High Prevalence Of Intestinal Parasites In A Nigerian Tertiary Health Institution

O CN, E CI, C C, O EN, O VM

Citation

O CN, E CI, C C, O EN, O VM. *High Prevalence Of Intestinal Parasites In A Nigerian Tertiary Health Institution*. The Internet Journal of Parasitic Diseases. 2009 Volume 4 Number 2.

Abstract

A prospective study was carried out to determine the prevalence of intestinal parasite and its epidemiological risk factors among patients in admissions in Accident and Emergency Unit of Nnamdi Azikiwe University Teaching Hospital a Tertiary Health Institution in Anambra State Nigeria between June 2008 and May. Standard parasitological procedures as recommended by World Health Organization were employed in sample collection and examination.
Out of a total of 492 subjects examined, 190 (38.62%) were infected with one or more of the intestinal parasites. Age distribution of the prevalence of infection did not show a definite pattern but infection rate was highest among the subjects in the first decade of life (56.3%) and least among the subjects aged 60 years and above (30.0%). This observed difference in prevalence by age was not statistically significant (p>0.05). Entamoeba histolytica was the most prevalent parasite amongst the population (43.9%) while Giardia lamblia
showed
the least prevalence (12.4%). Comparing the distribution of parasites within the age groupings, Entamoeba histolytica was most encountered among the subjects in the first two decades of life while hookworm infection was most frequent among subjects aged 20
–
49 years in relation to the prevalence of the other parasites within each age grouping.

The males showed a higher prevalence of intestinal parasite infections (40.31%) than the females (36.58%). However, this is not statistically significant (p>0.05).
Occupational prevalence showed that infection rate was highest among the farmers (60.94%), followed by the pupils and pre-school children (59.09%) while the civil servants showed the least prevalence (30.17%) of infection with intestinal parasites. Difference in occupational prevalence was found to be statistically significant (p<0.05). Distribution of intestinal parasite infections based on their major sources of drinking water showed that subjects who depend on the streams as their major source of drinking water recorded the highest level of prevalence, followed by those that drink well water while the subjects that depend on pipe-borne water and sachet water as major sources of drinking water recorded the least prevalence of intestinal parasite infections. This difference was statistically significant (p<0.05). The study has documented a very high prevalence of intestinal parasite amongst subjects examined who were not diarrheal patients and do not manifest major symptoms of intestinal parasitic infection, re-emphasizing the need for intermittent de-worming even without the constitutional abdominal ache, vomiting and diarrhea. Hygienic food preparation and health education to encourage individuals to adopt behavioral change is advocated.

INTRODUCTION

Human intestinal parasites are parasites that populate the gastro-intestinal tract of humans. It has become a major health problem in many developing countries[8,24,28]. There are two main types of intestinal parasites: helminths and protozoa. In their adult form, helminths cannot multiply in the human body. Protozoa, however have only one cell, and can multiply inside the human body, which contributes to their survival and enables serious infections to develop. Sometimes two or more can cause infection at the same time, a concept known as polyparasitism.[6,7,8,24] Intestinal helminths are distributed worldwide, particularly in tropical

and sub-tropical areas of the world. More than one billion of the world's population including at least 400 million school children are chronically infected with Ascaris lumbricoides, Trichuris trichiura and the hookworms.[28] The prevalence of infections and degree of factors predisposing to infection vary from one region to another.[15] Intestinal parasitic infections are among the most prevalent of human parasitic infections worldwide. [12,23,27] They had been long recognized as an important health problem especially among Nigeria Children.[2,14,18,19,26] Several epidemiological studies had indicated high prevalence rates of intestinal infections among Nigeria children.[10,18,24,28] Few studies had also indicated a direct correlation between the intensity of infection with hook worms and with Ascaris lumbricoides and iron deficiency anaemia and intestinal obstruction.[6,7,26] Majority of Nigerian Children from low socioeconomic class has been found to be anaemic, stunted with retarded growth and underweight due to malnutrition, all due mainly to intestinal parasites.[20,28]

MATERIALS AND METHOD

STUDY AREA

The study was undertaken in the Accident and Emergency Unit of Nnamdi Azikiwe University Teaching Hospital(NAUTH) Nnewi Anambra State South East Nigeria. The hospital is the only tertiary health care provider for Nnewi community and its environs. South Eastern Nigeria has a tropical continental climate with distinct wet and dry seasons. The average relative humidity is about 80% reaching 90% during rains. The inhabitants are diverse in occupation ranging from the elite (doctors, engineers etc) to traders and artisans. Rain water stored in tanks and boreholes are their source of drinking water and stream and free flowing water common among the surrounding communities.

SUBJECTS

The subjects were patients presenting at the Accident and Emergency Unit of the Teaching Hospital which is the only section of the hospital that is forever on-duty attending to patients even during holidays when other units are off duty. The consent of the patients were sought and obtained after they were briefed on the importance and significance of the study by the researchers. The unit is open to all accident and emergency cases irrespective of the age and sex.

COLLECTION OF SAMPLE

Each patient were given a clean, dry, well labelled specimen container with which the faecal samples were transported to the Parasitology Laboratory of Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Anambra State for processing. They were instructed to collect stool specimen using the convenience in the ward and digital rectal examination (DRE) was done during medical examination for the unconscious patients in order to collect their fecal samples. In the course of the study, there were two unidentified road accident victims brought by the men of Federal Road Safety Commission and Good Samaritan. There was nobody to provide information for the questionnaire. Of the 500 patients issued a specimen container during the study period, 492 returned their stool specimen for examination between December 2008 to May 2009. A questionnaire was administered to each patient from whom personal information on age, sex, and occupation was derived.

LABORATORY INVESTIGATION

In the laboratory, each sample was first examined for its consistency, colour, and presence of blood, mucous, adult worms, proglottids of tapeworms, with an applicator stick. Saline and iodine wet mount, concentrated saturated sodium chloride floatation and formol-ether concentration techniques were used according to Chessbrough[32] and WHO[33] were used for the microscopic examination of each stool sample. Antigen testing was not performed; therefore the differentiation of Entamoeba histolytica from Entamoeba dispar was not possible.

DATA ANALYSIS

Data accruing from the study were analyzed using Social Sciences (SPSS) Statistical Package (Version 11.0). Cross-tabulations were generated and Chi-square test was applied for this purpose. Chi-square was calculated using GraphPad StatMate™ 2.0.

RESULTS

Out of a total of 492 subjects examined, 190 (38.62%) were infected with one or more of the intestinal parasites. Age distribution of the prevalence of infection did not show a definite pattern but infection rate was highest among the subjects in the first decade of life (56.3%) and least among the subjects aged 60 years and above (30.0%) (Table 1). This observed difference in prevalence by age was not statistically significant ($p>0.05$). Despite the fact that the subjects examined were not diarrheal patients and do not manifest major symptoms of intestinal parasitic infection, infection rate was relatively high in the population.

Entamoeba histolytica was the most prevalent parasite amongst the population (43.9%) while Giardia lamblia showed the least prevalence (12.4%) (Table 1). Comparing the distribution of parasites within the age groupings, Entamoeba histolytica was most encountered among the subjects in the first two decades of life while hookworm infection was most frequent among subjects aged 20 – 49 years in relation to the prevalence of the other parasites within each age grouping.

Table 2 indicated that males showed a higher prevalence of intestinal parasite infections (40.31%) than the females (36.58%). However, this is not statistically significant ($p>0.05$).

In Table 3, Occupational prevalence showed that infection rate was highest among the farmers (60.94%), followed by the pupils and pre-school children (59.09%) while the civil servants showed the least prevalence (30.17%) of infection with intestinal parasites. Difference in occupational prevalence was found to be statistically significant ($p<0.05$). Two infected patients whose detailed information could not be obtained were also accounted for in disease distribution by epidemiological factors.

Distribution of intestinal parasite infections based on their major sources of drinking water showed that subjects who depend on the streams as their major source of drinking water recorded the highest level of prevalence, followed by those that drink well water while the subjects that depend on pipe-borne water and sachet water as major sources of drinking water recorded the least prevalence of intestinal parasite infections. This difference was statistically significant ($p<0.05$).

Figure 1

Table 1: Prevalence of Intestinal Parasite Infections by Age

Age grp	NE	NI	*A. lumbricoides*	Hookworm	*T. trichiura*	*E. histolytica*	*G.lamblia*
<10	16	9 (56.25)	6 (37.50)	1 (6.25)	4 (25.0)	9 (56.25)	4 (25.0)
10 – 19	22	12 (54.55)	8 (36.36)	4 (18.18)	6 (27.27)	12 (54.55)	2 (9.09)
20 – 29	144	55 (38.19)	27 (18.75)	35 (24.31)	11(7.64)	26 (18.06)	9 (6.25)
30 – 39	126	63 (50.0)	42 (33.33)	64 (50.79)	21(16.67)	62 (49.21)	13 (10.32)
40 – 49	88	38 (43.18)	10 (11.36)	34 (38.64)	6 (6.82)	32 (36.36)	7 (7.95)
50 - 59	76	25 (32.89)	16 (21.05)	12 (15.79)	8 (10.53)	18 (23.68)	6 (7.89)
≥60	20	6 (30.0)	6 (30.0)	6 (30.0)	3 (15.0)	6 (30.0)	4 (20.0)
Total	**492**	**190(38.62)**	**124 (25.20)**	**135 (27.44)**	**62 (12.60)**	**216 (43.90)**	**61 (12.40)**

Key: NE – Number Examined, NI – Number Infected

Figure 2

Table 2: Prevalence of Intestinal Parasite Infections by Sex

Sex	No. Examined	No. Infected (%)	No. Uninfected (%)
Male	258	104 (40.31)	154 (59.69)
Female	234	86 (36.58)	148 (63.25)
Total	**492**	**190 (38.62)**	**302 (61.38)**

Figure 3

Table 3: Prevalence of Intestinal Parasite Infections by Occupations

Occupations	No. Examined	No. infected (%)	No. uninfected (%)
Farmers	64	39 (60.94)	29 (39.06)
Traders	130	51 (39.23)	81 (60.77)
Civil Servants	116	35 (30.17)	81 (69.83)
Artisans	110	34 (30.91)	76 (69.09)
Students	48	16 (33.33)	32 (66.67)
Pupils/Pre-school	22	13 (59.09)	9 (40.91)
Unknown	2	2 (100.00)	0 (0.0)
Total	**492**	**190 (38.62)**	**302 (61.38)**

Figure 4

Table 4: Prevalence of Infections by the Developmental Status of Their Communities

Locality	No. Examined	No. Infected (%)	No. uninfected (%)
Urban	206	75 (36.41)	131 (63.59)
Semi-urban	112	42 (37.5)	70 (62.5)
Rural	172	74 (43.02)	98 (56.98)
Unknown	2	2 (100.0)	0 (0.0)
Total	492	190 (38.62)	302 (61.38)

Figure 5

Table 5: Prevalence of Intestinal Parasite Infections by Educational Status

Educational Status	No. Examined	No. Infected (%)	No. uninfected (%)
None	84	38 (45.24)	46 (54.76)
Primary	172	67 (38.95)	105 (61.05)
Secondary	128	49 (38.28)	76 (61.72)
Tertiary	106	34 (34.91)	72 (32.08)
Unknown	2	2 (100.0)	0 (0.0)
Total	492	190 (38.62)	302 (61.38)

Figure 6

Table 6: Prevalence of Infections by the Major Source of Drinking Water

Major source of drinking H_2O	No. Examined	No. Infected (%)	No. uninfected (%)
Stream	192	86 (44.79)	106 (55.21)
Pipe-borne water	64	10 (15.63)	54 (84.38)
Rain water	136	52 (38.24)	84 (61.76)
Well water	46	19 (41.30)	27 (58.70)
Sachet water	52	8 (15.38)	44 (84.62)
Unknown	2	2 (100.0)	0 (0.0)
Total	492	190 (38.62)	302 (61.38)

Figure 7

Table 7: Prevalence of Intestinal Parasite Infections by Epidemiological Factors

Human behavior	Status	No. Examined	No. Infected (%)	No. uninfected (%)
Eat raw vegetable	Yes	159	122 (76.73)	37 (23.27)
	No	331	68 (20.54)	263 (79.46)
Hand washing	Yes	160	42 (26.25)	118 (73.46)
	No	330	148 (44.85)	182 (55.15)
Walking barefooted	Yes	78	51 (65.38)	27 (34.62)
	No	412	139 (33.74)	273 (66.26)
Animal pet	Yes	99	43 (43.43)	56 (56.57)
	No	391	147 (37.60)	244 (62.40)
Swimming	Yes	132	62 (46.97)	70 (53.03)
	No	358	128 (35.75)	230 (64.25)
Deworming	Yes	89	16 (17.98)	73 (82.02)
	No	401	174 (43.39)	227 (56.61)

DISCUSSION

This study found that the overall prevalence of intestinal parasite infection was highest between the ages <10 to 39 years, even though the observed difference in prevalence by age was not statistically significant. This study contradicts the work of Oguoma et al who reported highest prevalence in the ages 9-10 years among children from resident homes in Owerri Metropolis.[18] Even though WHO confirmed that intestinal protozoan parasite (IPP) are dependent on age and greater severity of the infection is found in the younger children.[29] This could be attributed to the different host responses and other related factors such as the nutritional status.[1]

Despite the fact that the subjects examined were not diarrheal patients and do not manifest major symptoms of intestinal parasitic infection, infection rate was relatively high in the population. This concurs with the study by Oguoma et al who identified higher prevalence rate of infection among the studied resident homes who were not presented with any symptom of infection than the subjects in health institutions.[18] Entamoeba histolytica was the most prevalent parasite amongst the population while Giardia lamblia showed the least prevalence. This observation agrees with the work of Roche et al where Entamoeba hystolitica and E. dispar recorded the highest in prevalence,[22] but differs with the work of Alakpa et al who reported that Cryptosporidium sp was the most prevalent intestinal pathogenic parasite in Lagos Nigeria especially among diarrhoeal cases in adults, while Giardia was found amongst those aged 6-10 years.[3] These results and those other works done by Ogbe and Odudu; Ndifon; Kogi et al;Gundiri and Akogun, showed that parasites particularly hookworms and Ascaris, are common throughout much of Nigeria.[16,15,13,11] The relatively high prevalence of helminths (27.4% for hookworm, and 25.2% for Ascaris) observed here agrees with previous findings in parts of Northern Nigeria.[4,13] Several other reports from other parts of tropical Africa have shown very high (>70%) infection rates of intestinal helminths.[9] Variations in prevalence rate of intestinal helminthiasis from different rural communities could be related to several factors including people's level of education, standard of personal/environmental hygiene and perhaps social habits. More so, some ecological factors such as temperature, relative humidity, rainfall, different diagnostic techniques employed by various workers could be responsible for observed differences in prevalence between communities.[21]

This work also showed that the males had a higher prevalence of intestinal parasite infections than the females. This may be due to the common feeding pattern in which a great number of men eat outside their homes while on daily activities to earn a living. Prevalence is not dependent on sex among the sampled population which disagrees with the work of Atu et al in 2006 who observed a higher prevalence of intestinal parasite in females than in males.[5]

Occupational prevalence showed that infection rate was highest among the farmers (61.0%). This could possibly be due to the unhealthy practices of walking bare footed while farming and the rampant defecation in the farm lands, followed by the pupils and pre-school children (59.1%) while the civil servants showed the least prevalence (30.2%) of infection with intestinal parasites . Difference in occupational prevalence was found to be statistically significant ($p<0.05$).

Two infected patients whose detailed information could not be obtained were also accounted for in disease distribution by epidemiological factors.

The rural residents recorded the highest prevalence of infection (43.0%), followed by the semi-urban residents (37.5%) while those from the urban settings recorded the least prevalence of infection (36.4%) The explanation could be because of poor knowledge on health education practices on preventable diseases and cultural farming practices. By their educational status, there was an association between prevalence of infection and level of education. Chronological pattern in the prevalence of infection, ranging from the non-educated who recorded the highest prevalence of infection(45.2%), to the subjects that attained the tertiary level of education who recorded the least prevalence of infections (34.9%) . However, these differences were not statistically significant ($p>0.05$).

The study also revealed that subjects who depend on the streams as their major source of drinking water recorded the highest level of prevalence(44.8%), followed by those that drink well water (41.3%) while the subjects that depend on pipe-borne water (15.6%) and sachet water (15.4%) as major sources of drinking water recorded the least prevalence of intestinal parasite infections. This difference was statistically significant ($p<0.05$). This could be due to due natural use of local streams for different purposes with the antecedent contamination coupled with poor hygiene practices common amongst the people.

Also observed in the study was the significant prevalence level of parasitaemia amongst those who indulge in the habit of eating raw vegetables (76.7%), habit of neglecting to wash their hands after handling stools(44.9%), walking bare footed(65.4%), swimming in water(47.0%), and lack of intermittent de-worming(43.4%).

CONCLUSION

What is needed is to adopt drug treatment for those already infected similar to the National Immunization Program to alleviate the sufferings of the already infected population, and prevent the parasites they harbor from passing into the environment and infecting others. Sanitary improvements such as safe, efficient and hygienic management of water (from extraction, through transport and storage, to use, particularly for drinking); safe, efficient and hygienic disposal of feces as identified by Oguoma et al [18] is important with a regular and effective use of water (with a scouring agent like ash or soap) for hand washing after contact with stools. Hygienic food preparation; and health education to encourage individuals to adopt behavioral change is advocated.

Estimates of these parasitic diseases thus become a matter of necessity for the surveillance of public health, proper health-care delivery and people's welfare. These findings will generate some scientific interest amongst clinicians and scientist, so that the much needed study will focus more on the epidemiology of these neglected intestinal parasites, and will be compared with the prognosis of the patients.

References

1. Adekunle, L. (2002): Intestinal parasites and nutritional status of Nigerian children. Afr. J. Biomed.Res; 5: 115-119.
2. Ajayi E.O.S., and Akinyinka O.O. (1999): Evaluation of the nutritional status of first year school students in Ibadan South. West Af. J. Med. 28: 59-63.
3. Alakpa G.E, and Fabgenro-Beyioku A. F.(2002): Cyclospora cayetanensis and Intestinal Parasitic Profile in stool samples in Lagos Nigeria. Acta Protozoologica 41; 221-227.
4. Alo E.B, Anosike J. C, and Danburan, J. B. (1993): A survey of intestinal helminths among students of post-primary institution in Adamawa State, Nigeria. Appl. Parasitol; 34: 1-7.
5. Atu B.O, Galadima M, and Alice F. (2006): Prevalence of intestinal parasites in Etulo, Benue State Nigeria. Nig. J. of Parasitology; 7: 1-16.
6. Centre For Disease Control and Prevention. (2009): Intestinal Protozoan Parasites. http://www.dpd.cdc.gov/dpdx (accessed in June 2009).
7. Centre For Disease Control and Prevention. (2009): Intestinal Helminth Parasites. http://www.dpd.cdc.gov/dpdx (accessed in June 2009).
8. Corry J.K, and Brett V. S. (2004): Common Intestinal Parasites. Am.Fam.Physician;69(5): 1111-1118.
9. Dada-Adegbola H.O, Oluwatoba A.O, and Falade C.O. (2005): Prevalence of multiple intestinal helminths among children in a rural community. Afr. J.Med.Sci;34: 263-267.
10. Graitcher P.L, and Gentry E.M. (1998): "Measuring children - One reference for all" Lancet; 11: 292.
11. Gundiri M.A, and Akogun O.B. (2000): Gastro intestinal and urinary parasitic infections amongst School children in Rumde, Yola. The Nigerian J. Parasitol 21: 117 – 124.
12. Jeliffe D.B. (1966): The assessment of the Nutritional status of the community. WHO Monograph series. No 53.
13. Kogi E, Umoh J. U, and Vajime C.G. (1991): Intestinal parasites and gastro enteritis among patients attending the University Clinic, Samaru Zaria, Nigeria. The Nigerian J. Parasitol. 12: 77 –80.
14. Kow F. and Balasurbrama E. (1986): "Are international anthropometric standards appropriate for developing countries'. J. Trop Prediat. 16: 37-44.
15. Ndifon, G. T. (1991): Human Helminthiasis in the Tiga Lake Basin, Kano, Nigeria. The Nigerian J.Parasitol. 12: 81-84.
16. Ogbe M.G, and Odudu L.A. (1990): Gastrointestinal helminthiasis in Epe LGA, Lagos State, Nigeria. Nigerian J Parasitol ; 9(11): 95–106.
17. Ogbe M.G, and Adu O.O. (1990): Intestinal helminthiasis in an orphanage in Nigeria. Bioscience Res. Comm. 2: 105-118.
18. Oguoma V.M, Anyasodor A. E, and Mbata T. I.(2008):

Prevalence of Intestinal Protozoan parasites among children aged 5-12 years in Owerri Metropolis South Eastern Nigerian. Trop. J. Health Sci;15(2): 43-48.
19. Olusi S.O, Mc farlane H, Ade-semano M, Oshunkoya B.O, and Adeshina H. (1975): Complement components in children with PCM. Trop and Geog. Med. 28: 323-328.
20. Onadeko M.O, and Oladipo O.A. (1989): Intestinal parasitic infestation in Rural Community Focus for Primary Health in Nigeria. Af. J. Med. Science, 18: 289-294.
21. Onwuliri C.O.E, Anosike J.C, Nkem C.N, and Payne V.K. (1993): The ecology of animal parasitic nematodes in endemic areas of Jos, Nigeria. Appl. Parasitol; 15(4): 53-56.
22. Roche J, and Benito A. (1999): Prevalence of intestinal parasite infections with `special reference to Entamoeba histolitica on the Island of Bioko (Equatorial Guinea) Am. J.Tropical Medicine and Hygiene;60(2): 257-262.
23. Toriola A.C. (1990): Anthropometric assessment of nutritional status of the Nigerian Children. Trop Geos. Med 42; 337 - 341.
24. Sayyan A.A, Imanzadeh F, Bagheri Y, Karami H, and Yaghoobi M. (2005): Prevalence of Intestinal Parasitic infections in the Islamic Republic of Iran. Eastern Medi. Health J; 11(3):1-7.
25. Salimon L.S, and Akinyemi A.(1986): Lymphocyte number F. Rosette inhibiting substance and soluble Immune compels in PCM measles and malaria. Nitr. Inter;2: 264-267.
26. Salimon C.S. (1980): Immune response and history substance in malnutritional children Ph.D. thesis, University of Ibadan.
27. World Health Organization. (1986): "On the use and interpretation of anthropometric indicators of nutritional status". W.H.O working group. Bulletin of the World Health Organization 04(6): 929-94.
28. World Health Organization. (1987): Prevention and control of Intestinal parasitic infections – World Health Organisation Technical report series no 749-783.
29. World Health Organization. (2005): De-worming for health and development. Report of the third global meeting of the partners for parasite control [database online]. Geneva: http://www.who.int. (accessed in June 2009).
30. World Health Organisation. (2009): Intestinal Protozoan Parasites. http:// www.who.int. database online] (accessed in June 2009).
31. World Health Organisation. (2009): Intestinal Helminth Parasites. http://www.who.int. [database online] (accessed in June 2009).
32. Monica Cheesbrough. (1981). Medical laboratory manual for tropical countries. Vol.1.
33. World Health Organization. (1991). Basic laboratory methods in Medical Parasitology. W.H.O. Geneva.

Author Information

Ogbuagu CN, BSc, MBBS, MSc
Accident & Emergency Department, Nnamdi Azikiwe University Teaching Hospital

Eneanya CI, PhD
Department of Parasitology & Entomology, Nnamdi Azikiwe University Teaching Hospital

Chukwuma C, BSc, MSc
Department of Medical Laboratory Sciences, Nnamdi Azikiwe University Teaching Hospital

Ogbuagu EN, MBBS
Institute of Human Virology, Nnamdi Azikiwe University Teaching Hospital

Oguoma VM, BSc, MSc
Department of Parasitology & Entomology, Nnamdi Azikiwe University Teaching Hospital