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Prevalence of Intestinal parasitic protozoan and helminth infections in Aguluzigbo rural community, Anaocha L.G.A Anambra State, Nigeria

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ABSTRACT

This study investigated the prevalence of helminth and protozoan infections in Aguluzigbo town, Anambra State, Nigeria, between July 2023 and June 2024. A total of 400 fecal samples were examined using direct wet mount and formol ether concentration techniques. The results showed that 161 (40.25%) samples were positive for gastrointestinal parasites, with 109 (27.25%) cases of helminth infections and 52 (13.00%) cases of protozoan infections. *Ascaris lumbricoides, Entamoeba histolytica,* Hookworm, *Gardia lamblia, Trichuris trichiura* , *Strongyloides stercoralis* and *Isospora belli* were encountered in the studied samples *Ascaris lumbricoides* was the most prevalent parasite, with a prevalence rate of 18.25%. The prevalence rates for females (43.23%) and males (38.61%) did not differ significantly (P>0.05). Similarly, the prevalence rates among different age groups and villages did not differ significantly (P>0.05). The study highlights the need for regular sanitary and environmental hygiene checks to control parasitic infections in the community. The findings of this study can inform public health interventions aimed at reducing the burden of gastrointestinal parasitic infections in the study area. Overall, the study provides valuable insights into the prevalence of gastrointestinal parasites in Aguluzigbo town, and the results can be used to develop targeted interventions to improve public health.

Key words: Gastrointestinal, Infections, Sanitary, Hygiene

INTRODUCTION

Throughout history, human have been infected by parasite from single cell protozoa to large worms living in the gastrointestinal tract. Intestinal parasites are one of the main health problems in developing countries, and3.5 billion people around the world are affected, including 450 million believed to be infected by these infections (WHO, 2017). School kids bring the heaviest burden of the associated morbidity (Nematian, *et al.,* 2004), due to their dirty conduct of playing or dealing with of infested soils, eating with soiled palms, unhygienic rest room practices, ingesting and consuming of contaminated water and food (Nwosu, 1981).It's been envisioned that *Ascaris lumbricoides*, Hookworm and *Trichuris trichiura* infect 1,450 million, 1300 million and 1,050 million humans international, respectively, whilst Schistosomiasis influences over 200 million humans (WHO, 2002). Globally, two billion people had been infected with intestinal parasites; out of those majorities had been youngsters because of malnutrition (WHO, 2002). Particularly in Sub-Saharan Africa, it was stipulated that parasitic infections were the major public health problem. These parasitic infections cause thousands of unnecessary deaths every year and are one of the most common infectious diseases in the world. People of all ages are affected by parasitic infections but children are the most affected. In Nigeria, gastrointestinal parasitic infections persist due to low standards of living, poor environmental hygiene, ignorance of simple health-promoting behaviours, lack of drinking water, overpopulation, proximity to animals and social and cultural practices related to food supply and consumption (Sufiyan *et al.,* 2011). Parasite transmission are by the consumption of contaminated foods and water, skin penetration and contact between individuals (Ekesiobi, 2025 Emmy-Egbe *et al., 2012*). Approximately one quarter of the world's population is at risk of getting affected by intestinal parasitic infections (IPIs) (WHO, 2016). People with Intestinal Parasitic infections are at high risk of iron deficiency, anaemia, gastrointestinal disorders and growth retardation, which adversely affect them. Ingestion of infective eggs from soil contaminated vegetables and water is the primary route of infection. Transmission also comes through municipal recycling of waste water into crop fields (Baird *et al.*, 2002). People became infected with *Taenia solium* and *Taenia saginata* by eating under cooked meat or drink

unpasteurized milk. *Giardia lamblia* and *Entamoeba histolytica* are spread by fecal contamination of drinking water and foods as well as direct contact with infected dirty hand. *Ascaris lumbricoides* can be contacted and spread by eating infected faecal contaminated food, unwashed vegetables or raw fruits. Penetration of intact skin by infective stage is a means of transmission employed by Hookworm and *Strongyloides stercoralis.* Swimming in contaminated water can also result in infestation by parasite such as Schistosoma sp. (Nematian *et al.,* 2004) In view of these, there is a need for the development of good preventive and control measures adaptable for the parasitic infections in Aguluzigbo town, Anaocha Local government Area of Anambra state. This cannot be done effectively without baseline information on the prevalence of the parasitic infections within the study area. Several works have been done on the prevalence of intestinal parasitic infection in Anambra stare Nigeria (Ekesiobi, A. O. 2025; Igbodika *et al*., 2014; Oluwaseun *et al*., 2025; Chukwubude, *et al.,* 2024; Emmy-Egbe *et al.,* 2012; Abiodun *et al.,* 2024; Igbodika, *et al.,* 2012). There is little on information on the prevalence of intestinal parasitic infections in Aguluzigbo rural community, hence this study was undertaken to determine the prevalence of intestinal parasitic protozoan and helminth parasites in Aguluzigbo rural community.

MATERIALS AND METHODS

Study population

The study population were 400 individuals of all ages randomly selected from the study area. This included 200 participants from each village.

Samples and sampling techniques

A total of 202 males and 198 females were recruited and examined using the Yaro Yamane's formular given by $n = N/1+N(e^2)$ according to Uzoagulu, (2011) where n = the minimum sample size; N = The population size; e = level of significance or limit of tolerance (0.05); 1 = unity (a constant). After a preliminary survey of the study area was carried out. Record of the villages was obtained. In the community 2 villages were randomly selected. Fecal samples were collected from 100 males and 100 females) randomly selected from the households in Iruowelle village whereas 102 males and 98 females were randomly from the households in Ifite Village. Households were selected by systematic random technique according to Asika, (1991).

Sample collection periods

The study was carried out between the months of July 2023 and June, 2024. Samples when collected were taken to a private laboratory for parasitological examinations.

Faecal collection

The individuals were instructed on how to collect the fecal. Samples were labeled appropriately and then transported to the Laboratory parasitological examinations. Oral interview and Structured questionnaire were administered to each individual respondent.

Stool samples were collected into wide mouthed grease free and clean specimen containers and taken to the laboratory.

Parasitological techniques

Methods described by Cheesbrough (2000) and WHO (1991) were used for fecal processing, analysis, examination and identification of parasites.

Macroscopic examination

All fecal specimens were examined macroscopically for appearance, consistency, colour, and presence of mucus, blood, adult worms, or segment.

Microscopic examination

Direct stool smear

A drop of physiological saline was placed on one end of the grease free clean glass slide and a drop of iodine on the other end. Using an applicator stick, a small amount of the fecal sample was collected from different sides and mixed with the saline and the iodine drop separately. This was covered with cover slip and examined under the microscope for larvae, eggs, cysts. The results obtained was recorded.

Concentration technique

Formol ether concentration technique as described by Cheesbrough (2000) was used. Using a rod or stick about 1g of fecal specimen was emulsified in 4ml of 10% formol water contained in screw cap bottle or tube. A further 3-4ml of the formol water was added and mixed well by shaking. The emulsified fecal sample was sieved into a beaker. The fecal suspension was transferred into a centrifuge tube and 3-4ml of ethyl acetate added and was mixed very well.

It was centrifuged at 750-1000g for I minute.

Using a stick, the layer of faecal debris from the side of the tube was loosen and inverted to discard the ether, faecal debris and formol water such that the sediment remained in the tube.

The bottom of the tube was tapped to resuspend and mixed with the sediment.

The sediment was transferred to a slide and covered with a cover slip.

This was examined microscopically using 10x and 40x objective lens.

Ethical considerations

Letter of introduction was secured from the department of Biological sciences Anambra state university. Approval was sought from the transition committee chairman of the selected LGAs and from the Igwe and the President general of selected the towns. Verbal and written informed consent were sought from all recruited individuals/respondents. Those people positive for gastrointestinal helminth and protozoan parasites were assisted in the procurement of anti-helminthic drugs.

Statistical analysis

The results were recorded, represented in tables and Figures and prevalence were calculated. Data obtained were analyzed using statistical package for the social sciences-SPSS software version 2.0. Chi-square (χ^2) test and one way ANOVA was used to determine if there is any statistical significant difference between prevalence of parasites in relation to the sex and the age of the individuals. Level of significance was set at 95% confidence interval, $p<0.05$ was considered statistically significant

RESULTS

The prevalence of intestinal parasitic infection in relation to age, sex and village in Aguluzigbo town, Anaocha L.G.A Anambra state is shown in Table 1, A total number of 400 samples were examined and 161(40.25%) were positive for helminth parasites 109(27.25%) and protozoa parasites 52(13.00%). Ascaris lumbricoides recorded the highest prevalence of 73(18.25%) followed by E. histolytic 41(10.25%). Both parasite maintained high prevalence in both Iruowelle and Ifite villages. The difference in the abundance of parasites recorded was significant ($P<0.05$). Age group 1-10 years recorded highest prevalences in Iruowelle village 23(54.76%) and Ifite villages 22(48.89%). The disparity in infection rate in relation to age group was significant ($P<0.05$). The females maintained higher prevalences in Iruowelle village 40(40.00%), Ifite village 43(43.88%) and overall 83(43.33%) than the males 36 (36.00%), 42(41.18%) and 78(38.61%) respectively. the difference in the infection between sexes was not significant than Iruowelle village, 76(38.00%). both villages did not differ significantly in the infection rate ($P>0.05$).

Table 1: Prevalence of intestinal parasitic infections in relation to sex, age and village in Aguluzigbo Anaocha LG.A.

Age group (years	Number examined			Number Positive			Number positive (%) IRUOWELLE VILLAGE									
							Helminthes						Protozoa				Total
	Males	Females	Total	Males	Females	Total	AS	HW	TR	ST	T	Sub total	EA	GL	IB	Sub total	
1 – 10	22	20	42	10(45.45)	13(65.00)	23(54.76)	10(23.81)	4(9.52)	0	0	0	14(33.33)	7(16.67)	2(4.76)	0	9(21.43)	23(54.76)
11 – 20	28	28	56	9(32.14)	7(25.00)	16(28,57)	8(14.29)	2(3.57)	1(1.79)	0	0	11(19.64)	4(7.14)	1(1.79)	0	5(8.93)	16(28.57)
21 – 30	22	25	47	9(40.91)	8(36.36)	17(36.17)	9(19.15)	2(4.26)	0	0	0	11(23.04)	5(10.64)	1(2.13)	0	6(12.77)	17(36.17)
31 – 40	20	20	40	7(35.0)	8(20.00)	15(37.50)	7(17.15)	1(2.50)	1(2.50)	1(2.50)	0	10(25.00)	3(7.50	1(2.50)	1(2.50)	5(12.50)	15(37.50)
> 40	8	7	15	1(12.50)	4(26.67)	5(33.33)	3(20.00)	0	0	0	0	3(20.00)	2(13.33)	0	0	2(13.33)	5(33.33)
Total	100	100	200	36(36.00)	40(40.00)	76(38.00)	37(18.50)	9(4.50)	2(1.00)	1(0.50)	0	49(24.50)	21(10.50)	5(2/50)	1(0.50)	27(13.50)	76(38.00)
Age group	Number examined			Number Positive			Number Positive (%) IFITE VILLAGE										
							Helminthes						Protozoa				Total

(years	Males	Females	Total	Males	Females	Total	AS	HW	TR	ST	T	Sub total	EA	GL	IB	Sub total	
1 – 10	24	21	45	10(41.67)	12(57.14)	22(48.89)	9(20.00)	4(8.89)	1(2.22)	0	0	14(31.11)	7(15.56)	1(2.22)	0	8(17.78)	22(48.89)
11 – 20	27	26	53	12(44.44)	11(42.31)	23(43.40)	10(18.87)	5(9.43)	1(1.89)	1(1.89)	0	17(32.08)	4(7.55)	1(1.89)	1(1.89)	6(11.32)	23(43.40)
21 – 30	22	24	46	9(40.91)	10(41.67)	19(41.30)	6(13.04)	4(8.70)	0	1(2.17)	2(4.35)	13(28.26)	5(10.87)	1(2.17	0	6(13.04)	19(41.30)
31 – 40	20	21	41	10(50.00)	7(33.33)	17(41.46)	7(17.07)	3(7.32)	2(4.88)	0	0	12(29.27)	4(9.76)	1(2.44)	0	5(12.20)	17(41.46)
> 40	9	6	15	1(11.11)	3(50.00)	4(26.67)	4(26.67)	0	0	0	0	4(26.67)	0	0	0	0	4(26.67)
Total	102	98	200	42(41.18)	43(43.88)	85(42.50)	36(18.00)	16(8.00)	4(2.00)	2(1.00)	2(1.00)	60(30.00)	20(10.00)	4(2.00)	1(0.50)	25(12.50)	85(42.50)
Grand Total	202	192	400	78(38.61)	83(43.23)	161(40.25)	73(18.25)	25(6.25)	6(1.50)	3(0.75)	2(0.50)	109(27.25)	41(10.25)	9(2.25)	2(0.50)	52(13.00)	161(40.25)

DISCUSSION

Intestinal parasitic infections remain an important cause of morbidity and sometimes mortality in developing countries. A growing body of evidence obtained through epidemiological surveys suggests that intestinal parasitic infections are associated with household environment and sanitation (Mahfouz *et al*., 1997). This study assessed the prevalence of gastrointestinal parasitic infection Aguluzigbo Town Anaocha Local government area, Anambra state. The results of this study revealed that gastrointestinal parasitic infections are still a public health problem in Anambra State. The overall prevalence of 40.25% recorded in this study is a pointer to the fact that intestinal parasitic infections have not drastically reduced in some parts of Anambra state. This prevalence is comparably lower than the 31.76% reported by Chikwubude *et al*., (2024) in Anambra state; 23.95% reported in Bayelsa by Gbonhinbor, (2022); 18.31% Oluwaseun and Ekesobi (2024) in Anambra state; 43.0% recorded in Imo state by Kamalu *et al*. (2013) 34.2% recorded in north-west-Ethiopia (Gelaw *et al* .(2013); 35.2%by Aribodor *et al* ., (2025) and higher than 63.16% recorded by Arumba *et al* (2016) in Anambra state; 57.2% by Alo *et al* ., (2013) Ebonyi state; 52.5% by Odo *et al*., (2016) in Enugu state; 75.7% in Abia state by Nwosu and Onyeabor (2014); 69.6% in Ogun state by Idowu *et al*., (2022); 72%reported by Igbodika *et al* (2014).

These variation in prevalence could be attributed to differences in geographical settings, sanitary facilities and practices, hygiene practices and access to safe water as observed by Dambie *et al*., (2021); Gupta *et al*., (2013); Nzeukwu *et al*., (2024).

Eight parasites species were identified in this study. Eight parasites species were identified in this study. This included five (5) heminths parasites and three (3) protozoan parasites included *Ascaris lumbricoides* 18.25%; *Entamoeba histolytic* 10.50%; Hookworm

6.25%; *Gardia lamblia* 2,50%, *Trichuyris trichuiura* 1.50%; *Strongloides stercoralis,* 0.75%; *Taenia and Isospora belli* 0.50%. These species significantly differed from one another (P<0.05) in their prevalences. The ages overalls prevalences varied significantly among the age groups (P<0.05) whereas the sexes did not significantly vary within the and across the villages examined (P>0.05). The result of this study agrees with that by Chukwubude *et al*., (2024) Idowu *et al*., (2022); Udensi *et al*., (2015); Ihejirika *et al*., (2023). These parasites transmit favourably where poor fecal disposal and open defecation as well poor hygiene status are major contributory factors. Flies particularly house flies, are capable of mechanically transmitting the infections due to the behavior and association with man and his food including fruits and vegetables. This is a very important epidemiological factor because the egg of *Ascaris lumbricoides, Trichuris trichiura,* the cysts of *Entamoeboa histolytical* and that *Gardia lamblia* can easily be spread by house flies from fecal materials openly deposited on soil. The present study corroborates with previous studies that recorded no significant difference in the infection rate between sexes implying that intestinal parasitic infections are not sex dependent. These previous studies include Balarak *et al*., (2016), Oluwaseun and Ekesiobi (2024); Igbodika *et al* (2014), Ekesiobi (2025),, Emmy-Egbe *et al., (*2012); Emmy-Egbe, I.O. (2007); Emmy-Egbe, I.O., (2013).

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