laboratory between the months of May to July 2014.

Material and Methods

A total of 353 participants were included in the study. Stool samples were collected in accordance with WHO guidelines on the collection of fecal samples. Upon receipt of request from the clinicians, each patient, patient's parent or guardian was given a clean and leak-proof plastic container with an applicator stick attached to a well fitted screw cup. Each participant was asked to produce stool sample and aseptically put in the container. With the aid of the applicator stick, the participant was to transfer a small proportion of the stool into the container and transport it immediately to the laboratory reception. At the reception, each sample was labeled with the patient's number, and immediately transported to the parasitology bench together with the request form. The average time between sample collection and processing was 20 minutes. Upon sample arrival in the parasitology bench laboratory, few drops of normal saline were put on the polypot. With the aid of applicator stick the sample was emulsified. A drop of emulsified sample was placed on a clean slide then covered with a cover slip. The slide was viewed under x10 objective lens and confirmed with x40 objective lens for the presence of a trophozoite (in case the stool is diarrhoeic) or for a cyst of a *G. lamblia* (in case it is formed or semi-formed stool). The results were then recorded on the patient's request form and also on the observation checklist against the patient's code, age and sex. Data was collected by use of an observation checklist, analyzed by descriptive statistics and presented in tables, graphs and pie charts.

Results and Discussion

The total number of patients who enrolled for the study was 353. Female participants were more 273 (77.3%) than the male participants80 (22.7%) as illustrated in the table below (table 1).

Table 1. Patients who enrolled for clinical diagnosis of *G. lamblia* based on gender (n=353).

Gender	No. of patients (n)	Percentage (%)
Female	273	77.3
Male	80	22.7
Total	353	100

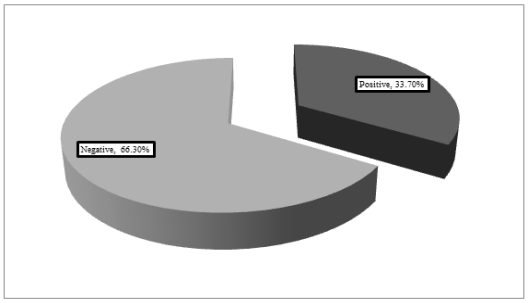

Figure 1. Point prevalence of *G. lamblia* in the study area

Out of the participants who enrolled for the study, 119 (33.70%) participants were positive for giardiasis while 234 (66.30%) were negative for giardiasis. Therefore the point prevalence of giardiasis in the study area was 33.7%**.**

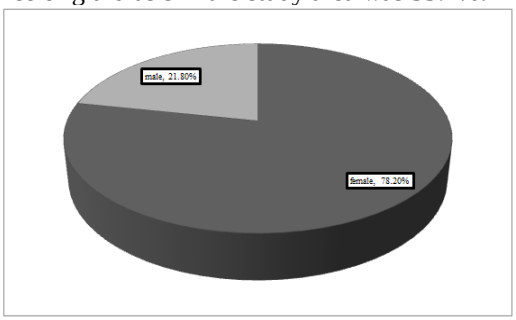

Figure 2. Point prevalence of giardiasis based on gender (n=119)

Out of the total number of positive cases (119), majority of patients who were diagnosed to have *G. lamblia* were female (93) 78.2%) only (26) 21.8% males were positive for giardiasis

Table 2. Point prevalence of Giardiasis based on age category (n=353).

Age bracket	No of positive cases	No of negative cases	Total no of cases	Percentage positive cases
0-5	22	19	41	18.5
6-10	19	26	45	16.0
11-15	10	17	27	8.4
16-20	11	21	32	9.2
21-25	14	66	80	11.8
26-30	25	47	72	21.0
31-35	8	17	25	6.7
36-40	6	11	17	5.0
41>	4	10	14	3.4
TOTAL	119	234	353	100.0

Most of patients who were diagnosed to have G. lamblia were in the age category of 26-30 years (21%), followed by 0-5 years (18.5%) then 6-10 years (16%), and lastly 41> (3.4%).

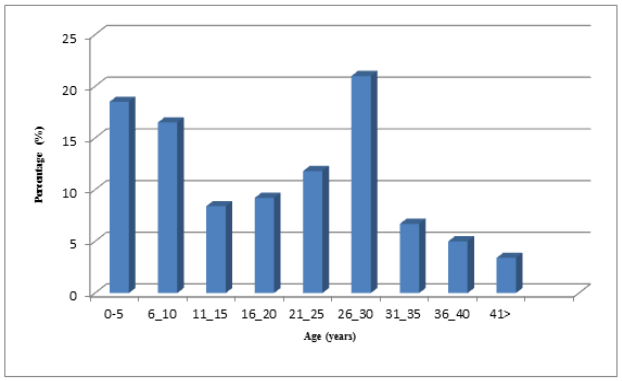

Figure 3. Age category most affected (%).

The age-group mostly affected was 26-30(21%), followed by 0-5(18.5%) while the list was 41> (3.4%).

The study was carried out at Sioport sub-county hospital to determine the point prevalence of *Giardia lamblia* among out-patient during the period of May to July 2014. According to the study findings 353 patients were enrolled for the study, of which 273 (77.3 %) were females while 80 (22.7 %) were males. This may be addressed basing on both sex and gender and the effect in health seeking behavior. This large variation in numbers of females compared to males may indicate that in the study area females have good health seeking behavior as compared to males. This is contrary to what has always been believed that women's lower position in society can affect their health-seeking behaviors. Structural gender inequalities that place women in a subordinate position to men underlie and contribute to gender differentials in disease out come and health seeking behaviour.

The study revealed that the point prevalence rate of *G.*lamblia was 33.7% which is in agreement with earlier studies (Julio et al., 2012) which indicated that the prevalence of G. lamblia in developing countries ranges between 20-30%. In developing countries, access to clean water has been a challenge. Most of the open water sources are polluted like Lake Victoria which neighbors Sioport sub county hospital. The lake in this area is used both as source of domestic water to some families, domestic animal drinking points, fishing points at the same time bathing points. All these activities highly contribute to water pollution hence increasing chances of infection.

According to the study the most affected sex was female with 93 (78.2 %) while males were least affected with 26 (21.8 %). This contradicts (Kliengman et al., 2007) in which males were the most affected due to homosexuality. This may be addressed basing on both the effect of sex and gender in relation to disease burden. Sex and gender can act alone, independently, or interactively in determining differentials in the burden of disease.

High prevalence in females was attributed to their frequent contact with children who are prone to giardiasis infection as compared to their male counterparts. This is because child care is looked as a gender role where women are expected to be at home most of the time taking care of children. They are the same women who will go to the lake either to wash cloth or fetch water for domestic use. This first and frequent encounter with polluted water places them at a higher risk of contracting giardiasis. Therefore this excess health burden is based mainly on gender roles. Some females have a habit of eating soil to supplement for iron deficiency while expectant. This may have predisposed them Giardiasis contraction.

In terms of age-group category, the most affected age-group was 25-30 years of age with point prevalence of 21%. This is in agreement with earlier studies which showed that the prevalence was high in adult aged 25-39 years (John and Petri 2006). This is attributed to the fact that those in this age-category comprises of housewives and nursing mothers. Due to the fact that they have young children and incidence of giardiasis is higher in children, which may be passed to their mother due to close interaction. Children in the age-group of 0-5 years were 18.5%, this study is in agreement with earlier studies (Annan et al., 1986) where pre-school children in Ghana had a prevalence of 18.2%. This may be attributed to the fact that children more often play with the soil which harbors giardia parasites. Due to tender age, children are not keen on personal hygiene practices such as washing of hands with soap and water before eating, after playing in the soil and after visiting the toilet. Children will in most cases demand for foods being sold by streets vendors some of whom do not practice proper personal hygiene. This may be another source of infection (Nyarango et al., 2008).

In Samia sub-county, Busia County Kenya, there is no clear water treatment plant and also due to lack of potable water on farms, farmers and their children drink from streams and rivers which are sometimes used by both domestic and some wild animals. This may have contributed to the high prevalence rate of Giardia lamblia infection in children and young mothers within the study area. Age-specific prevalence was high in infancy and childhood and decline towards adolescence and start to increase at age 21 reaching peak at age group of 25-30. This was in line with earlier studies conducted (Gelanew et al., 2007). The decline could be due to adherence to hand washing after visiting toilet and limited contact with soil as compared to the younger counterparts. According to the study the age-group of 41 years and above was the least affected with prevalence of 3.5%. This could have been due to the fact that the group comprised of the few age-group that visited the hospital during the study period and probably only those who were symptomatic.

Conclusion

Based on the study findings it was concluded that the point prevalence of G.lamblia among out-patients attending Sioport sub-county hospital is 33.7% with the highest being in the age-bracket of 26-30 (21%) and female being the most affected sex with the prevalence rate of 78.2% hence giardiasis is a health problem in areas where proper personal hygiene is not taken into consideration.

The study recommend that adherence to appropriate infection control for example exclusion of children ill with diarrhea, hand washing, diaper changing, and separation of ill children policies is recommended for controlling giardiasis, and other enteric pathogens, in these group settings. Patients and at-risk individuals should be instructed regarding appropriate hygiene methods and signs/symptoms of infection. Emphasis should be placed on measures such as careful hand washing after changing diapers. Day-care workers should use meticulous hygiene and careful hand washing to reduce spread between children and to staff. Personal hygiene education to minimize person-to-person transmission in high-risk settings such as residential areas and institutions will be go a long way in reducing infections. Patients should be advised that oral-

anal and oral-genital contact increase the risk of transmission hence should be avoided.

Hikers and travelers to areas where the disease is endemic should be educated. Drinking water should be boiled or treated by use of halogenating compounds like chlorine or be filtered. In general, health education should be enhanced in the area. The government should put in place giardiasis surveillance plan to be used as a tool of controlling giardiasis. The government should also introduce a mandatory policy for analysis of stool sample for all under-five's in order to detect the asymptomatic and carriers of giardiasis so as to curb its spread.

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Conflict of interest: the authors declares no conflict of interests

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