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Prevalence of Gastro-Intestinal Parasitic Infection among School Children in Port Harcourt City Local Government Area, Nigeria

Emmanuel I Michael*, Austin Abah and Peace Marcus

Department of Microbiology, Institute of Science Laboratory Technology, University of Port Harcourt PMB, 5323, Choba, Rivers State, Nigeria

***Corresponding author:** Emmanuel I Michael, Department of Microbiology, Institute of Science Laboratory Technology, University of Port Harcourt PMB, 5323, Choba, Rivers State, Nigeria, E-mail: emmanuelmichael001@yahoo.com

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Abstract

Intestinal parasitic infection is a serious and continuous health issue in Nigeria due to the suboptimal nature of sanitary equipment and housing facilities. Knowing the prevalence of intestinal parasitic infection among primary school pupils is a very vital concern to develop appropriate control measure in Port Harcourt City Local Government Area of Rivers State (PHALGA). A total of 250 children were examined. A study to determine the prevalence of intestinal parasitic infection was conducted. A Structured questionnaire was used to establish environmental, behavioral and sociodemographic factors of the pupils. Stool samples were collected from all study subjects into sterile sample bottles and examined for parasites using a direct smear and formol-ether concentration technique. The results were analyzed statistically using GraphPad prism version 7 statistical tool. A total of 24.8% (62 of 250 children) carried on intestinal parasite. The most prevalent intestinal parasites identified were *Ascaris lumbricoides* (12.4%), *Trichuris trichiura* (6.8%) and hookworm (5.6%). This study indicated that the prevalence of intestinal parasites is associated with drinking unprotected well/spring water and less educated parents who do not practice hand washing before meal. Therefore, interventions such as chemotherapy, provision of adequate sanitary facilities and portable drinking water, improved personal hygiene and health education should be considered and implemented. Thus, these segments of the population should be considered by governmental and non-governmental health institutes for any community-based intervention program.

Keywords: Intestinal parasites; Prevalence; Helminthes; Public health; Infection; Gastrointestinal

Introduction

Intestinal parasitic infection caused by helminthes and protozoan are serious public health problems in developing countries [1-3].

Parasites that affect the gastro-intestinal tracts are among the most common infections worldwide. It is estimated that 3.5 billion people are affected, and 450 million are ill as a result of these infections, the majority of whom are children [4].

Parasites are one of the most common causative agents of diarrhea, weight loss, abdominal pain, nausea, vomiting, lack of appetite, abdominal distention and iron deficiency anemia [5].

Unavailability of clean and safe drinking water, highly populated density, inappropriate disposal of waste, noncompliance with health standards, lack of adequate washing of food substances (vegetables and fruits), and consumption of improperly cooked meat lead to high prevalence of intestinal parasites [6,7].

The present study therefore sought to ascertain the prevalence of gastrointestinal parasites among Primary school pupils in Port Harcourt City local government area of Nigeria.

Materials and Methods

Study area

The study was conducted in Port Harcourt, the capital city of Rivers State. Port Harcourt is located between latitudes of 04° 4'N and longitudes 07°10'E at the southern region of Nigeria in West Africa. Port Harcourt enjoys a tropical monsoon climate characterized by high temperature, low pressure and high humidity all year round. It has a mean temperature of 30°C (86°F) and a relative humidity of between 80% and 100% and a mean annual rainfall of 2,300mm [8].

Data collection and study population

The study examined stool samples of Primary school children. Data collection and variations in distribution patterns of positive stool samples between sex and age consistency of the stool sample (formed, soft, semi-soft and watery) were recorded for identification and comparison of infection rate based on sample appearance. GraphPad prism version 7 statistical tool was used to compare relative frequencies between groups (sex and age). P value <0.05 were considered statistically significant. Questionnaires were given to every child that was sampled to ascertain socio demographic characteristics such as toilet system, method of waste disposal, source of drinking water, residential settlements, parent's level of education and how often they deworm their children.

Survey questionnaire of gastrointestinal parasites and risk factors

Child's #_____ Date: _____

1. Parent/ guardian signature_____

(Informed Consent)

2. Age of child: _____

3. Gender of child: _____

4. Place of Residence: _____

5. Community/ Neighborhood: _____

6. City of Birth_____

7. Country of Birth: _____

8. Number of years living in your present residence: _____

9. Other cities or countries where the child has lived before current place of residence_____

10. Parent's level of education_____

11. What is the total number of people living in your household? _____

12. Circle any of the following symptoms that the child has had in the last 7 days:

(a) Diarrhea (b) Blood in stools (c) Abdominal pain (d) Nausea (e) Worms in stools (f) Anal itching (g) Fever (h) Vomiting (i) Abdominal distention (j) Loss of appetite (k) Increased appetite (l) Weight loss (m) Weight gain (n) Headache (o) Rash (p) Dry cough without a cold or chronic cough (q) Coughing up worms (r) Greasy stools

13. Has the child ever been diagnosed in a clinic or hospital with a parasite or worm of the intestines or stomach? (a) No (b) Yes…if so, (i) When? _____ (ii) What kind?_____ (a) No (c) Unsure

14. Has the child recently been given medicine in school for parasites? (a) Yes….if so, (i) When? _____ (b) No (c) Unsure

15. How many times a year does the child visit a clinic or hospital? _____

16. Where do you get your drinking water? (a) Purchase bottled water (b) Community well (c) Tap water

(d) River or stream (e) Rain water collected (f) Other_____

17. If you do NOT buy bottled water, what do you treat your water with before drinking? (a) Nothing (b) Boil (c) Iodine (d) Chlorine (e) Filter…if so, (i) What kind? _____ f. Other_____ _____ (g) Unsure

18. What type of toilet do you use at home or where do you use the bathroom? (a) Indoor flushable toilet (b) Public or shared outdoor latrine (c) Private outdoor latrine (d) Outside/ Nature (e) Other_____ _____

19. What type of toilet does the child use at school? (a) Indoor flushable toilet (b) Outdoor latrine (c) Other_____ _ (d) Unsure

20. How often does the child wash his/her hands with soap and water after using the toilet? (a) Never (b) Sometimes (c) Rarely (d) Always

21. Does the child use any of the following after a bowel movement to clean himself/herself? (a) Toilet paper (b) Cloth (c) Paper (d) Stones (e) Leaves (f) Nothing (g) Other_____

22. How often does the child wash his/her hands with soap and water before eating? (a) Never (b) Sometimes (c) Rarely (d) Always

23. What kinds of animals live in or around your house? (a) Dog (b) Cat (c) Pig (d) None (e) Cow (f) Horse (g) Chicken (h) Goat (i) Sheep (j) Donkey (k) Other_____

24. What type of floor is in your home? (a) Dirt (b) Tile (c) Cement (d) Other_____

Analysis of Stool Samples/Identification of Intestinal Parasites

About 1g portion of the preserved stool sample was analyzed by the formol-ether concentration method as described by [9]. About 1g of the faeces was emulsified in 4ml of 10% formol water and mix properly. Microscopic slides were made as studied in a light microscope at 100× and 400× magnifications for the presence of cysts and ova of the parasites.

Samples collection and processing was carried out on the same day. A drop of physiological saline was placed on a clean grease-free slide. A little quantity of thoroughly mixed stool sample was collected with the aid of an applicator stick and emulsified on the drop of the saline. The emulsified sample was covered with a cover slip and light microscopy at100x and finally with 400x magnifications for microscopic examination. Formol-ether concentration technique was employed. One milliliter of a thoroughly-mixed stool sample was put in a tube containing 4mL of 10% formalin. Three milliliters of the 10% formalin was introduced and mixed by shaking. Separation of the suspension was aided by a coffee strainer into a tube of centrifuge. Three milliliters of diethyl ether was added and stoppered. It was then shaken vigorously for 1min. The stopper was removed and the suspension centrifuged for 1min at 400rpm. The complete division of the liquid below the fecal remains and ether was carefully removed using a Pasteur pipette and transferred into another tube of centrifuge. Ten percent formalin was to the transferred suspension to make up to 10mL. It was then centrifuged at 1000rpm for 10mins. The supernatant was decanted and the bottom of the tube tapped to resuspend the deposit. The deposit was examined by light microscopy at 100x and 400x magnifications for the presence of ova or cyst of parasites.

Results

A total of 250 children aged 1-11 years participated in the study; 112(44.8%) and 138(55.2%) were females and males respectively. Total infected indicated 27(10.8%) and not infected 223(89.2%) out of 250 examined. Parasites identified in the study were *Ascaris lumbricoides* 10(4.0%), 21(8.4%), *Trichuris trichiura* 9(3.6%), 8(3.2%) and Hook worm 8(3.2%), 6(2.4%) for males and females respectively (Table 1).

Intestinal Parasites	Males	Females
Ascaris lumbricoides	10 (4.0%)	21 (8.4%)
Trichuris trichuira	9 (3.6%)	8 (3.2%)
Hookworm	8 (3.2%)	6 (2.4%)

Table 1: Percentage distribution of intestinal parasitic infection among school children in Port Harcourt City Local Government Area.

Indicate the frequency and types of parasites with gender distribution (Figure 1). Female pupils were more infected than males. Analysis of stool sample across gender appearance indicated 37(14.8%), 78(31.2%), 52(20.8%) and 83(33.2%) as formed, soft, semi-soft and watery respectively (Table 2). Anthropometric data obtained explained the risk factors for intestinal parasitic infection. Result obtained from 250 children indicated that 138(55.2%) females and 112(44.8%) males had their drink source of water from tap water, stream water and well water in the trend as follows; stream 59(23.6%), tap 29(11.6%), well 50(20.0%) for females and tap 53(21.2%), stream 39(15.6%) and 20(8.0%) for males (Table 3). Deworming in the last 6months of study showed that 119(47.6%) females had no treatment, followed by 19(7.6%) with treatment. Males treated 46(18.4%) had treatment, but 66(26.4%) were never treated. Routine hand washing after toilet use appeared to be a very significant risk factor with 116(46.4%), 78(31.2%), 22(8.80%) and 34(13.6%) that practiced and do not practice for both females and males respectively. Co-infection with mixed species of parasites among the 62(24.8%) infected out of 250 subjects were 11(4.4%) females and 6(2.4%) (Table 4).

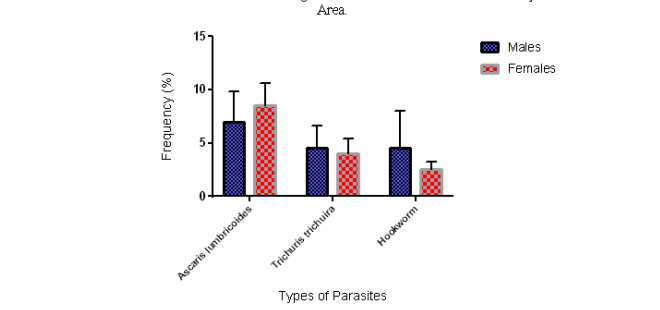

Figure 1: Statistical analysis of frequency and types of parasites.

Factors associated with intestinal parasite infection

The statistical analysis showed that significant factors related to the occurrence of intestinal parasite infections were unavailability of safe water supply, exposure to moist soil during outdoor games and educational grade had statistical significant association with the occurrence of intestinal parasitic infection ($P<0.05$).

Stool Sample Appearance	% Frequency
Formed	37(14.8)
Soft	8 (3.2%)
Semi-soft	52 (20.8%)
Watery	83 (33.2%)

Table 2: Stool sample analysis.

Drinking Water Source	Females 138 (55.2%)	Males 112 (44.8%)
Tap water	29 (11.6%)	53 (21.2%)
Stream water	59 (23.6%)	39 (15.6%)
Well water	50 (20.0%)	20 (8.0%)
Deworm (Last 6 months)		
Yes	19 (7.6%)	46 (18.4%)
No	119 (47.6%)	66 (26.4%)
Hand Wash (After Toilet Use)		
Yes	116 (46.4%)	78 (31.2%)
No	22 (8.80%)	34 (13.6%)

Table 3: Survey risk factors associated with intestinal parasites.

Co-Infection	Females	Males
%Frequency	11 (4.4%)	6 (2.4%)
Total Subjected	112 (44.8%)	138 (55.2%)

Table 4: Co-infection with mixed species of parasites.

Discussion

The present study showed that primary school pupils in Port Harcourt City Local Government Area (PHALGA) were infected with intestinal parasite to a non-trivial extent. The present study was similar to a previous study in Nigeria [10], on the prevalence of intestinal helminthes and protozoan parasites. In this study, the observed overall prevalence rate of intestinal parasite which is somewhat lower than previously reported among different regions in Port Harcourt. Epidemiological survey by [11], on intestinal helminthiasis in the Akpor area of Port Harcourt, Rivers State, recorded 42.7% prevalence of hookworm 16.0%, *Ascaris lumbricoides* 15.4%, *Trichuris trichiura* 8.0%, *Strongyloides stercoralis* 3.0%, and *Taenia saginata* 1.7%. This high prevalence could be due to the standard of living of the subjects and the geographical condition of the study area. This study found that intestinal helminthes remain a problem in Port Harcourt. The prevalent species were *Ascaris lumbricoides* (12.4%), *Trichuris trichiura* (6.8%) and hookworm (5.6%), are prevalent among primary school children in Port Harcourt city Local Government Area. Previous research attributes transmission of these parasites to be due to the sanity level of environmental as many children are exposed to moist soil during outdoor activities such as games. Similarly, the high prevalence observed in our study likely to be associated with poor

hygienic conditions and status of health education among parents of the sampled population in Port Harcourt City Local Government Area. High prevalence of intestinal parasitic infection has been reported to occur in this geographical settlement [11,12]. The parasitic infection recorded by this study therefore synchronizes with an overall high prevalence of gastrointestinal tract infections in this study area due to the level of sanitation and economic status of the inhabitants.

Ethical Considerations

Communication with the administrators of schools sampled was made through formal letter obtained from Port Harcourt Local Government Education Authority. In order to keep confidentiality of any information provided by study subjects, the data collection procedure was anonymous.

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