PREVALENCE OF INTESTINAL PARASITES AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN GENERAL HOSPITAL CALABAR, CALABAR, NIGERIA

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ABSTRACT

The prevalence of intestinal parasites among pregnant women attending antenatal clinic at General Hospital, Calabar was investigated between February and July, 2016. Each stool sample was collected into a universal sterile container and examined under the microscope using the direct smear and sedimentation methods. In this study, 200 samples of stool were collected from pregnant women attending antenatal clinic in General Hospital Calabar; 45(22.50%) were positive for intestinal parasite infection. Result revealed, pregnant women within the age group of 35-39 years had the highest prevalence value (38.09%). This was followed by age group 20-24years (27.27%), 45 and above (25.00%), 15-19 years (20.00%), 25-29years (19.17%), 30-34years (17.14%) and age group 40-44 years had the lowest prevalence value (16.66%). The prevalence of intestinal parasites in relation to age showed significant difference ($p<0.05$). The prevalence of intestinal parasites in relation to parasite species indicated that Ascaris lumbriocoides had the highest value of 64.4%, followed by Ancyclostoma duodenale with prevalence of 13.30%, Entamoeba histolytica prevalence of 11.11%, Trichuris trichiura 6.67% and Strongyloides stecoralis 4.44%. Out of 200 pregnant women examined in relation to occupation, business women had the highest prevalence value for parasites (55.55%) followed by students (22.22%) and house wives (13.30%) with the lowest value found among civil servants (8.89%). With reference to risk factors, those using pit latrine were more infected (64.44%) than those using water closet (35.56%8). The prevalence of intestinal parasite in relation to toilet facilities showed significant difference ($P<0.05$). Effort should be made to educate pregnant women on personal hygiene, and sanitation practices to prevent the spread of parasitic diseases.

Keywords: Intestinal, Parasite, Pregnant Woman, Antenatal Clinic

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INTRODUCTION

Parasitic diseases caused by helminths and protozoa are the major causes of human diseases and misery in most countries in the tropics. The burden due to soil transmitted helminthes (STH) and schistosomes infections is enormous (Usip and Ita, 2017). More than 40% of tropical disease burdens, excluding malaria, are due to this group of infections. Over two billion suffer from associated severe morbidity. Taken together, Soil Transmitted Helminthes (STH) and Schistomoses infections are the most prevalent parasitic infection in the world (WHO, 2003). The poor families are perpetually those who suffer the most, and within that group, adolescent girls and pregnant women all at critical phases of life are put among the highest risk. The impact in terms of individual suffering is silently devastating, while in economic terms the productivity of entire countries is damped (World Health Organization, 2002).

The effect of anaemia during pregnancy on maternal and neonatal life ranges from varying degrees of morbidity to mortality. Many studies have shown that severe anaemia (Hg < 7 g/l) during pregnancy has been associated with major and fatal complications (Bodeau-Livinec *et al.,* 2011 and Kousar *et al.*, 2010). It increases the risk of preterm delivery, low birth weight, intrauterine fatal death, neonatal death, maternal mortality and infant mortality. In more limited or focal geographic settings, other parasitic diseases (e.g Schistomiasis, filariasis) contribute similarly to this cycle. Parasitic protozoa and helminths are responsible for some of the most devastating and prevalent diseases in human.

According to WHO (1999), the major intestinal parasitic infections of global public health concerns are the protozoan species *Entamoeba histolytica* and *Giadia intestinalis:* and the Soil Transmitted Helminthes: *Ascaris lumbricoides, Trichuris trichiura* and hookworm. During pregnancy, ameobic disease appears to be more frequently associated with acute exacerbations of the disease (Riverra, 1972; Lewis *et al.,* 1969). Infected pregnant women may have bloody dysenteric stools with moderate abdominal pain and tenderness. The diarrhea is marked, and secondary signs include fluid loss and electrolyte imbalance, which may adversely affect the outcome of pregnancy. Giardiasis is caused by infection with the enteric pathogenic intestinal flagellate, *Giardia intestinalis*. It is considered the most common human intestinal protozoan infection.

According to Garcia (1999), the transmission of the parasite is mainly by faeco-oral route but also occurs by human-to-human transmission. Clinical symptoms of giardiasis include diarrhea, steatorrhea, epitgastric pain, wasting, hypoalbuminamia and impaired absorption of Folate and vitamin B_{12} as reported by Neva and Brown, (1994). The adverse effect of Giardia infection on pregnancy is related to the associated diarrhea, fluid and electrolyte loss, and malabsorption, which may contribute adversely to the ultimate outcome of the pregnancy (Hoskins *et al*., 1967).

The three major soil transmitted helminthes considered to be of public health concern in Nigeria are *Ascaris lumbricoides*, *Trichuris trichiura* and *Ancyclostoma duodenale* (Usip and Matthew, 2015).. Over one billion of the world's population is estimated to be infected with these parasites; two billion are said to be at more risk (Montresor *et al*., 1998).

According to Neva and Brown (1994), *Ascaris lumbricoides* is a "robust parasite". This quality is due, in part, to the resiliant nature of its eggs, which are capable of surviving a wide range of hot and cold temperatures and chemicals; disinfections and other extreme conditions.

Trichuriasis or whipworm infection is caused by *Trichuris trichiura*. The infection is estimated to affect around 1049 million persons worldwide, of these, 114 million are children of preschool age, and

233 million are school age as reported by Chan (1997). According to Horii and Usuii (1985), human are the primary host for infection caused by *Trichuris trichiura* but the species has been detected in some non-human primates. Infection with *Trichuris trichiura* occurs via the oral- fecal route caused by ingestion of infective egg from contaminated food, hands or water.

In severe infection, the worm may be observesd embedded in the edematous rectal mucosa accompanied by moderate eosinophilia. Bleeding from heavy infections may be sufficient to produce iron deficiency anemia, therefore the infection poses little or mild risk to pregnant women (Layrisse *et al*., 1967). The prevalence of triachuriasis at 1.3% in Njoro of Kenya was lower compared to 4.6% among 817 pregnant women in Nyanza province of Kenya and 1.7% reported in Nigeria (Brooker, *et al.*, 2008; Luoba, *et al.*, 2005). The prevalence was however higher than 0.9% reported among pregnant women in Ghana (Baidoo *et al.*, 2010).

According to Okon and Asor (2012), Hook worm infection is acquired through the penetration of human skin exposed to contaminated soil, usually the feet and sometimes hands and buttocks by the filariform larvae of the parasite. Research has also reported that severe maternal anaemia and malnutrition are associated with fetal growth restriction and low birth weight infants (Sarah *et al.*, 2011). During pregnancy, the main concern is iron deficiency anemia, for example, in light infection; the diary blood loss may be 10ml/day or less. However, heavy infection with 300 worms or more, the patient may have blood loss of 50ml or more.

AIM AND OBJECTIVES

The major aim of this research was to determine the prevalence of intestinal parasites among pregnant women attending antenatal clinic in the General Hospital Calabar, Calabar with the following objectives to;

1. determine the prevalence of intestinal parasitic infections in pregnant women.
2. determine the types of parasite infecting pregnant women.
3. identify the socio-economic and environmental risk factors of intestinal parasitic infections in pregnant women.

MATERIALS AND METHODS

DESCRIPTION OF STUDY AREA

Calabar which is the study area is the capital of Cross Rivers State with a population of about 191,630 (Census 2006) people and is between Calabar River and the Great Kwa River. It is located at latitude 04^0 95'N and longitude 08^0 32'E along the Costal parts of Nigeria forest belt (figure 1). Calabar is characterized by two distinct seasons, the rainy season which begins from March to October and the dry season which starts from November to March. The area also experiences harmattan weather from December to February.

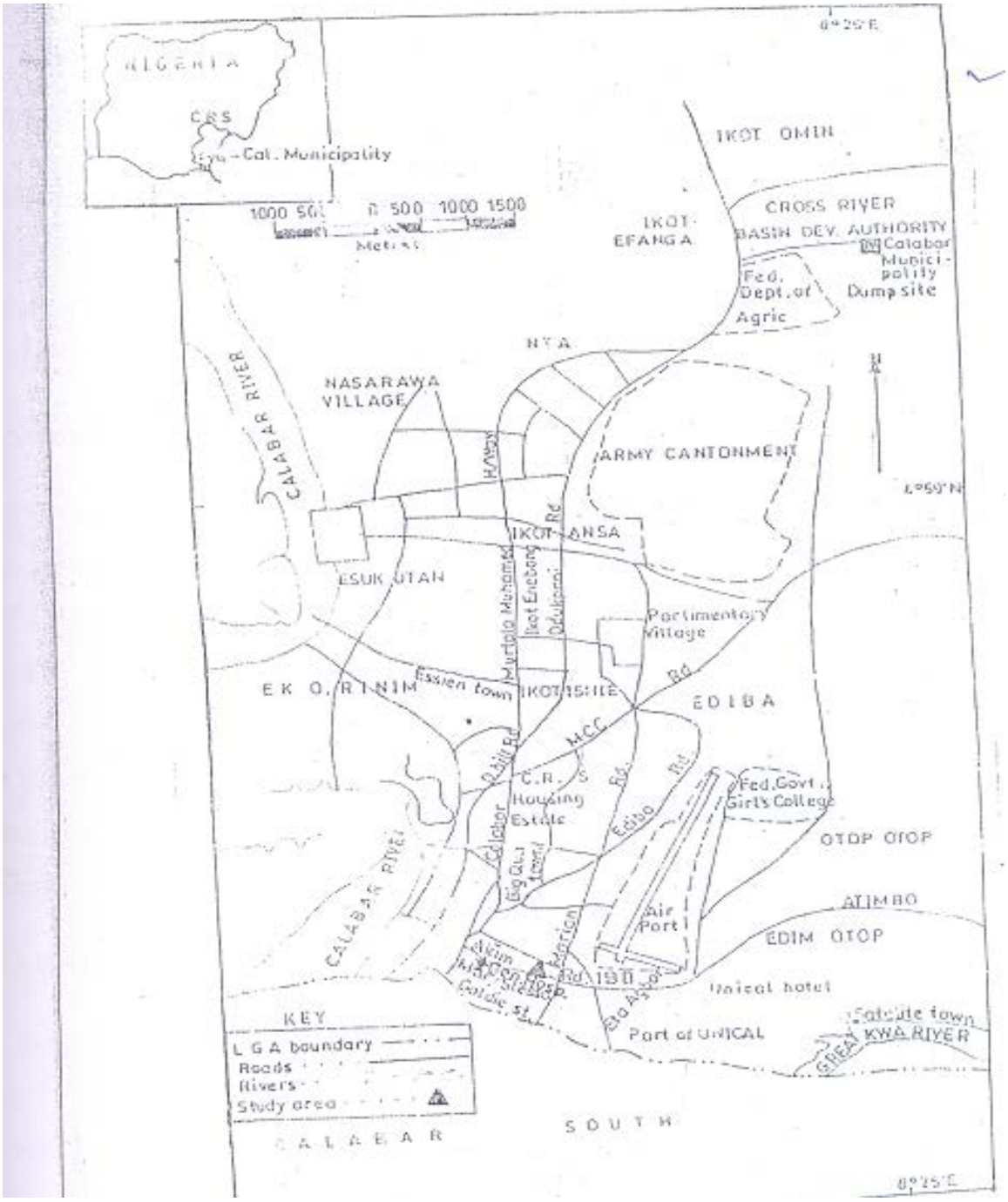

Figure 1: Calabar Municipality Showing Study Area.

ETHICAL CLEARANCE

Ethical clearance was obtained from the Cross River State Health Research Ethics Committee. A written consent form was obtained from each participated pregnant woman attending antenatal Clinic in General Hospital Calabar.

SAMPLE POPULATION

The sample population and sample size comprised of all the pregnant women attending antenatal clinic in General Hospital, Calabar out of which a sample size of 200 pregnant were randomly selected, during the period of the study. The participation was voluntary and questionnaires were given to all participants. The study was carried out within the period of February to July 2016 and the samples were collected every twice a month until the estimated number of pregnant women were examined.

SAMPLE COLLECTION

Early morning stool was collected from pregnant women attending antenatal clinic in sterile dry specimen bottles with the use of applicator stick, with information on their names, age, occupation, address, and the day of collection. The stool sample was transferred each day of collection to the Gooddeeds medical laboratory for laboratory analysis.

LABORATORY PROCEDURE

The following parasitological techniques were used for the stool examination.

Direct Smear Method

At one end of the slide ($1^1/2 \times 3$mm), a drop of physical saline was placed, and drop of iodine stain on the other half. Thin smear of faecal sample was made evenly on saline and iodine drops respectively. Cover glass was applied to each of the smears and the preparation was examined systematically with low power magnification for the presence of ova and helminths under $\times 10$ and $\times 40$ magnification of binomial single microscope.

Formalin- ether sedimentation technique

Two (2) grams of faecal sample was mixed in 10ml of water and strained through two layers of gauge in a funnel. The filtrate was centrifuged at 2000rpm for 2 minutes. The supernatant was discarded and the sediment was suspended in 10ml of physiological saline and centrifuged. After, the sediment was resuspended in 7ml of formalin saline and allowed to stand for 10minutes to which 3ml of ether was added. The tube was stoppered and shaken vigorously to mix. Then the stopper was removed and the tube was centrifuged at 2000 rmp for 2 minutes, after which the tube was allowed to rest in a stand. The supernatant was poured off leaving a small amount of formalin saline for suspension of the sediment. The sediment was then poured on a clean glass slide covered with coverslip for microscopic examination (Arora & Arora, 2012).

IDENTIFICATION OF PARASITE SPECIES

Identification of the parasite egg and cyst was done based on structural and morphometric criteria with the help of parasitology laboratory atlas. The criteria include size, shape and possibly colour of the egg and cyst (Arora & Arora, 2012; Ash and Oritel 1996).

DATA ANALYSIS

In order to achieve the aim of the study descriptive data analysis was done using chi square (χ^2) analysis with SPSS version 20 to investigate differences between proportion.

RESULTS

Out of 200 samples collected of stool from pregnant women attending antenatal clinic in General Hospital Calabar, 45(22.50%) were positive for intestinal parasites infection. Table 1 shows the prevalence of intestinal parasitic infection in relation to ages. This shows that pregnant women between the age group of 35-39 years had the highest prevalence value (38.09%). This was followed by age group 20-24 years (27.27%), 45 and above (25.00%), 15-19years (20.00%), 25-29years (19.17%) , 30-34 years (17.14%) and age group 40-44years had the lowest prevalence value (16.66%). However, the prevalence of intestinal parasites in relation to age shows no significant difference (P<0.05) (Table 1).

Table 1: Prevalence of intestinal parasites among pregnant women attending antenatal clinic in General hospital, Calabar in relation to age range

Age range (years)	No of women examined	No infected (%)
15-19	5	1(20.00)
20-24	44	12(27.27)
25-29	73	14(19.19)
30-34	35	6(17.14)
35-39	21	8(38.09)
40-44	18	3(16.66)
45 & above	4	1(25.00)
Total	**200**	**45(22.50)**

χ^2 = 3.9, Df=6, p<0.05

Table 2 shows the prevalence of the intestinal parasite species in relation to the age range among pregnant women attending antenatal clinic in General Hospital Calabar. *Ascaris lumbricoides* had the highest prevalence of about 64.4%, followed by *Anyclostoma duodenale* with the prevalence of 13.30%, *Entamoeba histolytica* with prevalence of 11.11%, *Trichuris trichiura* with the prevalence of 6.67% and *Strongyloides stecoralis* with the lowest prevalence of 4.44%.

TABLE 2: prevalence of intestinal parasite in relation to parasite species

Age range (years)	**No of women examined**	**No of infected**	***Ascaris lubricasdioes***	***Trichuris trichiura***	***Ascylostomal duodenale***	***Entamoeba histolytica***	***Strongyloide stecoralis***
15-19	5	1(20.00)	1	0	0	0	0
20 – 24	44	12(27.27)	11	2	3	1	0
25 – 29	73	14(19.17)	12	0	1	1	0
30 – 34	35	6(17.14)	5	0	1	0	1
35-39	21	8(38.09)	3	1	1	2	1
40-44	18	3(16.660	3	0	0	0	0
45 &Above	4	1(25.00)	0	0	0	1	0
Total	200	45(22.50)	29	3	6	5	2

Table 3/Figure 2 shows the prevalence of intestinal parasite among pregnant women attending antenatal clinic in General Hospital Calabar in relation to occupation. This showed that business women (55.55%) had higher prevalence value for parasites. This was followed by students (22.22%) and house wives (13.30%) while lower prevalence value was found among civil servants (8.89%). However, there was no significant difference ($p<0.05$) as shown in Table 3.

Table 3: prevalence of intestinal parasite in relation to occupation of the women

Occupation	**No of women examined**	**No of infected (%)**
Civil servant	35	4(8.89)
House wives	28	6(13.3)
Business women	88	25(55.55)
Student	49	10(22.22)
Total	200	45(22.5)

$\chi^2 = 2.8621$, Df=3, $p<0.05$

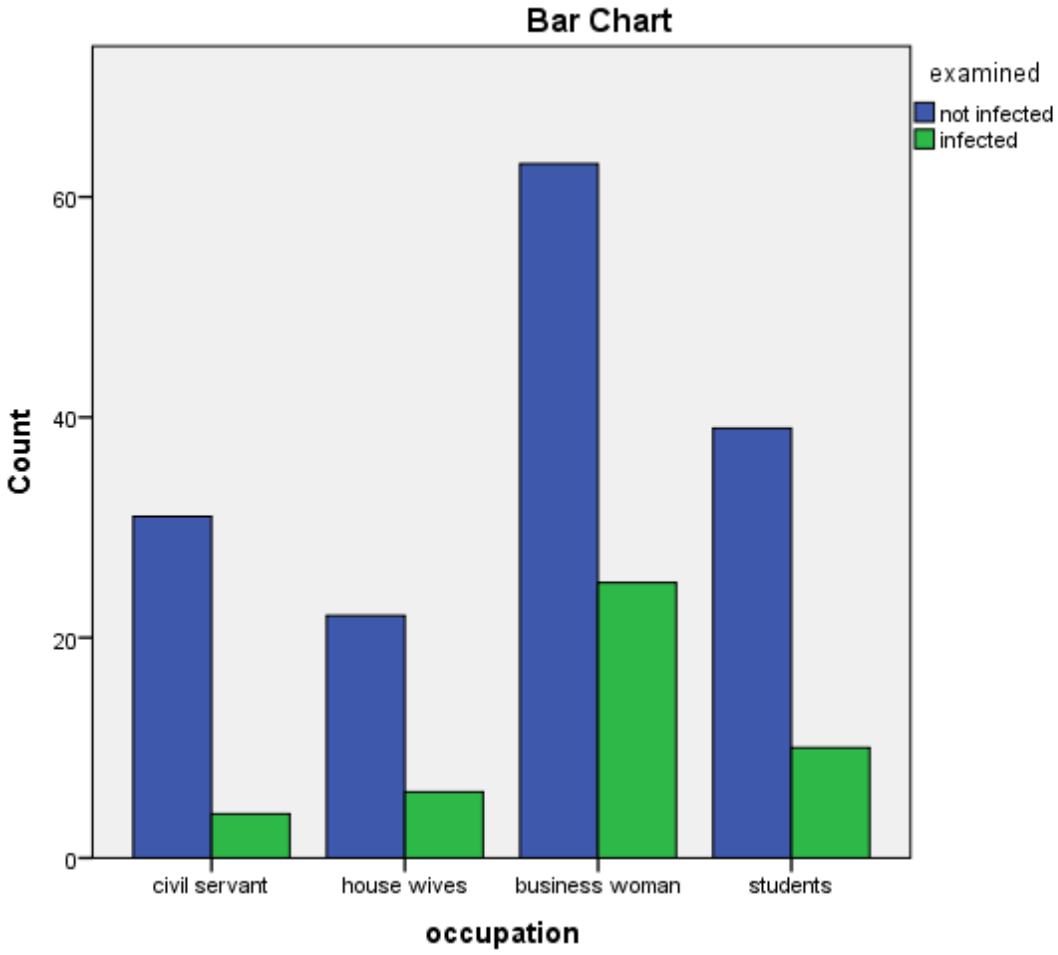

Figure 2: Prevalence of intestinal parasites among pregnant women attending antenatal clinic in General Hospital Calabar in relation to occupation.

Table 4 shows the prevalence of co-infection among pregnant women attending antenatal clinic in General Hospital Calabar in relation to their occupation. Those infected with *Ascaris lumbricoides* and *Anyclostoma duodenale* had the highest prevalence of about 47.38%; followed by *Ascaris lumbricoides* and *Strongyloides stecoralis* with a prevalence of 26.63%; *Ascaris lumbricoides* and *Entamoeba histolytica* with prevalenceof21.05%. *Ascaris lumbricoides* and *Trichuris trichiura* had the lowest prevalence of 5.26%.

Table 4: Occupation, prevalence In relation to multiple infections

Occupation	No of women	No infected (%)	*Ascaris lumbricodes* and *Trichuris trichiura*	*Ascaris lubricodes* and *Ancyclotima duodenale*	*Entamoeba histolytica* and *Ascaris lumbriciodes*	*Ascrais lumbricadioes* and *strongyloides stecoralis*
Civil servant	35	4(11.42)	0	0	1	0
Housewives	28	6(21.40)	1	0	0	0
Business women	88	25(28.40)	0	5	2	3
Students	49	10(20.40)	0	4	1	2
Total	**200**	**45(22.5)**	**1**	**9**	**4**	**5**

Table 5 shows the prevalence of intestinal parasite among pregnant women attending antenatal clinic in General Hospital Calabar in relation to the type of toilet facilities. Those pregnant women using pit system had the highest prevalence of 64.44%, followed by those using water system with a prevalence of 10.96%. There were no women examined using the pail system. However, these shows significant difference ($p<0.05$) as shown in Table 5.

Table 5: prevalence in relation to toilet facilities

Types of toilet facilities	No of women examined	No infected (%)
Water closet	146	16(10.96)
Pit system	54	29(64.44)
Pail system	0	0(0.00)
Total	200	45(33.5)

$\chi^2 = 23.2$, Df = 2, $p<0.05$

DISCUSSION

The study revealed an overall prevalence rate of 22.5%. This is however lower than what was previously reported by Egwunyenga in Nigeria who found 33.3% prevalence value among 816 pregnant women (Egwunyenga *et al*., 2004). This lower prevalence reported in our study may be attributed to high efficient environmental sanitation observed in Calabar, Cross River State, as well as strategies of treatment regimen for pregnant women attending antenatal clinic in Calabar. These pregnant women are given anthelminthic drugs immediately they commence their antenatal. Mordi and Ngwodo (2007) reported a value of 0.7% in all the eighteen local government areas of Edo State, Nigeria. The difference in the percentage may be due to environmental factor, life style and occupation

of the subjects, as seen in this project, which may truly expose them to infection; also personal habits like ingesting food and water with contaminated infective larvae or ova of these parasites. Moreover, the occurrence of intestinal parasite infection at high rates among pregnant women is indicative of faecal pollution of soil and domestic water supply around homes due to poor sanitation, ignorance of the mode of transmission of these worms and improper sewage disposal.

Among the intestinal parasites detected in this study, *Ascaris limbricoides* was the most predominant [29(64.44%)]. This predominance of *Ascaris lumbricoides over* other intestinal nematodes agreed with some previous reports by other authors Eguwunyenga (2004). The 64.44% prevalence value reported for *Ascaris lumbricoides* in our study was however low compared with what was reported in other areas by different authors. Eguwunyenga (2004) reported a prevalence of 55.0% in Eku Delta State. Odikamnoro and Ikeh reported a prevalence of 51.5% among the Kpiri-kpiri community of Abakiliki of Ebony State (Odikamnoro & Ikeh, 2004). Also, the 64.44% prevalence value reported of *Ascaris lumbricoides* in our study was however higher when compared with what was obtained in other areas by different workers. Shitta & Akogun (2004) reported a prevalence of 48.0% among the nomadic Fulanis of Northern Nigeria. Obiamiwe and Nmorsi (1990) also reported a value of 46.7% in the defunct Bendel State of Nigeria. It is also higher when compared with the prevalence value of 30.0% reported by Mordi and Ngwodo (2007) in a similar study. However, our value is significantly higher than what was reported by Omudu *et al.,* 2004, who reported a prevalence of 1.8% in Markurdi, Benue State. Ramos *et al.,* 2005 reported a value of 0.7% in another rural community in Mexico. The presence of helminth in the stool is of great public health concern. The high prevalence of *Ascaris lumbricoides* reported in this study may be due to faecal pollution of the soil/environment of the patients whose stool samples were used for this study. Soil pollution is thus a major factor in the epidemiology of human ascariasis. Infection with *Ascaris lumbricoides* could also be spread through eggs, which are swallowed as a result of ingestion of contaminated soil or contact between the mouth and the various objects carrying the adherent eggs. Contamination of food or drink by dust or handling is another source of infection (Usip and Ita, 2017).

Ancyclostoma duodenale was the second most common parasite species identified in the study. The prevalence value was 13.3%. This value is low when compared with the value from other studies in various parts of the country both now and in the past. Egwunyega *et al.,* (2004) reported infection rate of 22.5% at Eku in Delta State of Nigeria. Nwosu & Anosike, 2004 reported 25.8% in Aba, Abia State, Nigeria. Hookworm infections occur by skin penetration of the L3 stage infective larvae. Poor sanitary disposal of human faeces and indiscriminate defecation are the principal factors in the etiology of hookworm infections. However, the high prevalence of intestinal nematode recorded in this study indicates high level of unhygienic practices among some group of occupation which enhanced transmission in the communities.

In the study *T. trichiura* had a prevalence value of 6.67%. This value is quite low when compared with 20.8% prevalence reported by Egwuyenga *et al.,* (2004) in Eku, Delta State of Nigeria. Obiamiwe and Nmorsi (1990) 77.6%. The but lower when compared with other studies; Brooker, *et al*., (2008) reported a prevalence of 1.7 % in Nigeria while Baidoo *et al.,* (2010) reported a prevalence of 0.9 % in Ghana.

The prevalence of *Entamoeba histolytica* (11.11%) reported in this study was however higher than the report by Usip and Ita (2017) who reported 6.16% prevalence of *Entamoeba histolytica* among 1055 primary school children in Calabar South, Cross River State, Nigeria.

The prevalence value for *S. stercoralis* (4.44%) however, is close to the values recorded in the past in the country. Recently other workers reported varying values from various parts of the country. Mordi and Ngwodo (2007) reported a value of 1.0%. Egwuyenga *et al.,* (2004) reported a prevalence value of 0.2%. Obiamiwe and Nmorsi (1990) reported a value of 1.8% while Nwosu *et al., (*2004) reported 0.4%. However, the 4.44% prevalence value reported for *S. stercoralis* in this study is very much lower compared to what had been reported in other parts of the country. Anosike (2005) reported a value of 6.0% while Shitta and Akogun, (2004) reported a value of 25.3% among the nomadic Fulani in Adamawa State, Nigeria. This helminth generally has low prevalence as observed in most studies. The reason for low prevalence may not be unconnected with its vulnerability to adverse environmental conditions hence its alternate mode of infection, auto-infection. This parasite was found in 2 samples collected in Calabar, Cross River State, Nigeria. However, based on WHO, (1999) classification, the intensity of intestinal nematode infection in this study was moderate.

In this study, it has been successfully revealed that the prevalence of intestinal parasite is high among those using pit system (64.44%). This agrees with the study by Amuta *et al*., (2008) which showed that highest infection rate was in those using pit latrine (66.20%) among women in Makurdi, Benue state, Nigeria. The highest value reported among those using pit system in this study could be due to poor hygienic maintenance of the toilet; this can promote the transmission of these intestinal parasites through domestic animal or flies.

RECOMENDATION

Findings from this study thus support the need for the establishment of more health programmes for the control of the gastro-intestinal parasites in the community. For this reason, measures should be adopted to monitor, control or prevent this tendency of parasites and/or their eggs/cysts from invasion of the body system. The obvious preventive measures would include: the improvement of general standards of sanitation through the installation of suitable sewage treatment and disposal facilities, and provision of pipe-borne water supply as pre-requisites for successful prevention and control. In terms of implementing control, the WHO should urge member states to ensure access to good quality anthelminthic drugs at all levels of the health care system in endemic areas. The health authorities should continue to be incorporated in their control programs aspects of health education, antiprotozoa drugs and control of natural water sources.

Provision of prophylactics, prevention, treatment and control of parasitic infections amongst people in this part of Nigeria is necessary. Health education in local languages should be vigorously mounted to highlight the principles of basic personal or community parasitic diseases in Nigeria hygiene, vis-à-vis the life cycle, mode of transmission (vector), as well as possible preventive measures of some of the prevalent parasitic infections in the area. There should be toilet facilities to discourage indiscriminate defecation and urination in public places. Social amenities in form of recreation centres, amusement parks, schools, and commercial establishments should be provided with toilet facilities and water to improve the quality of life for the people. There should be good drinking water, drugs, and diagnostic facilities in the hospitals for the diagnosis and treatment of infected individuals. However, further studies should therefore be advocated.

CONCLUSION

The study also provides data for understanding the epidemiological status of the gastrointestinal parasites in Calabar. The information on the age, occupational and toilet facilities distribution of these parasites is very useful in the control strategy. In response to prevalence and incidences of gastro-intestinal parasites, the current deworming programme which is headed by some agencies and NGOs should be cost effective and use of potent but safe anti-helminthic drugs should be encouraged the more in Calabar.

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