The Prevalence and Risk Factors of Intestinal Parasitic Infections among School-age Children in Ogbese, Ondo State, Nigeria

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Author's contribution

This work was carried out in collaboration between all authors. Author MFI designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aim: Prevalence of human intestinal parasitic infections among school age children in Ogbese town, Akure North,Nigeria was investigated between January and June 2015.
Study Design: This was a prospective cross sectional study. Information about sex, age and other epidemiological habits was collected from all the participating children using standard questionnaires
Methodology: A total of 250 stool samples were examined for human intestinal parasitic infections using standard parasitological method.
Results: Overall prevalence of intestinal parasites was 66.8% (167/250). The human intestinal parasites encountered with their prevalence are *Entamoeba histolytica* (18.8%), *Ascaris lumbricoides* (12.8%), *Giardia lamblia (*11.2%), Hookworm (10.8%), *Schistosoma mansoni* (6.4%), *Trichuris trichiura* (4.4%) and *Strongloides stercoralis* (2.4%). The prevalence in intestinal parasitic infections was higher in males (37.2%) than their female's counterparts (29.6%). The highest

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prevalence of the parasitic infection was recorded in age group 4 – 8 years (27.6%) while those in age group 14 – 18 years had the lowest prevalence (12.8%). Highest prevalence was observed in children that uses bush toilet (48.0%) compared to those that have access to standard toilet facility. Prevalence recorded was higher among children using stream and pond as source of water (42.8%) and have least prevalence in children using tap and borehole as source of water (7.6%). The prevalence was low among children with (clean) cut nail (14.0%) compare to children with uncut nails (52%). The result was statistically significant (p< 0.005).

Conclusion: The findings of this study reveal high prevalence of intestinal parasite among the school children, which is because a greater number of the children defecate openly and do not follow hygiene. *E. histolytica* was the most common intestinal parasite with highest prevalence in this study. The higher prevalence in intestinal parasite observed among the age 4-8 years school children.

1. INTRODUCTION

Human intestinal parasites are parasites that infect the gastro-intestinal tract of human, human intestinal parasites reside in the small or large intestine and use the stool or blood from intestinal wall as source of food, therefore they are classify as Endoparasites [1]. Parasite are found living in organism of distinct species called host, some of these intestinal parasites causes infection inside the body while others can live for long period in the bowel without causing symptoms or requiring treatment [2]. The two major types of intestinal parasites are helminths and protozoa, helminths are worm with many cells which cannot multiply in the human body while protozoa have only one cell and can multiply inside the human body which may infect humans causing parasitic diseases, and parasitic infections caused by intestinal parasites are among the prevalent infection in human [3]. In developed countries, protozoa parasites more commonly cause gastro- intestinal infections compared to helminths and people there are also at particular risk due to drinking water from sources that may be contaminated with parasites that can colonized the gastro- intestinal tract [4].

Means of exposure to the parasitic infection caused by the human intestinal parasites include ingestion of under cooked food, drinking infected water and skin absorption that is skin contact with larva infected soil [5]. When the organisms are swallowed, they move into the intestine where they reproduce and cause symptoms. The cyst and eggs of intestinal parasites may be found in faeces, which aids in providing a means for the parasitic species to exit the current host and enter another host [6].

Children are particularly susceptible if they are not thoroughly cleaned after coming into contact with infected soil that is present in environments that they may frequently visit such as sand boxes and school play grounds, helminthes recognized are the nemathelminths (nematodes), platyhelminths (flat worms) the latter being sub-divided into cestodes and trematodes [7]. Helminths infections are the most common and infective agents of man kinds and are responsible for morbidity throughout the developing world [8], its infection was ranked highest in morbidity rate among schoolage children who often presents with much heavy worm infection because of their vulnerability to poor hygiene and nutrition deficiency [9].

In general, the factors that influence intestinal parasite to cause infection includes: living or visiting an area prone to parasites, poor or inadequate sanitation, poor hygiene, age (children are more susceptible to infection than elderly people), exposure to child and institutional care centres, having a weaken immune system and Human immunodeficiency virus (HIV) or Acquired immuno-deficiency syndrome (AIDS) [10]. Preventive measures against parasitic infection includes, proper washing of hands before eating and after defeacation, improved hygiene, wearing of shoes and treating sewage. Fortunately, infections caused by these human intestinal parasites can be effectively treated with drugs.

Intestinal parasitic infections are the major health problems in both developed and under developed nations [11], most especially among school children in tropical Nigeria where poor sanitation provide conducive environment for their development and transmission.

Therefore, the purpose of this study is to Prevalence of human intestinal parasitic infections among school age children in Ogbese

town, Akure North, Nigeria was investigated between January and June 2015.

2. MATERIALS AND METHODS

2.1 Study Area

The study area, Ogbese is a community located between latitudes 7°15` N and 5°23`E of Akure in Ondo State, the inhabitants are predominantly farmers and petty traders, there is a river that run across these towns called Ogbese which the people used for domestic purposes and the children usually swim in the river. Ogbese is a small town that lack amenities such as water and toilet, out of the three schools visited for this research work, only one primary school has a modern toilet for the children. The schools visited for sample collection in the town include Community Comprehensive High School, St Andrew Anglican Primary School and St. Mary Primary School [12].

2.2 Study Design

This was a prospective cross sectional study. Consent was obtained from the parent of the participants, school principal and head teachers of the schools involved in the study. Information about sex, age and other epidemiological habits was collected from all the participating children using standard questionnaires.

2.3 Sample Collection

Sterile and dry universal containers were given to the children for samples collection, proper instruction was given to them on the way of collecting the samples without contaminating themselves, and the sample collection was done in the morning. The total numbers of 250 samples were collected from the children which was properly labeled for easy identification. The samples were quickly transported to the Federal University of Technology, Akure, microbiology Laboratory for analysis.

2.4 Parasitological Analysis of Stool Samples

The formol ether sedimentation technique adopted by Cheesbrough, [13] was used to carry out analysis in the laboratory. 2 g of stool sample was emulsify in 7 mL of 10% formalin in a centrifuge size tube using a swab stick, the mixture was passed through a sieve (0.75 mm) into an evaporating basin. It was then centrifuge at 3000 rpm for 60 seconds, after spinning the stool sample, the supernatant was decanted and the deposit was removed using a Pasteur pipette on to a clean glass slide, the preparation was stained with 1% Lugol's iodine and the stained slide was subsequently observed under the microscope using x10 and x40 objectives for ova, trophozoites and cyst of the parasites respectively.

2.5 Statistical Analysis

All data accrued were analyzed and calculated using Chi-square (x^2) and binomial text to determine the association of risk factors and intestinal parasitic infection. The probability of occurrence is significant $P > 0.005$ with 95% confidence Interval.

3. RESULTS AND DISCUSSION

3.1 Results

Out of the 250 stool samples examined, 167 (66.8%) were infected with human intestinal parasitic infections (Table 1). The human intestinal parasites encountered in the study are *E. histolytica* (18.8%), *A. lumbricoides* (12.8%), *G. lamblia* (11.2%), Hookworm (10.8%), *S. mansoni* (6.4%), *T. trichiura* (4.4%) and *S. stercoralis* (2.4%). There was a statistical significant difference as the $P < 0.05$. Table 2 showed that males have a higher prevalence of (37.2%) than the females (29.6%). Table 2 showed that children between the age group 4 – 8 years has the highest prevalence of (27.6%), followed by age group 9 – 13 years (26.6%) and those between 14 – 18 years has (26.4%) prevalence. There was a statistical significance difference (P< 0.05) within each age group.

Table 2 also showed that children that are using bush toilet and pit latrine recorded highest prevalence of (48%) and (17.2%) while those that has access to water system show the least prevalence of (1.6%). The differences were insignificant (P > 0.05). The prevalence of intestinal parasite infections based on their major sources of drinking water and other domestic usage (Table 2) reveals that children using stream and pond water for drinking purposes has the highest level of prevalence (42.8%) followed by those that drink well water (16.4%) while those children that uses borehole and tap water as source of drinking water recorded the least prevalence of (7.6%) which was significant (P< 0.05). Table 3 indicated prevalence for each epidemiological habits among the school children

which ranges from water treatment, hand washing before meal and after defeacation, finger nails (cut and uncut), nail biting, eating raw vegetables and fruits and walking bare footed.

3.2 Discussion

The findings of this study reveal high prevalence of intestinal parasite among the school children in Ogbese in Akure North Local Government Area of Ondo State. An overall prevalence by this study was higher when compared with some reports from other parts of Nigeria that shown a lower prevalence. The high prevalence of human intestinal parasites shown in this study agrees with report of Ozumba and Ozumba, [14] that stated that it may be due to the fact that a greater

number of the children defeacate in the nearby bushes and farms around their schools, this could also be accredited to infections from their homes when playing with soil and walking bare footed, poor environment, personal hygiene and shortage of good water supply.

E. histolytica was the most common intestinal parasite with highest prevalence in this study this could be as a result of person to person transmission through food or water among the school children in the study observed, the low prevalence of *S. stercoralis* in this study agreed with submission of Ijagbone and Olagunju, [15] who opined that low prevalence observe may be to its vulnerability to adverse environmental condition hence, its alternate mode of infection, auto infection.

Table 1. Prevalence of human intestinal parasitic infections among school children based on the parasite identified

Parasites encountered	Number infected	Prevalence %
Entamoeba histolytica	47	18.8
Ascaris lumbricoides	32	12.8
Giardia lamblia	28	11.2
Hookworm	27	10.8
Schistosoma mansoni	16	6.4
Trichuris trichiura	11	4.4
Strongyloides stercoralis	6	2.4
Total	**167**	**66.8**

N= 250 (Number of children examined) P < 0.05

Table 2. Prevalence of human intestinal parasites based on different factors

Gender	Number examined	Number infected	Prevalence (%)
Prevalence of human intestinal parasites based on sex			
Male	117	93	37.2
Female	133	74	29.6
Total	250	167	66.8
Prevalence of human intestinal parasites based on age group			
4 - 8	75	69	27.6
9 -13	87	66	26.4
14 - 18	88	32	12.8
Total	250	167	66.8
Prevalence of human intestinal parasites based on toilet facilities			
Bush	182	120	48
Pit latrine	57	43	17.2
Water closet	11	4	1.6
Total	250	167	66.8
Prevalence of human intestinal parasites based on sources of water			
Streams	127	107	42.8
Well	81	41	16.4
Tap/borehole	42	19	7.6

Table 3. Prevalence of infection based on different epidemiological factors

Risk factors	Status	Number examined	Number infected	Prevalence (%)	(P-value)
Water treatment at home	Yes	2	9	3.6	
	No	229	158	63.2	0.015
Total		**250**	**167**	**66**.8	
Hand washing before meal	Water only	242	164	65.6	
	Water and soap	8	3	1.2	0.912
Total		**250**	**167**	**66**.8	
Hand washing after defeacation	Water only	233	159	63.6	
	Water and soap	17	8	3.2	0.073
Total		**250**	**167**	**66**.8	
Finger nail	Cut	84	35	14.0	
	Uncut	I66	132	52.8	0.000
Total		**250**	**167**	**66**.8	
Nail biting	Yes	91	88	35.2	
	No	159	79	31.6	0.000
Total		**250**	**167**	**66**.8	
Eating raw vegetables/fruits	Yes	138	96	38.4	
	No	112	71	28.4	0.303
Total		**250**	**167**	**66**.8	
Walking bare footed	Yes	149	103	41.2	
	No	101	64	25.6	0.343
Total		**250**	**167**	**66**.8	

The higher prevalence in intestinal parasite observed among the age 4-8 years was in line with the report of Obiukwu et al. [16] who stated that children under this age group play a lot in the sand and not care to wash their hands and legs thereafter, unlike their counterparts in age group 9 – 18 years that have low prevalence because they can control themselves by avoiding means of exposure to infections caused by these parasites. The high prevalence recorded among children with uncut nails in this study may be due to the poor personal hygiene practice by the children. The findings in this study stressed the need for encouragement of good sanitation programme and provision of social amenities for this community by the government.

4. CONCLUSION

The findings of this study reveal high prevalence of intestinal parasite among the school children, which is because a greater number of the children defecate openly and do not follow hygiene. *E. histolytica* was the most common intestinal parasite with highest prevalence in this study. The higher prevalence in intestinal parasite observed among the age 4-8 years school children.

This study shows that the presence of reasonably high amount and occurrence of human intestinal parasite are the common cause of parasitic infection among children of both secondary and primary school in the study area, this and similar information generated from the study may provide invaluable statistics needed for planning meaningful public programmes that aim at reducing the prevalence and morbidity of parasitic infection. However, since the prevalence of infestation especially was more than 50%, there is need for mass deworming of school children in the community (Ogbese) and other measures such as health education, provision of safe water supply, sanitation facilities (toilet) and collaboration with both government and non- governmental organizations (NGO) in public health intervention is imperative so as to reduce or totally eradicate the menace usually caused by this parasite.

CONSENT

All authors declare that 'written informed consent was obtained from the patient, parents of the participant, school principal and head teachers of the study area for publication of this paper.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore

been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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