Intestinal Parasites among Patients Attending Federal Medical Centre and Specialist Hospital, Yola, Adamawa State, Nigeria

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ABSTRACT

Intestinal parasites are identified as a cause of morbidity and mortality throughout the world particularly in the developing countries. This research was conducted to determine the prevalence of intestinal parasites and the risk factors for specific and multiple infections among patients attending Federal Medical Centre and Specialist Hospital, Yola, Adamawa State, Nigeria. The unsanitary environment and indiscriminate defaecation in Yola communities and environs is common. People commonly move bare-footed; and consumption of contaminated foods and water which leads to increase in diarrhoeal cases among inhabitants. Four hundred and twenty-three (423) stool samples were randomly collected and analyzed in the laboratory using saline wet mount procedure and formal ether concentration technique. Of the 423, 103(24.3%) had intestinal parasites with a total of seven parasite species were observed. The frequency of occurrence of intestinal parasites from the stools examined indicates that Entamoeba histolytica was the most predominant 32(7.6%), and Ascaris lumbricoides was least predominant 8(1.9%). Co-infection with Hymenolepis nana and Gardia lamblia was also observed 2(0.5%). Prevalence of intestinal parasites was higher in males 71(16.8%) than in females 32(7.6%); while according to age groups, it was higher among 11-20 years old 36(8.6%) and lowest among 41 and above years old -10(2.4%). There was statistically significant difference between intestinal parasitic infection and gender (P<0.05). However, there was no statistically significant difference between intestinal parasitic infection and age (P>0.05). This finding provides data for understanding the epidemiological status of the human gastrointestinal parasites which would be useful in the effective formulation and control of the parasitic diseases.

Keywords: Prevalence, Intestinal, Parasites, Co-infection, Yola

INTRODUCTION

Gastro-intestinal parasites are a major cause of morbidity and mortality throughout the world particularly in the developing countries.[1] They are one of the most common infections in humans especially in tropical and sub-tropical countries.[2] Intestinal parasitic diseases remain a serious public health problem in many developing countries especially due to faecal contamination of water and food.[1]

Several outbreaks of diarrhoeal disease caused by *Cyclospora cayetanensis* have been reported during the last decade. Spread of these protozoan parasites in developing countries mostly occurs through faecal contamination as a result of poor sewage and poor quality of water.[3] Food and water-borne outbreaks of these protozoan parasites have occurred, and the infectious cyst form of the parasites is relatively resistant to chlorine. Other species of protozoan parasites can also be found in the human gut, but they are not pathogenic, except *Microsporidia* sp.[4]

According to United States Centre for Disease Control, the intestinal parasites are hard to completely eliminate from the environment, but the risk of human infection can be decreased. Infected persons and persons at risk should carefully wash their hands after they have any contact with faeces. Careful hand washing is important, especially for caregivers of diapered infants in day-care centres, where diarrhoea is common and carriers of *Giardia* organisms are numerous.[5]

Eating uncooked foods that may have been grown, washed, or prepared with contaminated water should be avoided. Breastfeeding appears to protect infants from *Giardia lamblia* infection. Breast milk contains detectable titres of secretory IgA,

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which is protective for infants, especially in developing countries. Furthermore, infected infants who were exclusively breast-fed had fewer clinical manifestations than those who were not exclusively breast-fed.[6]

According to McGowan *et al*.,[1] the degree of harm caused by intestinal parasitic infection to health of individual and communities depends on the parasites species, the nature of interactions between the parasites species and concurrent infection, the nutritional and socioeconomic factors of the population.

Lustigman *et al*.[7], stated that majority of the intestinal parasitic infections are attributed to Soil Transmitted Helminths (STH) and *Schistosoma* species. It is estimated that more than a billion people in the world are infected with schistosomes and STHs, most of whom suffer from associated severe morbidity. Human schistosomiasis is of considerable public health importance and mainly affects individuals living in developing countries where water resources allow development of snails and poor sanitation facilitates infection.[7] Furthermore, the construction of dams for the purpose of irrigation and hydroelectric power has created new areas of transmission, which intensified community level infection by *S.mansoni* in children living in Africa.[8] Helminth infections is based on regular anti-helminthic treatment, improved water supply and sanitation and health education.[9] In developing countries, however, control measures are difficult to implement due to clean water, sanitation and education problems. As a result, intestinal helminths infection remains a significant health problem in developing regions.

In Nigeria, parasitic infection is endemic and commonly reported among individuals in various communities.[10] Poverty and social exclusion, and the lack of political and financial priority given to building the capacity of vulnerable families to care for and protect their own children in Yola are driving factors to the prevalence of the intestinal parasitic infestations. Furthermore, the frequency of infections may be related to the inadequacy of sanitation and indiscriminate defaecation in the environment. Moreover, many people commonly move bare-footed; and consumption of contaminated foods and water leading to increase in diarrhoeal cases among the inhabitants. Against this background, Patients attending Federal Medical Centre and Specialist Hospital, Yola, Adamawa State, Nigeria, were chosen for this study on the prevalence of intestinal parasitic infection among people in Yola and the state at large.

MATERIALS AND METHODS

Study Area

This study was conducted at Federal Medical Centre (FMC) and Specialist Hospital (SH), Yola, both in Yola metropolis. Yola lies between Latitude 9°19'60.00"N and Longitude 12°29'59.99"E. Adamawa is one of the largest States in Nigeria and occupies an area of about 36,917 square kilometres and a projected population of 4,464,609.[11] The state is well drained by many rivers, most of which are seasonal. The main river is the River Benue with major tributaries which have flat sandy beds and steep rocky incised valley sides with an undulating terrain which provide for suitable fishing, irrigational farming and cattle rearing.[12]

Ethical Issues

Approval and permission for this study was granted by Adamawa State Ministry of Health and Federal Medical Centre Ethical Committee on Health Research.

Methodology

Study design

A descriptive cross-sectional hospital-based study was carried out from June to August, 2018 in FMC and SH, Yola. The two Hospitals serve the population of the study area and its environs. The hospitals also provide inpatient and outpatient services.

Four hundred and twenty-three (423) patients were selected for this study between June and August, 2018 using the formula ($n= [(Z\ score)^2 x\ SD(1-SD)]/e^2$) proposed for studies that can only be used for large populations or unknown population sizes.[13]

Parasitological Methods

Faecal specimen collection

Four hundred and twenty-three (423) stool samples were collected using wide mouthed, sterilized and leak-proof containers.[14] The containers were labelled with identification number and given to each participant who were advised to take into consideration the environmental measures to prevent degeneration and deterioration of amoebic/flagellate trophozoites and cysts, respectively. They were administered along with a questionnaire to know their level of understanding on intestinal parasites and to obtain their socio-demographic information such as age, gender, occupation and educational level followed by locations and the hospital attended.

Macroscopic faecal sample examination

Stool samples were examined macroscopically for colour, odour, consistency, presence of mucus, blood, adult worms and segments of intestinal helminthes.[15]

Microscopic faecal sample examination

Eggs, larvae, ova of helminthes and intestinal protozoa were detected through microscopic examination of the stool samples. For this study, saline wet mount and formal-ether concentration technique methods were used.[15]

Saline wet mount procedure

With the aid of a dropper, a drop of physiological saline (0.9%) was placed on a clean grease free slide. Using applicator stick, a small portion of stool was picked and drop on the slide containing saline followed by mixing until a homogenous mixture was obtained. A cover slip was then placed and viewed microscopically at x10 and x40 objective lenses as described by Cheesebrough.[14]

Formol-ether concentration technique

Faecal sample were also assayed by use of the formal-ether concentration technique as described by Cheessebrough.[14] The resultant sediment was then examined for parasitic ova under x10 and x40 objective. Parasitic ova encountered were subsequently identified on the basis of morphological characteristics with reference to standard keys.

Data Analysis

Data obtained from the study was analysed using Statistical Package for Social Sciences (SPSS) Version 22.0. The statistical associations of potential risk factors and prevalence of intestinal parasitic infection against age, gender and socio-economic status was assessed by analysis of variance (ANOVA) and Chi-square. The confidence level for all the tests were set at 95%.

RESULTS

Of the 423 samples screened, 103(24.3%) were positive for various parasitic ova. A total of seven parasite species comprising of three protozoa and four helminths were observed. *Entamoeba hystolytica* was the most predominant, occurring in 32(7.5%) followed by *Gardia lamblia* which occurred in 23(5.4%), *w*hile *Strongyloides stercoralis* was least prevalent parasite found in 5(1.1%) stool samples as shown in Table 1. Majority of the positive cases were of single infection, but 2(0.4%) were cases of multiple infection involving *Hymenolepis nana* and *Gardia lamblia*.

The prevalence of intestinal parasites infection was higher among the 11-20 years old 36(8.5%), followed by the ≤ 1-10-years old age group 35(8.2%), 21-30 and 41 and above years old 11(2.6%), respectively. While the 31-40 year old age group had the least 10(2.3%) ($P<0.05$) (Table 2). Intestinal parasite infection was higher in males 71(16.7%) than females 32(7.5%) ($P<0.05$) (Table 3). Of the 423 of patients examined, 344(81.2%) showed no symptoms, 79(18.6%) complained of at least one symptom with intestinal parasitic infection.

Among patients who complained of four symptoms, the 41 and above year old had the highest 3(0.7%), followed by the 31-40 year old 2(0.4%), while the 11-20 and the 21-30 year old age groups, had 1(0.2%), respectively. For those with three symptoms, the 11-20 year old had the highest 20(4.7%), followed by <1-10 year old 11(2.6%), 21-30

year old 7(1.5%). The least being among the 31-40 year and 40 above year old 6(1.3%). The <1-10 year old had the highest frequency among those who reported 2 symptoms 9(2.1%), followed by the 11-20 4(0.9%), 31-40 2(0.4%) and the least among 41 and above 1(0.2%). Among patients who complained of one symptom, the 11-20 year old had the highest 3(0.7%), followed by the <1-10 year old 2(0.4%), while the least was among the 41 and above year old age group 1(0.2%) (P>0.05) (Table 4).

Males exhibited highest symptoms 5(1.1%) of infections with intestinal parasites when compared to females 2(0.4%) among those with four symptoms. Also, those with three symptoms, males had a higher prevalence 32(7.5%) when compared to females 18(4.2%). Results also showed that among patients with only two symptoms, males had 11(2.6%) while females had 5(1.1%). Males also had higher frequency among those with one symptom 4(0.9%), while females had 2(0.4%) (Table 5) (P>0.05).

Patients from rural areas exhibited higher symptoms 5(1.1%) than urban dwellers 2(0.4%) of those who presented with four symptoms. Among those with three symptoms, rural dwellers had a higher prevalence 34(8.0%) when compared to those from urban areas 16(3.7%). Those patients who complained of only two symptoms showed that those from rural areas 11(2.6%) were highest. Patients from rural areas also had higher frequency among those with one symptom 4(0.9%), while those from urban had 2(0.4%) (Table 6) (P>0.05).

Table 1: Prevalence of Intestinal Parasites among Patients attending Federal Medical Centre and Specialist Hospital, Yola

Parasite Species	**No. Positive**	**Prevalence (%)**
Entamoeba hystolytica	32	7.6
Gardia lamblia	23	5.4
Ascaris lumbricoides	8	1.8
Hymenolepis nana	9	2.1
H/nana + G.lamblia	2	0.5
Hookworm	14	3.3
Taenia	10	2.4
Strongyloides stercoralis	5	1.2
Total	**103**	**24.3**

Table 2: Prevalence of Intestinal Parasites in Relation to Age of Patients

Age (year)	**No. Examined**	**No. Positive**	**Prevalence (%)**
≤1-10	119	35	8.2
11-20	162	36	8.5
21-30	60	11	2.6
31-40	43	10	2.3
41-Above	39	11	2.6
Total	**423**	**103**	**24.2**

Table 3: Prevalence of Intestinal Parasites infection in Relation to Gender of Patients

Gender	No. Examined	No. Positive	Prevalence (%)
Female	185	32	17.3
Male	238	71	29.8
Total	**423**	**103**	**47.1**

Table 4: Prevalence of Intestinal Parasites in Relation to Symptoms and Age of Patients

Age (year)	No. Examined	One Symptom(%)	Two Symptoms(%)	Three Symptoms(%)	Four Symptoms(%)
≤1 - 10	119	2(0.4)	9(2.1)	11(2.6)	0(0.0)
11-20	162	3(0.7)	4(0.9)	20(4.7)	1(0.2)
21-30	60	0(0.0)	0(0.0)	7(1.5)	1(0.2)
31-40	43	0(0.0)	2(0.4)	6(1.3)	2(0.4)
41-Above	39	1(0.2)	1(0.2)	6(1.3)	3(0.7)
Total	**423**	**6(1.3)**	**16(3.7)**	**50(11.7)**	**7(1.5)**

Table 5: Prevalence of Intestinal Parasites Infection in Relation to Symptoms and Gender of Patients

Gender	No. Examined	One Symptom(%)	Two Symptom(%)	Three Symptom(%)	Four Symptom(%)
Female	185	2(0.4)	5(1.1)	18(4.2)	2(0.4)
Male	238	4(0.9)	11(2.6)	32(7.5)	5(1.1)
Total	**423**	**6(1.3)**	**16(3.7)**	**50(11.7)**	**7(1.5)**

Table 6: Prevalence of Intestinal Parasites Infections in Relation to Symptoms and Location

Location	No. Examined	One Symptom(%)	Two Symptom(%)	Three Symptom(%)	Four Symptom(%)
Rural	200	4(0.9)	11(2.6)	34(8.0)	5(1.1)
Urban	223	2(0.4)	5(1.1)	16(3.7)	2(0.4)
Total	**423**	**6(1.3)**	**16(3.7)**	**50(11.7)**	**7(1.5)**

DISCUSSION

Intestinal parasite are important threats to healthy living of humans in developing countries.[16] The degree of each factor and the prevalence of infections vary from one region to the other.[1,7] Knowledge of intestinal parasitic infection is crucial for planning of efficient intervention programs. The present study assessed the prevalence of intestinal parasites among patients attending FMC and SH, Yola, Adamawa state, Nigeria.

The intestinal parasites detected include *Entamoeba histolytica, Gardia*

lamblia, Hookworm, *Taenia*,*Hymenolepis nana, Ascaris lumbricoides* and *Strongyloides stercoralis*. Co-infection with *Hymenolepis nana* and *Gardia lamblia* was also observed. These intestinal parasites have been reported in various parts of Nigeria.[17] Our study recorded that *Entamoeba hystolytica* was the most predominant (7.5%). This finding agrees with previous studies done elsewhere in Nigeria which reported higher prevalence values. Ajero, *et al.*[17] reported that *E. Histolytica,* an indicator organism of faecal contamination, is frequently present in street foods, and street food may cause outbreak of amoebiasis, cholera, typhoid and hepatitis A.[17] Human amoebiasis is a disease caused by the protozoan, amoeba of the genera *Entamoeba*, of which *E. histolytica* is the most medically important. Infection occurs when man ingests foodstuffs, vegetables or drink water contaminated by cysts of *E.histolytica.*[17]

Gardia lamblia 5.4% is the second predominant intestinal parasites found in this study. This is in agreement with Heidari and Rokni,[18] that reported higher prevalence (23.9%) among children in urban slums of Karachi, Pakistan. Giardia lamblia is one of the most common pathogenic intestinal protozoan worldwide transmitted by the ingestion of cysts in contaminated water, food, or by the faecal-oral route.[19]

Strongyloides stercoralis (1.1%) is the least predominant intestinal parasite in this study. This also agreed with the findings of Egwari *et al*.[20] in Lagos, Southwest Nigeria, who found no *S. stercoralis* in their study of sachet water. Ajero *et al*.[17] in Lagos, Nigeria, also noted that *Strongyloides stercolaris* and other enteric pathogens formed a significant part of the isolates on the outside sachet surfaces of samples collected from cooling receptacles (pail, basin, wheel barrow, and refrigerator).

Result also showed that people within the 11-20-year-old age group had the highest prevalence of intestinal parasites, closely followed by the ≤1-10-year-old age group (Table 2). A similar trend was reported by Jombo,[21] in which the bulk of parasitic infestation occurred among the 8-15-year-old age group in a rural settlement of Northern Nigeria. Again the prevalence of intestinal parasites decreased with age in this study. This inverse relationship between the age and the prevalence of intestinal parasites might be due to higher level of awareness and good hygienic practice in the older age groups. Contrary to this study, some workers in Nigeria and overseas had reported higher prevalence among the elderly. Wariso and Ibe,[22] reported 46.0% prevalence of intestinal parasite in some parts of Port Harcourt, Nigeria. In this study, in-patients and out-patients of FMC and SH, Yola with signs and symptoms of intestinal parasitic infections were used for the study. It is also important to note that patients may have been treated at the primary healthcare levels before being referred to FMC and SH, Yola. This may explain the lower prevalence observed in our study.

This study also found out that males had a marginally higher prevalence (16.7%) compared to their female counterparts (7.5%), although there was statistically significant difference ($p<0.05$) between the enteric parasitosis and gender. This suggested that intestinal parasitic diseases were independent of gender in the study area. This is contrary to the report by Gimba and Dawam, [23] that stated that the prevalence of intestinal parasites in children attending Gwagwalada township clinic, Abuja-Nigeria was higher in females (30.0%) than males (25.7%). This difference was statistically significant ($P<0.05$) in the association between prevalence of intestinal parasitic diseases in the two gender. Our finding also agrees with that of Anosike *et al*.[24] in a survey of intestinal parasite among students of post-primary institutions in Imo State, Nigeria, who reported that parasitic infections were significantly higher in males than females. Okonko *et al*.[4] reported that gastrointestinal parasite infection from 2002 to 2004 were significantly higher in males than females though the difference was not statistically significant ($P>0.05$). The high prevalence of intestinal parasites in men from our study may be related to occupation-related activities such as farming, fishing, and travel that put male at high risk of intestinal parasitosis than their female

counterparts. Again, females prefer treating themselves at the onset of every infection. They also visit health facilities more often than males who would rather prefer enduring illnesses as a demonstration of their masculinity.

The prevalence of intestinal parasite among patients in relation to symptoms, and associated sociodemographic and environmental factors has been demonstrated. In this study, 18.6% had symptoms of nausea, vomiting, abdominal pain and/or diarrhoea, due to infections with intestinal parasites. With regard to age, elderly patients (41 and above year old age group) were reported to be the highest with all symptoms compare to other age groups (P>0.05). This agrees with the findings of Almeida *et al*.[25] who reported high prevalence of intestinal parasites among the elderly with many signs and symptoms, while frequency of lower symptoms was reported in children ≤ 1–10-year-old age group. The high prevalence of parasitic infection among elderly can be explained by immunological deficiencies that occur with aging, increasing susceptibility to such diseases. Increased difficulty in performing self-care, which hampers personal hygiene and feeding and causes a possible disconnect of elderly people from their health. It is worth mentioning that many elderly people perform activities that require contact with the soil, such as gardening and yard cleaning, which facilitate contamination by increasing the risk of exposure to parasites.[26]

The prevalence of infection with intestinal parasites among patients in relation to symptoms and gender in our study showed that males have more symptoms than their female counterparts. This agrees with the findings of Baldo *et al*.[27] who stated that infection rates for intestinal parasites were higher in males than females. This is due to the fact that males possess more symptoms and high risk of infections due to their occupational activities in relation to soil contact.

The prevalence of intestinal parasite infections among patients in relation to symptoms and location shows that patients from rural settlements exhibited high symptoms (1.1%) more than urban dwellers (0.4%). This study is in line with the report of Damen *et al*.[28] who reported high symptoms and prevalence of intestinal parasitism among the Almajiris in the rural North Eastern Nigeria. This can be attributed to unplanned urbanization, which results in poor sanitary and hygienic conditions and contamination of drinking water with faecal matter.[29]

The higher prevalence of *Entaemoeba histolytica*, *Gardia lamblia, Ascaris lumbricoides* and other intestinal parasites detected in this study was a reflection of the poor environmental sanitation and very poor personal hygiene and unclean habits practiced by endemic villagers compounded by public ignorance and illiteracy.

CONCLUSION

Intestinal parasites are prevalent among the study population. Data obtained from this study provides information on the various parasitic diseases associated with gastro-intestinal tract of people in the study area. The 24.2% prevalence of intestinal parasites from this study is a pointer to the fact that one quarter of the gastrointestinal diseases in humans in the study area might be associated with enteric parasites. There is a need for regular awareness programs on sanitary and good hygiene among people living in the study area. Public enlightenment and emphasis on personal hygiene and cleaner environment may be necessary in the prevention and control of parasitic infections among people living in the endemic areas. Preventive measures and surveillance systems should be emphasized. Hence, while treating for intestinal parasites, it is advisable to use broad spectrum or multi-agent drug combinations because of the poly-parasitism susceptibility.

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