Original Research Article

A retrospective study of intestinal parasite among patients in the Ho Teaching Hospital, Ghana

ABSTRACT

Aim: To assess the prevalence of intestinal parasite infections among patients who visit the Ho Teaching Hospital for stool examination from 2012 to 2016.

Study design: Retrospective study.

Place and Duration of Study: Ho Teaching Hospital, August 2017 to January 2018.

Methodology: The hospital's laboratory records were reviewed. Patients' data were recorded using a well-designed data collection tool. Data was analyzed with Statistical Package for Social Science (SPSS) version 20.0.

Results: A total of 7045 patients visited the Ho Teaching Hospital laboratory for routine stool examination within the five-year period. From the 7045 patients, 703 of them were infected with at least one of the intestinal parasites. The overall prevalence of intestinal parasite infection for the five-year period was 10.0%. Intestinal flagellates (90.0%) were the most predominant intestinal parasites, and *Entamoeba histolytica* recorded 5.7%. Hookworm (0.9%) was the most prevailing soil-transmitted helminth. *Ascaris lumbricoides* (0.1%) and *Schistosoma mansoni* (0.1%) were the least recorded parasites. Highest infection was among patients within age group 20 to 29 years. However, age groups below 10 years recorded low infection. This study showed that age was a risk factor for acquiring intestinal parasite infection (*P≤0.001*).

Conclusion: Intestinal parasitic infections were recorded among patients who visited the Ho Teaching Hospital. However, most of the patients were infected with intestinal flagellates. Various stakeholders should provide advance techniques in laboratory investigation of stool samples to enhance accurate diagnosis. Sensitization of the public about the dangers of intestinal parasites should also be undertaken by the stakeholders.

Keywords: Parasitaemia, intestine, stool sample, prevalence

1. INTRODUCTION

Intestinal parasites cause significant morbidity and mortality in the world, especially in low-income countries in the tropic and sub-tropical regions due to persistent shortage of clean drinking water, lack of proper sewage system and other unhygienic and poor living condition [1]. Despite their wide occurrence, some intestinal parasitic diseases are considered neglected by the World Health Organization, largely due to inadequate studies in many countries [2].

Globally, it is estimated that 3.5 billion people are infected and 450 million are ill as a result of these infections with the majority being children. These may include: *Ascaris lumbricoides*, *Blastocystis hominis*, *Entamoeba coli*, *Entamoeba histolytica*, hookworm, flagellates, *Schistosoma mansoni* and *Strongyloides stercoralis* [3]. The diseases are also common in poor countries and accounts for approximately 200,000 deaths per year [4]. In sub-Saharan Africa, estimates show that about 31.4% of the population in West Africa, are affected [5]. In Ghana, a spatio-temporal analysis of small area with intestinal parasite infection conducted between 2010 and 2014 showed an annual incident rate of 1.55% to 3.30% with an average annual incident rate of 2.53% [6].

Locally, a cross sectional study conducted in Volta Region among 5 primary schools in 3 of its districts revealed a low prevalence of helminth infection with *A. lumbricoides* (1.27%) as the prevailing parasite [7]. Moreover, intestinal parasite infections (IPIs) is a major problem, especially in children and pregnant women from developing countries [8]. The morbidity of IPIs is greatest among school going children and may have adverse effect on their growth [9]. It causes nutritional deficiencies, growth retardation, low pregnancy weight, intra uterine weight gain, and anemia among the population infected [9]. The most common effect of IPIs on the health of people is their normal physical development that is, the failure to achieve genetic potential for growth especially in children and having clinical consequences of iron deficiency anemia and other nutritional deficiencies also among pregnant women [10]. The health problems associated with IPIs suggests the need for more research to be done. Additionally, the study involves reviewing laboratory records of hospital patients for a good representation of clinical cases of IPIs. The study aimed to assess the prevalence of intestinal parasite infection among patients who visit the Ho Teaching Hospital's laboratory for routine stool examination from 2012 to 2016.

2. MATERIALS AND METHODS

2.1. Study design and setting

The study was a retrospective study. Data was reviewed from the routine stool examination record books from 2012 to 2016 at the Ho Teaching Hospital's laboratory based on prior permission from the administration officials of the hospital. The study was conducted from August 2017 to January 2018. The

Hospital was the main referral health facility in the Volta Region with more than three hundred bed capacity. Six general clinics (Medicine, Urology, Orthopedics, General Surgery, Pediatrics, Obstetrics and Gynecology) and laboratory services were located in the Hospital. The average Out Patient Department (OPD) attendance was more than one hundred thousand annually.

2.2. Laboratory investigation

The main method used in processing the stool specimen for the identification of intestinal parasites was direct wet mount technique. Other confirmatory methods such as formol-ether concentration technique and modified ziehl–neelsen staining were also performed as needed.

2.3 Data Analysis

The data obtained from the stool examination record books were entered into Microsoft Excel 2016 version and validated for double entry errors. The data were then exported to Statistical Package for Social Sciences (SPSS) version 20.0 to determine the frequency, percentages and rate of infection with respect to the intestinal parasite infection among age and sex. However, the data were graphically presented using the Microsoft Excel 2016 version. Chi-square test was used to find the association between intestinal parasite infection and patient's demographic characteristics (age and sex).

3. RESULTS

3.1 Distribution of Intestinal Parasite Infection

As shown in Table 1, there were about 7045 patients tested for intestinal parasite infection at the Ho Teaching Hospital from 2012 to 2016. Seven hundred and three (703) out of the 7045 patients were infected with at least one of the intestinal parasites. The overall prevalence of intestinal parasites was (10.0%). Highest infection was recorded in 2013 with prevalence of (16.2%) and lowest infection rate was in 2015 (7.2%). The total number of tested patients was high in 2012 (25.3%) and the least was recorded in 2013 (13.6%). Throughout the years, the records for females were more than the male counterparts. Furthermore, infection was prevalent in females than males with a total rate of 8.9% and 1.1% respectively. There was no significant relation between the sex of patients and intestinal parasite infection (*P-value=0.22*; CI = 95%). Thus, being a male or female had no influence on the risk of infection. In Figure 1, about 8 categories of intestinal parasites were found in the stool examination record books. The most prevalent intestinal parasites within the five-year period were intestinal flagellates (90.0%) and the least intestinal parasites recorded were *A. lumbricoides* (0.1%) and *S. mansoni* (0.1%).

Table 1: Distribution of Intestinal Parasite Infection by sex

Year	Number Tested (%)		Total Tested	Number Infected		Total Infected
	F	M	(%)	F (%)	M (%)	(%)
2012	1397	384	1781 (25.3)	181 (10.2)	48 (2.7)	229 (12.9)
2013	896	64	960 (13.6)	150 (15.6)	6 (0.6)	156 (16.2)
2014	1252	168	1420 (20.2)	89 (6.3)	4 (0.3)	93 (6.5)
2015	1309	119	1428 (20.3)	95 (6.7)	8 (0.6)	103 (7.2)
2016	1348	108	1456 (20.7)	114 (7.8)	8 (0.5)	122 (8.4)
Total	**6202 (88.0)**	**843 (12.0)**	**7045 (100.0)**	**629 (8.9)**	**74 (1.1)**	**703 (10.0)**

**Chi-square ($\chi 2$) = 1.536, P-value=0.22, M = Males, F = Females*

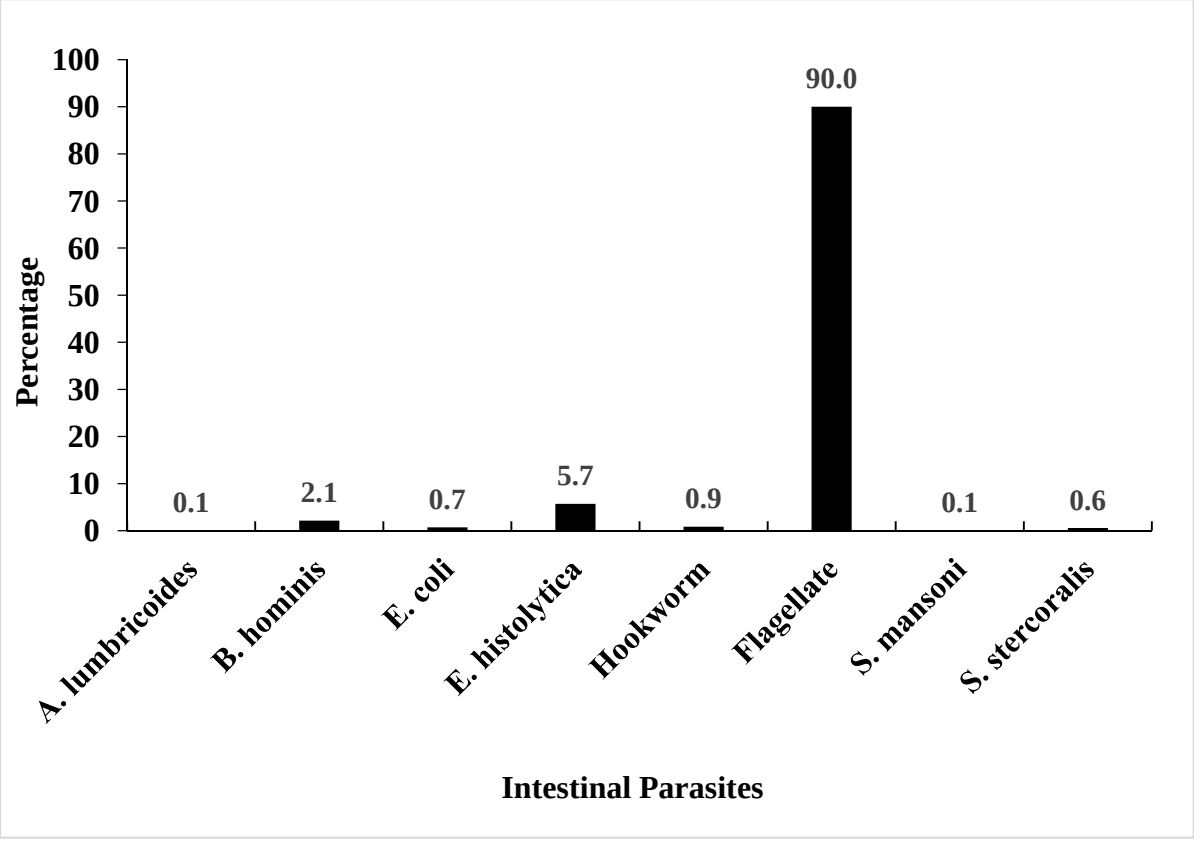

Figure 1: Percentage Distribution of Intestinal Parasites

3.2 Distribution of Intestinal Parasite by Age group

As presented in Figure 2, the affected age range was from 1 month to 87 years with a median age 29 years, mean 30.11 years and standard deviation 13.54 years. Patients within age group 20 to 29 years (43.81%) recorded the highest infection followed by 30 to 39 years (29.24%) in each of the years. However, patients within age group below 10 years (3.28%) recorded the lowest infection. In Figure 3, intestinal flagellates were the highest intestinal parasites recorded among all age groups followed by *E. histolytica*. However, age group 20 to 29 years had the highest recorded intestinal flagellates followed by age group 30 to 39 years and 40 to 49 years. This signifies that the youth were more at risk to parasitic infections. It also submit that there were low infection rates before 20years and after 39years.

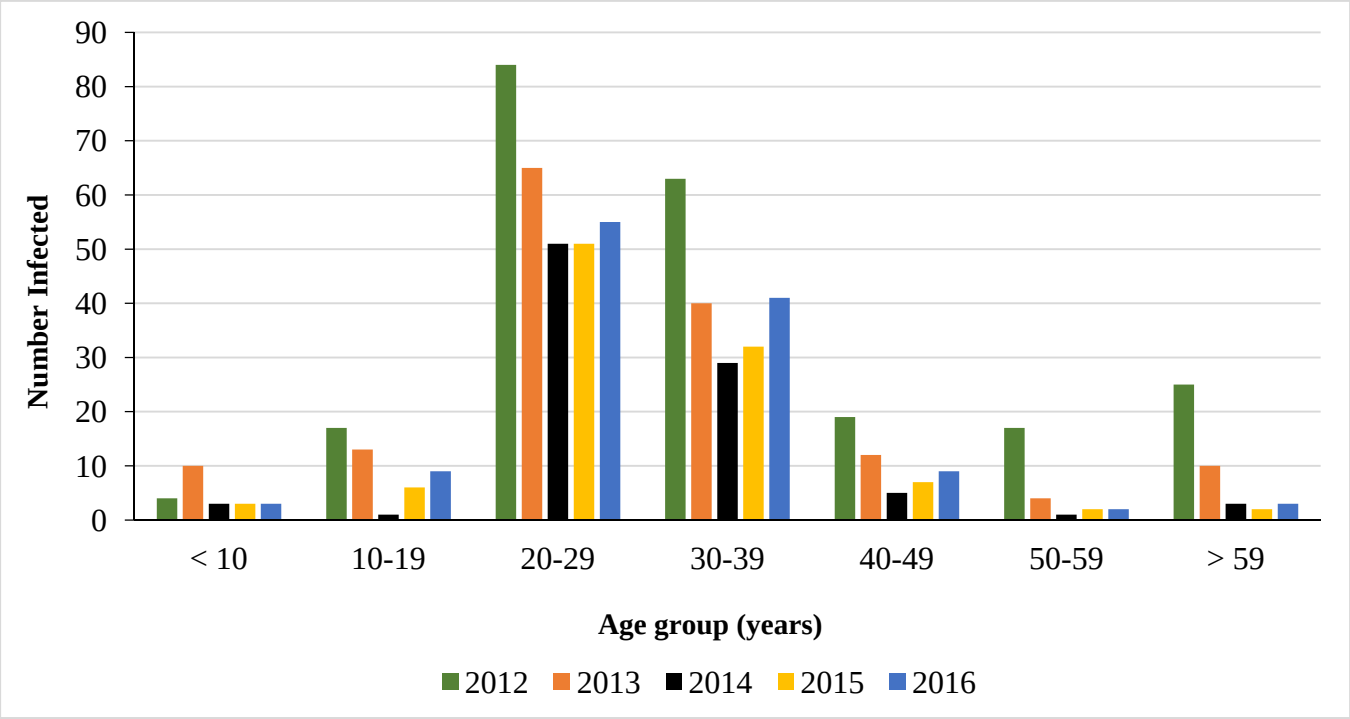

Figure 2: Distribution of Intestinal Parasite Infection by Age Group

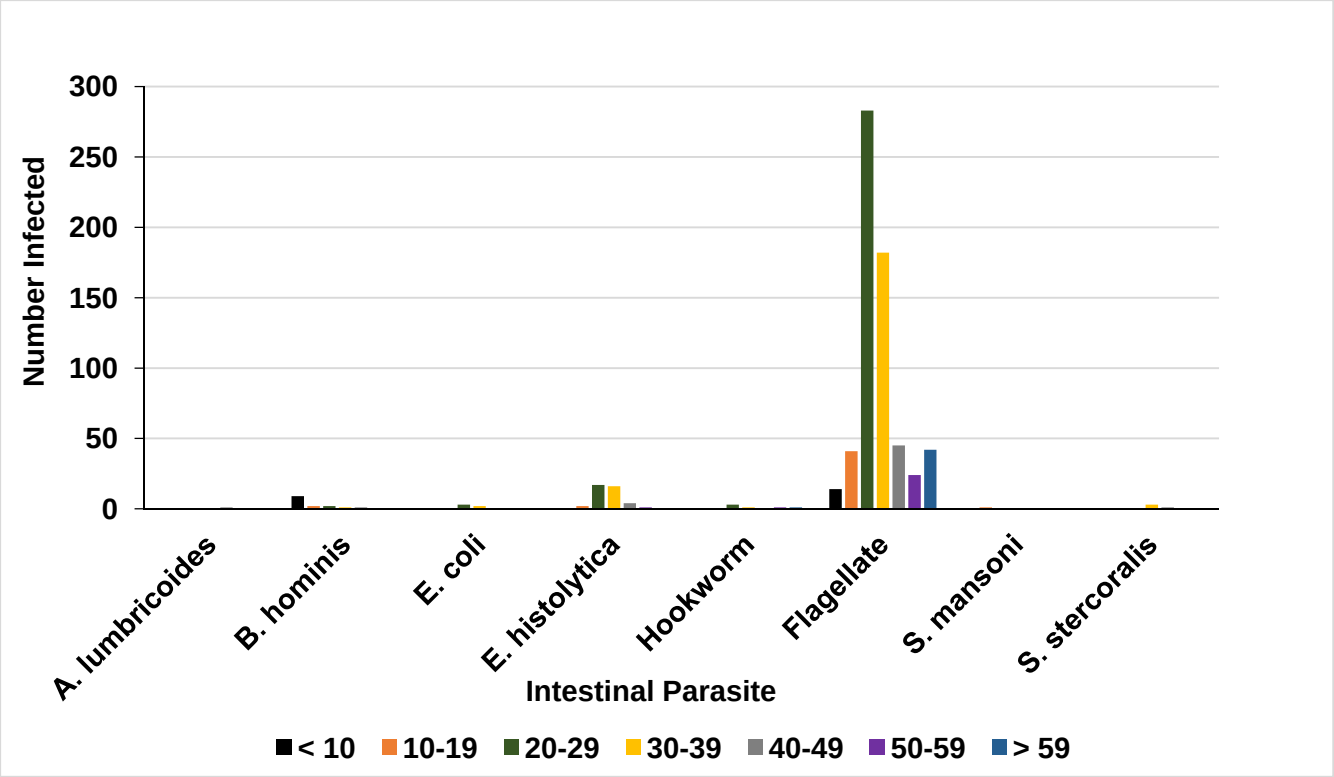

Figure 3: Distribution of Each Intestinal Parasites by Age Group

3.3 Association between Intestinal Parasite Infection and Patients Age group

As shown in Table 2, the association between intestinal parasite infections and patient's age yielded a significant difference (*P≤0.001*). Therefore, intestinal parasite infection was dependent on the age of patients.

Table 2: Association between Intestinal Parasite Infection and Age group

Age Group (Years)	Presence of Intestinal Parasite		Total Tested
	No (%)	Yes (%)	
< 10	452 (95.2)	23 (4.8)	475
10 to 19	411 (89.9)	46 (10.1)	457
20 to 29	2446 (88.8)	308 (11.2)	2754

30 to 39	2114 (91.2)	205 (8.8)	2319
40 to 49	433 (89.27)	52 (10.7)	485
50 to 59	230 (89.8)	26 (10.2)	256
> 59	256 (85.6)	43 (14.4)	299
Total	**6342 (90.0)**	**703 (10.0)**	**7045**

Chi-square ($\chi 2$) = 28.513; P≤0.001

4. DISCUSSION

This study reviewed laboratory records within a five-year period (2012-2016) in a Teaching Hospital of the Volta Region of Ghana. The current study revealed that 10.0% of examined patients were infected with intestinal parasites. This finding is consistent with the findings of studies done in other countries such as in Saudi Arabia, 6.2% [11], 6.23% in Ethiopia [12] and 10.7% in Iran [13]. Other studies have shown a wide range of variation in the prevalence of intestinal parasites. For example, findings of a study conducted in Vietnam, 88.0% [14] and 52% in Nigeria [15]. In comparison, the low prevalence of infection in this current study could be attributed to the fact that most of the examined patients at the Ho Teaching Hospital were urban dwellers with a high socioeconomic status.

Intestinal protozoa infections (*B. hominis, E. histolytica, E. coli* and intestinal flagellates were prevalent than soil-transmitted helminth infection (*A. lumbricoides, S. stercolaris*, hookworm and *S. mansoni*). This finding is in contrast with the findings of a study conducted in Nepal [16] and Saudi Arabia [17] which revealed soil-transmitted helminth as the most predominant intestinal parasite. The low prevalence of soil-transmitted helminth infection in this study could be due to the periodic deworming exercise initiated by the regional School Health and Education Programme (SHEP) of Ghana Education Service / Ministry of Education and the Neglected Tropical Disease Control Programme (NTDCP) of the Ghana Health Service [18].

The predominant intestinal protozoa parasites were intestinal flagellates (90.0%), followed by *E. histolytica* (5.7%). This could be due to poor sanitation conditions, contamination of water and improper hygiene [17]. This finding is contrary to studies conducted in Rwanda [19] and Egypt [20] where *E. histolytica* was the most prevailing intestinal protozoa parasite.

Hookworm infection was low (0.9%). However, it was the predominant intestinal helminth infection in the study. This finding agrees with the study conducted in Cape Coast Metropolis, Ghana which revealed hookworm as the most common prevailing helminth [21]. On the other hand, the prevalence of *A.*

lumbricoides (0.1%), *S. stercoralis* (0.1%) and *S. mansoni* (0.6%) were low compared to the study conducted in Cape Coast Metropolis, Ghana with prevalence of *A. lumbricoides* (3.0%), *S. mansoni* (1.7%) and *S. stercoralis* (1.7%) [21]. This variation could be due to the different geographical location of the study sites and also techniques used in the laboratory to detect these parasites. Although the prevalence of these intestinal parasites was very low, their detection in the study population indicates they are still being transmitted and the prevalence could surge under suitable conditions.

Regarding distribution of the intestinal parasites among various age groups, individuals in the age group 20-29 were most infected throughout the five-year period. Moreso, individuals in the age group below 10 recorded low infections. This is consistent with a similar finding in Nepal where most infection was among age group 20-50 years [22]. The reason for the higher prevalence of the infection among individuals aged 20-29 years could be due their frequent exposure to the environment as majority of them are energetic, hence they strive for their livelihood, and by doing so they do various types of works including farming, sewage cleaning and many more. The probability of them eating and drinking improper food and water during their working hours is high which could make them vulnerable to infection [22].

The study revealed higher rate of infection in females (9.11%) than in males (1.09%). This account is similar to the findings of a study conducted in Ethiopia [23]. Moreover, females have high intestinal protozoa and helminth infection, except for hookworm and *A. lumbricoides* infection that were predominant in males. Such sex predominance in infections rates is likely to be a reflection of different behaviour between the two groups [24]. The prevalence of intestinal parasite infection is dependent on the age of the patient ($P \leq 0.001$). In contrast, intestinal parasite infection is independent of sex of an individual ($P\text{-value}=0.215$). Therefore, age was a risk factor for acquiring these infections.

Implementation of laboratory quality management systems in the Ho Teaching Hospital Laboratory could lead to the reducing prevalence of intestinal parasites from 2013. This facility was graded three-star level by African Society for Laboratory Medicine (ASLM) after going through Strengthening Laboratory Management Toward Accreditation (SLMTA) programme [25].

5. CONCLUSION

The overall prevalence of parasitic infections could be classified as low compared to other reports. Among the intestinal parasites, intestinal flagellates and *Entamoeba histolytica* were found to be the most prevalent during the five-year period (2012–2016). Most intestinal parasites were more prevalent among individuals 20-29 years and the least infection was seen in individuals below 10 years. Although the overall burden of parasites was low, the increasing trend of some parasites in the study indicates the failure of maintaining good sanitation, personal hygiene, and provision of safe drinking water and health education in the Ho municipality. It is recommended that, various stakeholders should provide advance techniques in laboratory investigation of stool samples to enhance accurate diagnosis. Also, the provision

of hygienic toilet facilities, water supply, education and regular deworming should be promoted in other to help control the transmission of these parasites among the population.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

CONSENT

Written consent and approval for the study was obtained from the Ho Teaching Hospital management to use the laboratory records. The names of the individual patients were not recorded during the data collection; therefore, the patients' confidentiality were kept.

ETHICAL APPROVAL

Ethical approval for the study was sought from the Dodowa Health Research Centre Institutional Review Board [Ethic identification number: DHRC/IRB/1/09/17].

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