Prevalence of Gastrointestinal Parasites Among Secondary School Students in Nanka Orumba North L.G.A, Anambra State

ABSTRACT

Intestinal parasites infections are among the most prevalent infections in developing countries carrying high burden of morbidity and mortality especially among young people living in the tropical and subtropical regions with poor sanitation and substandard living conditions. This study was to determine the prevalence of the intestinal parasites based on the locality, age, sex and risk factors among secondary school students in Nanka, Anambra state Nigeria. Fresh faecal specimens were examined using direct saline and iodine and formal-ether techniques to detect the presence of intestinal parasites. The data obtained were analysed using SPSS version 25. Of the 454 faecal specimens examined, (n=66; 14.5%) were positive with *Ascaris lumbricoides* (n=29; 43.94%) being the predominant species, followed by hookworm (n=19; 28.79%) while cysts of *E. histolytica* (n=18; 27.27%) was the least. The younger age group, 9-11 years (n=23; 19.0%) had the highest infection. Males (n=30; 15.2%) were more infected than the females (n=36; 14.1%), although the result was not statistically significant (P>0.05). The risk factors including parents' occupation, sources of drinking water in schools and homes as well as toilet facilities used by students at home were assessed which indicated that students who use stream (n=30; 19.1%), defaecate in the bush (n=6; 37.5%) and whose parents are farmers (n=33; 16.3%) were infected more than their counterparts. Most of these worms found in this area can cause impaired nutrition, stunted growth, school absenteeism and loss of blood on the children. Students need to be enlightened on important preventive measures such as proper hygiene and sanitation, also there is a need to include the secondary school students in the deworming exercise.

Keywords: Prevalence, soil-transmitted, parasites, infection, *Ascaris, lumbricoides*

INTRODUCTION

Intestinal parasitic infections (IPIs) are infections caused by pathogenic helminths and protozoa species. They are among the most common infectious disease affecting the poorest, most deprived people and most communities worldwide with over 1.5 billion people or 24% of the world population reportedly infected [1]. More than 267 million preschool-age children and 568 million school-age children live in areas where these parasites are intensively transmitted [2]. Factors such as little or no access to portable water supply, inadequate sanitation, substandard living condition as well as the prevailing climatic and environmental conditions are responsible for the endemicity of intestinal parasitic infections [1, 3]. Mostly, young students and school children are reported to be most vulnerable to parasitic infections than adults because of poor hygiene, low immune status, nutritional deficiency, overcrowding, close contact with soil and with each other, lack of latrine and inadequate provision of safe water in schools [4, 5, 6].

In Nigeria, *Ascaris lumbricoides*, *Trichuris trichiura*, Hookworm, *Strongyliodes stercoralis*, *Enterobius vermicularis* and *Hymenolepis nana* (dwarf tapeworm) are among the most prevalent

intestinal parasites. However, *Entamoeba histolytica*, *Cyclospora cayetanensis*, *Cryptosporidium spp* and *Guardia lamblia* are the most common protozoan parasites [1]. These parasites are the major causes of stunted growth, impaired nutrient utilization, diminished physical fitness, impaired memory and cognition, anaemia and other physical and mental health conditions [4]. They can also cause hepatic abscess, central nervous system disorders, abdominal pain, cholangitis, obstructive jaundice, acute pancreatitis, ocular disorders, epilepsy among other symptoms [7, 8].

These parasites are transmitted through faeco-oral route in contaminated materials, food, water, formites [9] and larval skin penetration in the case of hookworm and *Strongyliodes stercoralis* [1]. Cyclorrhaphan flies especially *Musca domestica* and other non-biting flies are mechanical transmitter of parasitic infection and so contribute to the spread of diseases. They have been known to facilitate the contamination of household items and foods with cyst of parasites [10]. These parasites can be controlled through proper environmental condition, practice of good personal hygiene and also applying measures that will mitigate poor sanitation, illiteracy, poverty, impoverished health, overpopulation and poor environmental hygiene.

Nanka is a rural area that has been afflicted by gully erosion for many years. The erosion reduces lands available for agriculture, generates sediment and increases flooding; these sediments are washed into the water ways and water supplies thus exposing the residents to intestinal parasite infections. Hence, this research work is geared towards the prevalence of gastrointestinal parasites among secondary school student in Nanka Orumba North Government Area of Anambra State, Southeastern Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in Nanka, an Igbo speaking community located in Orumba-North Local Government Area, Anambra State, Nigeria. Nanka is located between latitude 6.4936° and longitude 7.4452^{o}, and lies within the humid tropical rainforest belt of Nigeria with an annual rainfall of about 180 to 300cm, average temperature ranges of about 25°C to 25.5 °C. The area experiences a typical climate with two distinct seasons: the rainy season occurring from April to October while dry season occurs November to March. The people living in the area are peasant farmers with few petty traders, civil servants and students.

Study Design

The study was a cross-sectional survey of gastrointestinal parasites among secondary school students. Four secondary schools were selected using random sampling and a total of 454 students between the ages of nine to twenty years were selected for the study.

Study population and Sample selection

The study population comprises students of four secondary schools selected from the seven villages of Nanka community namely: Community High School, New Generation College, Community Secondary School and Comprehensive Secondary School. Study participants aged 9-20 years, comprising of both genders were selected through simple random sampling, from all the classes.

Faecal specimen collection and examination for parasites

Universal specimen containers were given to students for faecal specimen collection which were retrieved the following day. The faecal specimens were examined both macroscopically and microscopically using direct saline, iodine and formal ether techniques [11].

Administration of Questionnaires

Structured pre-tested questionnaires were administered to collect socio-demographic information of the students as well as data on the risk factors such as water and toilet facilities as well as parents' occupations.

Data analysis

The data obtained were analyzed using the SPSS software version 25. Chi-square test was used to compare significant difference among variables at 95% confidence level.

RESULTS

Of 454 stool samples examined, (n=66; 14.5%) were positive. Community Secondary school had the highest prevalence (n=22; 17.9%) while New Generation College had the least (n=12; 10.0%); although the distribution of intestinal parasites within the location was not significant (P>0.05) [Table 1]. *Ascaris lumbricoides* (n=29; 43.94%) was the highest species of intestinal parasites recovered followed by hookworm (n=19; 28.79%) while cysts of *E. histolytica* (n=18; 27.27%) was the least (Table 2). Males (n=30; 15.2%) were infected more than the females (n=36; 14.1%) even though there was no significant difference in the prevalence between the males and the females (P>0.05), [Table 3]. Table 4 shows that the younger students 9-11years (n=23; 19.0%) and 12-14 years (n=19; 15.4%), were more exposed to intestinal parasitic infection than their older counterparts, although the distribution of intestinal parasites among different age groups was not statistically significant (P>0.05). The risk factors associated with prevalence of intestinal parasites in schools and at home were examined (Table 5). Students who had stream as their main source of drinking water had the highest prevalence of the intestinal parasites (n=30; 19.1%), whereas those who had borehole as source of drinking water had the least prevalence (n=14; 10.0%). Students who defaecate in the bush (n=6; 37.5%) were infected more than others who use pit latrine (n=21; 11.7%) and water system (n=29; 15.1%). Students whose parents were farmers had the highest prevalence (n=33; 16.3%), followed by students of civil servants (n=9; 14.5%) and traders (n=24; 12.6%).

Table 1: **Overall prevalence of intestinal parasites among the students in the study area**

S/N	Name of schools	Number examined	Number infected	% Prevalence
1	Community high school Agiligba Nanka	110	16	14.5
2	New Generation College Nanka	120	12	10.0
3	Community Secondary School Enugwu Nanka	123	22	17.9
4	Comprehensive Secondary School Ifite Nanka	101	16	15.8
	Total	454	66	14.5

P>0.05, P=0.748.

Table 2: Species of intestinal parasites found among students in the Secondary Schools examined in Nanka.

Schools	Number examined	Number infected (%)	*Ascaris lumbricoides* (%)	Hookworm (%)	Cyst of *E. histolytica* (%)
Community high school Agiligba Nanka	110	16(14.5)	6(37.5)	6(37.5)	4(25.0)
New Generation College Nanka	120	12(10.0)	6(50.0)	4(33.3)	2(16.7)
Community Secondary School Enugwu Nanka	123	22(17.9)	10(45.5)	5(22.7)	7(31.8)
Comprehensive Secondary School Ifite Nanka	101	16(15.8)	7(43.8)	4(25.0)	5(31.3)
Total	454	66(14.5)	29(43.94)	19(28.79)	18(27.27)

Table 3: Prevalence of intestinal parasites in relation to sex of the students in the selected schools

Sex	Number examined	Number infected	% Prevalence
Male	198	30	15.2
Female	256	36	14.1
Total	454	66	14.5

P>0.05, P=0.744

Table 4: Prevalence of intestinal parasites according to age

Age group	Number Examined	Number infected	% prevalence
9-11year	121	23	19.0
12-14years	123	19	15.4
15-17 years	115	13	11.3
18-20 years	95	11	11.6
Total	454	66	14.5

P>0.05, P=0.300

Table 5: Risk factors associated with prevalence of Intestinal parasites in schools examined

Water Source	Number Examined	Number Infected	Prevalence (%)
Borehole	139	14	10.0
Well	98	15	15.3
Stream	157	30	19.1
Sachet	60	7	13.3
Total	454	66	14.5
Toilet facilities used at home by the students examined			
Pit latrine	180	21	11.7
Water system	258	39	15.1
Bush	16	6	37.5
Total	454	66	14.5
Parents occupation			
Farmers	202	33	16.3
Traders	190	24	12.6
Civil servants	62	9	14.5
Total	454	66	14.5

P>0.05, P= 0.150; P>0.05, P=0.018; P>0.05, P= 0.582.

Discussion

The results of the present study showed that gastrointestinal parasite infections (GIPI) occur in secondary schools even though prevalence of 14.5% was moderately low compared to the results of other studies in Nigeria and beyond; 21.7% in Nimo [12]; 23.95% in southern Nigeria [13]; 27.7% in Igbariam [14]; 47.6% in Uyo, Akwaibom [15]; 51.7% in Benue state [16]; 46% in Akpo Anambra [17]; 47.2% in India [18]; 62.3% in Northwest Ethiopia [19]**.** However, another study reported 14.3% in Kano which is similar with the prevalence of the present study [20]. This shows that gastrointestinal parasites are still of public health concern. These differences could be attributed to the differences in the socioeconomic status of the people, sociodemographic distinctions, knowledge, hygiene, and sanitary facilities, weather, climate, and environmental factors that aid transmission of these parasites.

Three species of intestinal parasites namely; *A. lumbricoides*, hookworm and *E. histolytica* was recorded in the study. Intestinal helminthes, particularly *Ascaris* and hookworm are common throughout most part of Nigeria. *Ascaris* had the highest prevalence in another study in Rivers State [21]; in Dunukofia Local Government Area, Anambra State [22] and in southern Nigeria [13], but another report [20] recorded higher prevalence of hookworm instead.

Males were more infected than females even though the result was statistically significant meaning that GIPI is not sex dependent. Both sexes were equally exposed to infection. This agrees with an earlier finding in another location [4] but differs from others [19, 23] who found a higher infection rate in females than in males. It is in the nature of male students to play and run around outdoors especially in the school but females are not as active as their male counterparts.

Prevalence of intestinal parasites was higher among students of lower age group which is in line with other studies [13, 23]. This is likely to be the case since that age bracket falls among the group that just entered secondary school newly from primary school and are still trying to adapt to the

higher school environment. They may not have had much knowledge of the practice of sanitation habits as Nanka is a rural area.

The results of the risk factors showed that parental occupation, source of drinking water and toilet facilities of the students were associated with intestinal parasitic infections. A study [24] highlighted source of drinking water, toilet facilities, washing of hands after using the toilets, washing of hands before meals, the pattern of waste disposal, and washing of hands after waste disposal as risk factors in the distribution and spread intestinal parasitic infections. They further reaffirm WHO's position that safe and sufficient water, sanitation, and hygiene (WASH) play a key role in preventing numerous Neglected Tropical Diseases (NTDs).

Students whose drinking water source is stream have high prevalence of intestinal parasites. This is likely to be caused by rainfall carrying eggs of parasites from faecally contaminated surroundings via flood into the stream which is a source of drinking water and other domestic purposes for the community. Also, human activities within the stream may leave the stream contaminated as well. Furthermore, Students using bush to defaecate were infected more. This x-rays the danger of open defaecation. Open defecation and lack of sanitation and hygiene in general are important causes of various diseases. It can pollute the environment and cause health problems and diseases. High levels of open defecation are linked to high child mortality, poor nutrition, poverty, and large disparities between rich and poor [25]. These excreta can be washed by flood into streams used by households thus causing a lot of ill health such as infectious diseases, diarrhoea, typhoid and cholera, and viral infections [25].

Students whose parents were farmers had the highest prevalence. Another study recorded similar results in Hano Vietnam [26]. These students may be following their parents to the farm to help in raising the family's economic status. Farm work is associated with a variety of health problems and farmers are at a high risk for particular illnesses ranging from intestinal parasite infections and other diseases like cancers, respiratory diseases and injuries [27, 28]. Also, there is much exposure to the physical hazards of weather, terrain, fires and machinery; toxicological hazards of pesticides, fertilizers and fuels; and health insults of dust. The major challenge is that there is lack of emergency health services as majority of the farms are located in remote areas and faming has been rated as a vocation without high social status [27, 28].

Conclusion

Nanka in Orumba North Local Government Area, Anambra State has rainforest type vegetation and soil that retains moisture. These as well as adequate temperature and high humidity provides soil transmitted parasites with suitable condition to develop through their life cycle found in the soil to become infective to man. The presence of these parasites especially *Ascaris* and hookworm infection in this area of study calls for urgent attention on the part of the community, stakeholders, education authority, ministry of health and government authority. These students are the future hope of the nation and so any disease or otherwise which would disrupt their free growth and development should not be taken lightly by the agents involved.

CONSENT

Permission to conduct the study in the schools was obtained from Anambra State Universal Basic Education Board (ASUBEB); Ministry of Education (ASUBEB/AN/ADM/II/Vol.V/239).

Oral informed consents were obtained from parents and students after proper enlightenment about the study, prior to sample collection.

ETHICAL APPROVAL

Ethical approval to conduct the study was obtained from Ministry of Health, Anambra State (MH/AWKA/M/321/358).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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Details of the AI usage are given below:

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