



## **Prevalence of Gastrointestinal Helminthes in Students of Rivers State College of Health Science and Technology Port Harcourt**

**K. E. Okpara<sup>1</sup>, C. U. Nyenke<sup>1</sup>, H. O. Stanley<sup>2\*</sup> and O. M. Immanuel<sup>2</sup>**

<sup>1</sup>*Department of Medical Parasitology, School of Medical Laboratory Sciences, University of Port Harcourt Teaching Hospital, P.M.B. 5323, Port Harcourt, Rivers State, Nigeria.*

<sup>2</sup>*Department of Microbiology, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria.*

### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author KEO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors CUN and HOS managed the analyses of the study. Author OMI managed the literature searches. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/ACRI/2018/39463

#### Editor(s):

(1) Malakeh. Z. Malak, Community Health Nursing, Al-Zaytoonah University of Jordan, Jordan.

(2) Haifei Shi, Department of Biology, Physiology and Neuroscience, Miami University, USA.

#### Reviewers:

(1) N. Adekunle Oladunni, Olabisi Onabanjo University, Nigeria.

(2) Orish Verner, University of Health and Allied Sciences, Ghana.

Complete Peer review History: <http://www.sciencedomain.org/review-history/23290>

**Original Research Article**

**Received 18<sup>th</sup> November 2017**

**Accepted 15<sup>th</sup> February 2018**

**Published 23<sup>rd</sup> February 2018**

### **ABSTRACT**

This study was conducted to determine the prevalence of gastrointestinal helminthes among 347 students of Rivers State College of Health Science and Technology Port Harcourt aged 16-35 years. The study was carried out using both direct wet preparation and formal/ether concentration methods. Of the number sampled, 44 (12.7%) had various intestinal parasites with the occurrence of multiple parasitisms in some cases. The most common helminthes parasites isolated were *Ascaris lumbricoides* (40.9%); *Hookworm* (34.1%); *Trichuris trichuria* (18.2%); *Strongyloides stercoralis* (4.6%) and *Schistosoma mansoni* (2.3%). Students in the age group 16-20 had the highest infection rate (56.8%) followed by those of age group 21-26 (31.8%). Prevalence was higher in male (26.7%) than in female (8.8%) and was statistically significant ( $p < 0.05$ ). The level of co-infections was very low. The low prevalence of (12.7%) may be attributed to adequate health education, improved sanitary conditions, potable water supply, proper disposal of sewage and

\*Corresponding author: Email: [herbert.stanley@uniport.edu.ng](mailto:herbert.stanley@uniport.edu.ng);

refuse and medical services, provided by the school. Nevertheless provision of adequate drainage system, roads and more modern toilet facilities and affordable medical services would further reduce susceptibility. Likewise, observation of personal hygiene, as well as routine examination and treatment, should be encouraged.

**Keywords:** *Gastrointestinal helminthes, sanitary, students.*

## 1. INTRODUCTION

Helminth infections caused by soil-transmitted helminthes and schistosomes are among the most prevalent afflictions of humans who live in areas of poverty in the developing world [1]. They are among the major disease of public health concern worldwide and more importantly in developing countries [2]. The most helminthes are *Ascaris lumbricoides*, hookworms (*Necator americanus*, *Acyostoma deodenale*); *Trichiuris trichiura* and *strongyloides stercoralis* [3-5]. Numerous studies have shown that in Nigeria as in other developing countries, parasitic helminthes infections is more in the rural communities where open defecation and access to potable drinking water is still a challenge [6,7].

Infection with intestinal helminthes has been associated with stunting of linear growth, weakness and cognitive impairment in school children, host resistance to other disease causing agents, anaemia, intestinal malnutrition, abdominal pain, malnutrition, dysentery and fever [3-5]. The degree and severity of intestinal helminthes infections depends upon the number, size, activity and pathogenicity of the parasite and their location in the host. Poor literacy, low level of sanitation, lack of environmental awareness and absence of refuse and sewage disposal facilities, in combination with hot and humid climate conditions are factors favouring the transmission and endemicity of the parasites [8,9].

School-age children usually have the highest intensity of helminthic infection compared to any age group, and chronic infection negatively affects all aspects of children's health, nutrition, cognitive development, learning and achievement [4-6]. Intestinal parasitic infection has been severally reported as a common and important health problem among Nigerian children [6,7,10,11]. Several studies have reported high prevalence rates of intestinal parasitic infections in Nigeria. In a two years study of human intestinal parasites among patients at Jos University Teaching Hospital, Bello et al. [12] reported a prevalence rate of

27.9%. Ogbuagu et al. [13] reported a higher prevalence of intestinal parasites in a Nigerian tertiary health institution at 38.6%.

Sanitation has been reported to be the most important risk factor in the transmission of intestinal parasitic infections [14,15]. Poor uneducated people are more at risk because they are more likely to eat unwashed food, walk and play outdoors barefooted, to not wash hands before eating and after using the toilet, and leave their food uncovered [4]. Gastrointestinal parasites can live for long periods in the intestine and bowel without causing any symptoms or require treatment, which makes them often ignored. Without treatment or eradication, they remain endemic and can be transmitted to the susceptible host in the population. The prevalence rate of gastrointestinal parasitic infection among students of Rivers State College of Health Science and Technology Port Harcourt was the focus of this study.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

The study on the prevalence of gastrointestinal helminthes was carried out among students of Rivers State College of Health Science and Technology in Port Harcourt metropolis. The school is situated in Rumueme in Obio/Akpor Local Government Areas of Rivers State, Nigeria. The area has warm humid climate condition with high temperature and heavy rains distributed almost all the year round. Generally, there is a provision of some basic amenities like a clinic and student hostels with pipe-borne water and also hygienic toilet system (water closet system). But because of the student population, these amenities are far from adequate. The poor drainage system in the city and the school leads to occasional flooding after heavy rainfall.

### 2.2 Collection of Samples

Specimen bottles which were clean, dry, leak-proof, free from traces of disinfectant, wide

mouth and screw capped were given to the students. The containers were distributed a day before the collection, after educating them on the collection method. All collected containers were properly labeled. The stool samples were examined soon after collection, but those that could not be examined immediately were preserved in 10% normal saline or refrigerated at 4°C.

### 2.3 Examination of Specimens

The stool specimens were collected and examined in batches. The specimens were examined using the formal/ether concentration techniques of Cheesbrough [16] and the direct smear method with normal saline and iodine solution of Cheesbrough [17]. Each of the stool specimens was examined macroscopically and microscopically. Physical characteristics of the stool specimens were recorded in terms of colour, the presence of blood or mucus, consistency as to whether the stool is semi-formed, formed soft, loose or watery and any presence of adult segments or worm. Samples were examined microscopically using 10x and 40x objectives with a reduced condenser aperture by a medical parasitologist at the University of Port Harcourt Teaching Hospital.

### 2.4 Ethical Consideration

Informal ethical clearance was obtained from the Rivers State College of Health Science and

Technology, Port Harcourt before conducting this study. Informed consent from individual students was obtained before their enrolment.

### 2.5 Statistical Analysis

Statistical analysis was done using Statistical Package for Social Science (SPSS) version 22. Chi-square was used to determine significant differences between variables.

## 3. RESULTS

A total of 347 students were examined comprising of 75 male (21.6%) and 272 female (78.4%). The age range of the subject was 16-35 years. The result shows that 44 persons were infected. The most common human intestinal helminthes recovered in the faecal specimen of students surveyed were *Ascaris lumbricoides* 40.9%, *Hookworm* 34.1%; *Trichuris trichuria* 18.2%; *Strongyloides stercolaris* 4.5% and *Schistosoma mansoni* 2.3%. *Ascaris lumbricoides* had the highest occurrence at 40.9% (Table 1).

The gender-related infection and prevalence rate among the students is given in Table 2. The result shows greater prevalence of intestinal helminthes infection among male students (26.7%). Table 3 reveals the age-group related infection rate. The result shows that students in the lower age bracket were most affected.

**Table 1. Prevalence of intestinal helminthes in students of Rivers State College of Health Science and Technology Port Harcourt**

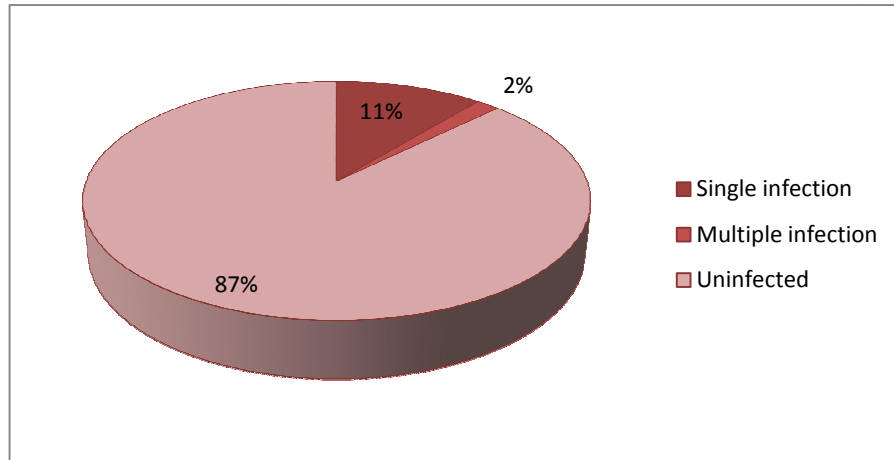
Parasite	Number infected	Percentage (%) infected
<i>Ascaris lumbricoides</i>	18	40.9(5.2)
<i>Hookworm</i>	15	34.1(4.3)
<i>Strongyloides stercolaris</i>	02	4.6(0.6)
<i>Trichuris trichuria</i>	08	18.2(2.3)
<i>Schistosoma mansoni</i>	01	2.3(0.3)
<b>Total</b>	<b>44</b>	<b>100(12.7)</b>

**Table 2. Gender-related infection among students of Rivers State College of Health Science and Technology Port Harcourt**

Gender	Total examined	Number infected	Percentage (%) infected
<b>Male</b>	75	20	45.45(26.7%)
<b>Female</b>	272	24	54.55(8.8%)
<b>Total</b>	<b>347</b>	<b>44</b>	<b>100(12.7)</b>

**Table 3. Age-related infection rate among students of Rivers State College of Health Science and Technology Port Harcourt**

Parasite\Age (years)	16-20	% infected	21-26	% infected	27-53	% infected
<i>Ascaris lumbricoides</i>	10	22.7	6	13.6	2	4.6
<i>Hookworm</i>	8	18.2	5	11.4	2	4.6
<i>Strongyloides stercoralis</i>	4	9.1	3	6.8	1	2.3
<i>Trichuris trichuria</i>	2	4.56	-	-	-	-
<i>Schistosoma mansoni</i>	1	2.3	-	-	-	-
<b>Total</b>	<b>25</b>	<b>56.8</b>	<b>14</b>	<b>31.8</b>	<b>5</b>	<b>11.4</b>

**Fig. 1. Distribution of students of Rivers State College of Health Science and Technology Port Harcourt with intestinal helminthes infection**

A review of the species of parasites per stool sample showed that about 87% were uninfected, 11% were infected with one parasite species and 2% with more than one parasites species (Fig. 1).

#### 4. DISCUSSION

The most common parasites recovered from faecal specimen of students surveyed were *Ascaris lumbricoides* and *Hookworm*. The result of this study agrees with previous reports elsewhere that *Ascaris lumbricoides* is one of the most prevalent intestinal parasites in Nigeria [3,6,12]. Most of the parasites encountered were soil transmitted helminthes and prevalence rates were correlated with level of sanitation. Globally, intestinal parasites infections are often linked to poor sanitation [18,1]. The infection rates of these parasites as shown in this study have reemphasized the claim that intestinal parasitic infections are still serious public health issue among students of tertiary school [19].

The infection rate of *Schistosoma mansoni* was the lowest. The low prevalence rate may be

attributed to the fact that majority of the students are from the hinterland and the school location is in the city capital. Hotze et al. [1] reported that maximum prevalence of schistosome infection is usually attained in adolescence or in early adulthood. This is in agreement with our findings as there was no case of schistosome infection among students older than 20 years.

The prevalence rate of intestinal parasites infections was low at 12.7%. The findings from the present study compare well with that from related studies of tertiary school students of Ambrose Alli University, Edo State where the prevalence rate was 12.5% [19]. This value is however, lower than the prevalence of 33.6% reported by Agi [20] and 48.7% by Mba and Amadi [21]. This difference was observed to be due to age variation and location of the study. The low prevalence was attributed to adequate health education (awareness), improved personal hygiene, availability of adequate sewage and refuse disposal facilities, and availability of functional medical services [8].

The prevalence of parasitic infection was more in male than female and statistically significant. It

has been reported that in as much as male and female students are equally predisposed to similar factors of infection they have an equal chance of getting infected [3,10]. Our study showed a different pattern, where prevalence was higher in the male population. This may be attributed to the difference in their lifestyle. In line with our findings, Qadeer et al. [4] reported that infections were high among the male. The age group distribution of prevalence shows high prevalence rate of 56.82% for age group 16-20. This indicated the common pattern of susceptibility to helminthic infections. Various studies have shown that younger people are more susceptible to helminthic infection than older ones. Luka et al. [22] and Nduka et al. [23] reported a similar observation in Kaduna and Abia State in which those in age group 16-20 had more Ascaris and hookworm infection than other age groups.

Multiple infections with more than one parasite were also observed in this study as in other parts of the country. This agrees with the report of Omorodion et al. [19]. Multiple infections among students in this study were very low compared to the report of high cases of multiple infections among primary school children in south-south Nigeria [24].

## 5. CONCLUSION

From the result obtained, it is satisfactory to conclude that the prevalence of intestinal helminthic infection is relatively low among the students of Rivers State College of Health Science and Technology, Port Harcourt. This was attributed to the level of environmental health awareness and compliance among the students. Nevertheless, the disease burden can be further reduced if the existing conditions earlier mentioned are improved upon, with drainage system and road maintenance to avoid the episodic flooding on campus. Provision of more modern toilet facilities in the hostel will reduce indiscriminate defecation. The medical services should be made more affordable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

- Hotze PJ, Donald APB, Brooker KBS, Drake L, de Silva N, Montresor A, Engels D, Jukes M, Chitsulo L, Chow J, Michaud RLC, Bethony J, Correa-Oliveira R, Shuhua X, Fenwick A, Savioli L. Helminth infections: Soil-transmitted helminth infections and schistosomiasis. In disease control priorities in developing countries. 2<sup>nd</sup> Ed; 2006. Available:<http://www.ncbi.nlm.nih.gov/books>
- World Health Organization (WHO). Prevention and control of international parasitic infections. World Health Organization Technical Report Series No. 749-783; 1987.
- Nduka FO, Nwaugo VO, Nwachukwu NC. Human intestinal parasite infections in Ishiagu, a lead mining area of Abia State. Animal Research International. 2006;3(3): 505-507.
- Qadeer MA, Wandaje HJ, Kunihya IZ. Gastro-intestinal parasites among individuals attending primary health care centre in Girei and Yola metropolis, Adamawa State, Nigeria. IOSR Journal of Pharmacy and Biological Sciences. 2017;12(5):16-21.
- Odo GRE, Agwu JE, Ekeh FN, Ezea CO, Aguoru GC, Anya C, Omeje KO, Ubachukwu PO. Prevalence of intestinal parasites among school children in Uzo-Uwani local government area of Enugu State. International Journal of Research Studies in Microbiology and Biotechnology (IJRSMB). 2016;2(2):7-14.
- Adeyeba OA, Akinlabi AM. Intestinal parasitic infections among school children in rural community, South Nigerian. Nigerian Journal of Parasitology. 2002;23: 11-18.
- Dada EO, Erinle BA. Study of human gastrointestinal parasites among primary school children in Ibule Soro-community of Ifedore local government area of Ondo State. Nigeria J Med Lab Sci. 2004;13(1):62-65.
- Udonsi JK. *Nector americanus* infection. A longitudinal study of an urban area in Nigeria. Annals of Tropical Medical and Parasitology. 1989;5(8):196-198.
- Huat LB, Mitra AK, Jamil N, Dam PC, Jan MHJ, Wan MWA. Prevalence and risk factors of intestinal helminth infection among rural Malay children. J Global Infect Dis. 2012;2:10-14.
- Taiwo AK, Agbolade OM. Intestinal helminthiasis among school children in

- Oru, Ogun State, Nigeria. Nig. Journal of Science. 2000;34:283-286.
11. Jombo GTA, Damen JG, Amechi I, Etukudo NS, Dabit O. Intestinal parasitosis among undernourished children of an urban settlement in West Africa: Pattern and types. International Infectious Diseases. 2011;1:1.  
(Retrieved 10<sup>th</sup> February 2014)  
Available:<http://www.emedpub.com/intestinal-parasitosis-among-undernourished-children-of-an-urban-settlement-in-west-africa/>
  12. Bello AU, Amadu UT, Michael SJ. A review study of intestinal parasites among patients in JUTH. Nigeria Journal of Medical Sciences. 1992;6:5-6.
  13. Ogbuagu CN, Eneanya CI, Chukwuma C, Ogbuagu EN, Oguoma VM. High prevalence of intestinal parasites in a Nigerian tertiary health institution. The Internet Journal of Parasitic Diseases. 2009;4(2):1-7.
  14. Rai SK, Uga SU, Ono K, Rai G, Matsumura T. Contamination of soil with helminth parasite eggs in Nepal. Southeast Asian Journal of Tropical Medicine Public Health. 2000;31:388-393.
  15. Anantaphruti MT, Waikagul J, Maipanich W, Nuamatanong S, Pubampen S. Soil-transmitted helminthiases and health behaviors among schoolchildren and community members in a west-central border area of Thailand. Southeast Asian Journal Tropical Medicine Public Health. 2004;35:260-6.
  16. Cheesbrough M. Laboratory practice in tropical countries. Part 1, Low Price Edition. 1999;404-405.
  17. Cheesbrough M. Laboratory practice in tropical countries. Part 1, Low Price Edition. 2000;402.
  18. Anderson TJ. Public health policies and disease control. West African Journal of Medicine. 1993;12(3):88-94.
  19. Omorodion OA, Isaac C, Nmorsi OPG, Ogoya EM, Agholor KN. Prevalence of intestinal parasitic infection among tertiary institution students and pregnant women in south-south, Nigeria. J. Microbiol. Biotech. Res. 2012;2(5):815-819.
  20. Agi PI. Pattern of infection of intestinal parasites in Sagbama Community in Niger Delta, Nigeria. West African Journal of Medicine. 1995;14(1):39-42.
  21. Mba IEK, Amadi AN. Helminthic infection in school children in Aba. Journal of Med. Invest. Pract. 2001;2:43-45.
  22. Luka SA, Ajoghi I, Umoh JU. Helminthiasis among primary school children in Lere Local Government Area, Kaduna, Nigeria. The Nig. Journal of Parasitology. 2000;21: 109-116.
  23. Nduka FO, Nwaugo VO, Nwachukwu NC. Human intestinal parasite infections in Ishiagu, a lead mining area of Abia State. Animal Research International. 2006;3(3): 505-507.
  24. Omorodion OA, Nmorsi OPG, Isaac C, Umukoro DO, Akhile AO. Distribution of intestinal parasites among school-age children in Delta and Edo States of Nigeria. PUJ. 2012;5(2):1-6.

© 2018 Okpara et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*  
<http://www.sciencedomain.org/review-history/23290>