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DISTRIBUTION PATTERN OF INTESTINAL PARASITIC INFECTIONS IN ANAMBRA STATE

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Abstract

Intestinal parasitic infections are among the most prevalent human parasitic infections worldwide and constitute a global health burden causing clinical morbidity and mortality. This study determined the distribution pattern and association of intestinal parasitic infections in Anambra State. Faecal specimens were examined using direct smear technique, formol ether concentration technique and Kato-katz technique. Of a total of 2,428 faecal specimens examined, 776(31.96%) were positive for intestinal parasites infections. Chukwuemeka Odimegwu Ojukwu University Teaching Hospital (COOUTH) Awka recorded the highest prevalence 34.08% of intestinal parasitic infections, followed by Nnamdi Azikiwe University Teaching Hospital (NAUTH) 31.00% whereas General Hospital Onitsha (GHO) recorded the least prevalence of 28.93%. The difference in the rate in the rate of infections was not statistically significant (P>0.05; P=0.246). Seven species of parasite were recorded in the study; *Entamoeba histolytica* 27.06% was the most prevalent, while *Giardia lambia*, 9.28% was the least. Others were *Ascaris lumbricoides* 24.23%, Hookworm 9.79%, *Strongyloides stercoralis* 5.41%, *Taenia spp* 10.44% and *Trichuris trichiura* 13.79%. The difference in prevalence of intestinal parasite species was statistically significant (P>0.05; P=0.000). Since intestinal parasitic infection is prevalent in the area, mass deworming is recommended. Public health education on the risk factors of the parasite infection should be conducted to help curtail the spread of the infections. Government and other non-governmental in healthcare should fund treatment and surgeries for haemorrhoid, to help ease the financial burden on people suffering the disease in the area.

Keywords: Intestinal parasitic infections. *Entamoeba histolytica. Giardia lambia. Ascaris lumbricoides*, Hookworm, *Strongyloides stercoralis*, *Taenia spp*, *Trichuris trichiura.*

INTRODUCTION

Intestinal parasitic infection has become a global health problem and still highly prevalent in the tropical region. Intestinal parasites are an organism that lives in or on and takes its nourishment from other organisms. Helminth infections form the most important group of intestinal worms affecting two billion people worldwide, causing considerable morbidity and suffering, though largely preventable. The common parasite causing Intestinal infection can be protozoa or helminthes (Tadesse, 2005). Among helminthic parasites, *Ascaris lumbricoides*, *Trichuris trichuria*, and hookworm are the most prevalent and affect about one-sixth of the world population (Stephenson *et al.,* 1990).

Globally, an estimated 438.9 million people were infected with hookworm, 819.0 million with *A. lumbricoides* and 464.6 million with *T. trichiura* infections in year 2010 (Pullan *et al.*, 2014). More than 100 million people are infected with *S. stercoralis* (Puthiyakunnon *et al.*, 2014). The highest prevalence occurs in areas where sanitation is inadequate and water supplies are unsafe (WHO, 2012). Infections are widely distributed in tropical and subtropical areas, with greatest numbers occurring in sub-Saharan Africa, South America, China and East Asia (Awasthi *et al.*, 2003). According to Brooker *et al.,* (2006), a total of 89.9 million African school age children are infected with one or more species of Soil Transmitted Helminths (STHs). These infections are widespread in Africa, including Nigeria (Muniz, 2008). Spatial distribution of helminth infections across the six geopolitical zones of Nigeria identified the following helminthes; *Ascaris lumbricoides,* hookworm, *T. trichiura*, *S. stercoralis, Taenia* sp, *S. mansoni, S. stercoralis, Enterobius vermicularis* and *Hymenolopis nana* (Funso-Aina *et al.*, 2020).

Infections by soil-transmitted helminths (STHs) represent a major public health problem in poor and developing countries with enormous consequences on health and development of school age children. Infection is caused by the ingestion of eggs (*A. lumbricoides, T. trichiura* and *A. duodenale*), or by skin penetration of the larvae in the soil (*N. americanus* and *S. stercoralis*). In humans, adult *A. lumbricoides* parasitize the entire small intestine while adult hookworms inhabit the upper part of the small intestine (Bethony *et al.,* 2006). Adult *S. stercoralis* live in tunnels in the mucosa of the small intestine /. Adult *T. trichiura* lives in the large intestine of the human gastro-intestinal tract (Bethony *et al.,* 2006).

.In addition to helminthic parasites, protozoa parasites such as *Giardia lamblia, E. histolytica,* and *Cryptosporidium* infections are very common in developing countries including Nigeria and the most dominant cause of intestinal morbidity in children.

The most common intestinal protozoan parasites are: *Giardia intestinalis, Entamoeba histolytica, Cyclospora cayetanenensis*, and *Cryptosporidium* spp. The diseases caused by these intestinal protozoan parasites are known as giardiasis, amoebiasis, cyclosporiasis, and cryptosporidiosis respectively, and they are associated with diarrhoea (Davis, 2002)

The main aim of this study was to determine the distribution pattern of intestinal parasitic infections among adults in Anambra state

The specific objectives of this study were to:

1. Determine the prevalence and intensity of intestinal parasitic infections in relation to hospital, gender and age.
2. Determine the prevalence and intensity of intestinal parasitic species in the study area.

METHODOLOGY

Study area

Anambra is a state in South-eastern Nigeria with boundaries formed by Delta State to the west, Imo State to the south, Enugu State to the east and Kogi State to the north. Its name was inspired by the term Omambala, the Igbo name of the Anambra River which flows through the area and is a tributary of the River Niger. The state lies between latitude 5˚ 42′ N and 6˚ 47′N and longitude 6˚ 37′ E and 7˚ 23′ E. The capital and seat of government are Awka. Onitsha, a historic port city from pre-colonial times, has developed as by far the largest urban area in the state followed by Nnewi. The indigenous ethnic group in Anambra state are the Igbo (98% of population) and a small population of Igala (2% of the population) who live in the western part of the state. Anambra state is composed of 21 Local Government Areas and 181 towns categorized into three senatorial zones (North, Central and South).With a population of 4,182,032 million people (NPC, 2007), spread over a land mass of 44,116 km^2. Anambra State is the most densely populated state in the southeastern part of the country. Anambra is the eighth-most populated state in the Federal Republic of Nigeria and the second-most densely populated state in Nigeria with the lowest poverty rate in Nigeria. Anambra is rich in natural gas, crude oil, bauxite, ceramics and almost 100 percent arable soil. Most of its natural resources remain largely untapped. Anambra state has many other resources in terms of agro-based activities such as fisheries and farming, as well as land cultivated for pasturing and animal husbandry. The people are very industrious, and most of the industrial base of the state is private sector driven, spanning from agro-allied, automobile and manufacturing situated mostly in the Nnewi insustrial belt. Onitsha market is reputed to be the biggest in West Africa. The stretch of more than 45 km between the towns of Oba and Amorka contains a cluster of numerous thickly populated villages and small towns, giving the area an estimated average density of 1,500–2,000 persons per square kilometer.

Sample and sampling technique

A total of 2428 people were randomly selected from each senatorial zone. Age groups 18 - 60 were recruited.

Collection and examination of faecal samples

A day before the collection of faecal samples, a labelled, wide-mouth transparent sterile specimen container was given to each participant. An applicator stick and a clean plain paper

were also given. The faecal samples were microscopically examined using direct smear technique (wet mount), formol ether concentration technique and Kato-Katz Technique.

Determination of intestinal parasites in faecal samples;

Direct smear technique (Wet mount)

The direct smear technique (wet mount) as described by Chessbrough (2000) was employed. A wet saline smear was prepared by placing a drop of saline on the centre of the slide. An applicator stick was used to pick up a small portion of the faecal sample (size of a match head) from the specimen container, and mixed with the drop of saline. A thin smooth preparation was made. The emulsified sample on the slide was covered with cover slip, pressed gently to avoid the formation of air bubbles and examined with a binocular microscope for helminth eggs and larvae and protozoan cysts. Identification of parasites was done using keys described by Chessbrough (2000).

Formol ether concentration technique

The formol ether concentration technique as described by WHO (1991) was employed. With an applicator stick, 1g of faecal sample was emulsified in 10mL of 10% formalin in a tube until a slightly cloudy suspension is formed. A gauze filter was fitted into a funnel and the funnel was placed on top of the centrifuge tube. The faecal suspension was passed through the filter into the centrifuge tube until the 7ml mark is reached. The filter was removed and discarded with the lumpy residue. Four (4) ml of ether was added and mixed well for a minute. The suspension was centrifuged at 1000g for a minute. The faecal debris was loosened with an applicator stick and the supernatant poured away by quickly inverting the tube. The tube was replaced in its rack and the fluid on the sides of the tube was allowed to drain down to the sediment. It was well mixed and a drop placed on a slide and then covered with coverslip for examination under a binocular microscope. The eggs and larvae of soil-transmitted helminths were identified using keys described by Chessbrough (2000).

Kato-katz technique:

The faeces were pressed through a mesh screen to remove large particles. A portion of the sieved sample was then transferred to the hole of a template on a slide. After filling the hole, the template was removed and the remaining samples were covered with a piece of cellophane soaked in glycerol. The eggs were then counted and the number calculated per gram of faeces (Cheesbrough, 2009).

Analysis of results

Data obtained were presented in tables and analyzed statistically using Statistical Package for Social Sciences (SPSS) version 25.0. A p-value less than 5% was declared statistically significant.

RESULTS

Prevalence and Intensity of intestinal Parasitic Infections in Relation to Hospital, Gender and Age

Of a total of 2,428 fecal specimens examined, 776 (31.96%) were positive for intestinal parasitic infections. The highest prevalence, 332 (34.08%) was recorded at Chukwuemeka Odumegwu Ojukwu University Teaching Hospital (COOUTH), while the least 92(28.93%) was recorded at General Hospital Onitsha (GHO) (Table 1). Of the total number examined, 765 (98.58%) had light infections, while 11 (1.42%) had moderate infections. None of the study participants had heavy infection. Highest light and moderate infection were recorded at Nnamdi Azikiwe University Teaching Hospital (NAUTH), 348 (98.86%) and GHO, 3 (3.26%) respectively, while least light and moderate infections were recorded at GHO 89 (96.74) and COOUTH 4 (1.20%) respectively. The difference in prevalence and intensity of infections was not statistically significant (P>0.05; P=0.246).

Table 1: Prevalence and Intensity of Intestinal parasitic infection among the study participants in relation to hospitals

Hospitals	Total Number Examined	Number Positive with Intestinal Parasitic Infections (%)	Intensity (%)		
			Light (1-1999 EPG)	Moderate (2000-3999 EPG)	Heavy (>4000 EPG)
COOUTH	974	332 (34.08)	328 (98.80)	4 (1.20)	0 (0.0)
NAUTH	1136	352 (31.0)	348 (98.86)	4 (1.14)	0 (0.0)
GHO	318	92 (28.93)	89 (96.74)	3 (3.26)	0 (0.0)
Total	**2428**	**776 (31.96)**	**765 (98.58)**	**11 (1.42)**	**0 (0.0)**

*EPG=eggs per gram of faeces based on Kato-Katz thick smear examination

Table .2 showed the prevalence of intestinal parasitic infection in relation to gender. The males recorded higher prevalence 422 (32.31%), than the females, 354 (31.55%). Light infection was highest in Male 417 (98.82%), but least in females, 348 (98.31%). On the other hand, the females recorded higher prevalence of moderate infections, 6 (1.69%), than the males, 5 (1.18%). The difference in the prevalence and intensity of infection in relation to gender was not statistically significant (P>0.05; P=0.056).

Table 2: Prevalence and Intensity of Intestinal parasitic infection among the study participants in relation to gender

Gender	Total Number Examined	Number Positive with Intestinal Parasitic Infections (%)	Intensity (%)		
			Light (1-1999 EPG)	Moderate (2000-3999 EPG)	Heavy (>4000 EPG)
Male	1306	422 (32.31)	417 (98.82)	5 (1.18)	0 (0.0)
Female	1122	354 (31.55)	348 (98.31)	6 (1.69)	0 (0.0)
Total	**2428**	**776 (31.96)**	**765 (98.58)**	**11 (1.42)**	**0 (0.0)**

In age groups, the highest prevalence of intestinal parasitic infection 164(42.49%) was recorded in age group 23-27years, whereas the least was recorded in age group >38years (Table 3). For Light infections were highest (100%) in age groups 28-32years, 33-37years and >38years, while the lowest light infections were recorded in 18-22years. Moderate infections were recorded only in the age groups 18-22years, 8 (4.40%) and 23-27years, 3 (4.40%). The difference in prevalence and intensity of infection in relation to age was not statistically significant (P>0.05; P=0.982).

Table 3: Prevalence and Intensity of Intestinal parasitic infection among the study participants in relation to age

Age (in Years)	Total Number Examined	Number Positive with Intestinal Parasitic Infections (%)	Intensity (%)		
			Light (1-1999 EPG)	Moderate (2000-3999 EPG)	Heavy (>4000 EPG)
18-22	492	182 (37.0)	174 (95.60)	8 (4.40)	0 (0.0)
23-27	386	164 (42.49)	161 (98.17)	3 (1.83)	0 (0.0)
28-32	468	156 (33.33)	156 (100.0)	0 (0.0)	0 (0.0)
33-37	486	142 (29.22)	142 (100.0)	0 (0.0)	0 (0.0)
>38	596	132 (22.15)	132 (100.0)	0 (0.0)	0 (0.0)
Total	**2428**	**776 (31.96)**	**765 (98.58)**	**11 (1.42)**	**0 (0.0)**

DISCUSSION

In this study, a total of 2,428 were examined for intestinal helminths. The study recorded an overall intestinal parasitic infection prevalence of 31.96%. The highest intestinal parasites prevalence 34.08% was recorded at COOUTH, while the least 28.93% were recorded at GHO. The overall prevalence recorded in this study is higher than 18.5% recorded in Calabar (Usang *et al.*, 2020) and 23.95% reported in Bayelsa (Gbonhinbor, 2022). It was also higher than 14.3% reported in Kano (Kumurya, 2021). Younes *et al.*, (2021) reported 11.7% prevalence among workers in Qatar. But in contrast, the result of this study is lower than 43.0% recorded in Imo State (Kamalu *et al*., 2013), and 34.2% recorded in another study in Northwest Ethiopia (Gelaw *et al*. 2013). Concerning variations in prevalence in different study locations, Gupta *et al*. (2020) noted that prevalence of intestinal parasitic infections in different areas is determined by multiple factors of our living society. Availability of basic amenities has been reported as a contributing factor (Nzeukwu *et al.,* 2024). Others may include personal hygiene, environmental conditions and demographic factors amongst others.

CONCLUSION

This study has revealed that there is a high prevalence of intestinal parasites infection in Anambra state.

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