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INTESTINAL HELMINTHIASIS AMONG MALNOURISHED SCHOOL AGE CHILDREN IN PERI-URBAN AREA OF IBADAN, NIGERIA

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This study was carried out between November and December 1999 in a peri urban area of Ibadan in Lagelu Local Government Area to determine the prevalence rate of intestinal helminth infection among malnourished school children. Stool samples and finger prick blood samples were respectively collected from pupils in form 3 to form 6 for analysis. The relationship between infection and their nutritional status was determined using such parameters as weight, height, age, sex, arm to head circumference. The haematocrit value and worm density in subjects were determined to rate level of infectivity in the individual.

The study shows that there are three common intestinal worms in the area Ascaris lumbricoides has the highest prevalence rate of 40.7% followed by Tribchuris trichiura (4.8%) and hookworm (4.4%).

Age and sex gender made no significant difference in the distribution of infection (P >0.05). however, there was a significant effect on weight and height by worm burden (P <0.05). Worm density impact negatively on the blood level in body thereby precipitating anaemia in the children. Epidemiological factors affecting the infection among the subject is discussed.

The strategies for control of the infection are discussed. It is recommended that the public be adequately health educated on the epidemiology of the infection through the mass media and community health talks. The academic curriculum in schools should include epidemiology and control of parasitic infestation. Periodic mass treatment of children is advocated.

INTRODUCTION

Parastic disease are common in the developing countries and are of major health hazard because of their high prevalent rate and their effect on both nutritional and immune status of the population (1) Intestinal parasitic infections mainly affect the parasitic and mental development of children who are most vulunerable, (2) Intestinal parasitic infections are distributed throughout the world. Ascariasis, hookworm infection and trichuriasis are among the most common infections in the world: other parasitic infections like abdominal angiostringyliasis, intestinal capillariasis and stronglodiasis are of public health concern (1,3).

Intestinal parasites have been shown to cause poor appetite, intestinal abnormalities, poor absorption or increased loss of nutrient, which may result in protein-energy malnutrition (4). Chronic parasitism in a population will only not jeopardize their health, it will also render them susceptible to other diseases, weaken them, make them less effective thereby reducing their productivity level and academic performance (2) and as a rule this may lead to low contribution in moving the nation forward. Therefore, regular monitoring of the prevalence of parasitism in such area is essential as a prelude to effective management and control of these infections.

Thus, this study is designed to determined the prevalence of intestinal helminthic infection among school children in a peri-urban community of Ibadan, Nigeria to form a baseline data for evaluation and control of the infection.

MATERIALS AND METHODS

Study area: the study was conducted in November and December 1999 in a peri-urban community situated 10 kilometers northeast of the Ibadan metropolis in Lagelu LGA of Oyo State Nigeria in the rain forest zone. The community has a population of about 7,000 (Nigeria census of 1991) of predominantly peasant farmers, though some are engaged in distributive trade and civil service work.

Sample Selection and collection: For the purpose of this study all the five primary schools in the area were enlisted. Only pupils in primary 3 up to primary 6 were selected as recommended by WHO. The consent of parents was taken before sampling. A total of 248 pupils of both sexes were examined in the 5 schools – 27, 34, 66, 41 and 80 respectively. All samples were collected with the full cooperation and assistance of teachers pupils and parents.

The subjects were given a stool receptacle on the eve of the day of examination with specific instruction to collect in the morning while blood samples were taken by finger prick into heparinized capillary tube sealed with a plasticine.

Other data collected included age, sex, class, schools, weight and height and arm circumference.

Sample Analysis

The faecal samples were examined for parasites using the method described by WHO (5): Direct level saline preparation of stool smear was examined for ova of parasite under the microscope. Negative samples were subjected to concentration method as described (5).

Haematocrit value of patient was determined using the microhaematocrit method described by Dacie and Lewis (6).

The data analysis was done by using computer with SPSS package to determine correlation coefficient, chi-square were applicable.

RESULTS

Intestinal helminthiasis among school age children by age and sex in peri-urban Ibadan is shown in

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Table 1 Result shows that peak infection (58.8%) occurred in the age group 9-11 years old followed by those in age bracket 15-17 years old (72.20%). Data revealed that there is no significant difference in prevalence by age (P >0.05). Similarly there is no statistical difference in sex of pupils as regard disease prevalence (P>0.05) The most prevalent parasite is *Ascaris* (40.7%) followed by *Trichuris* (4.8%). Data reveal significant difference in the occurrence rate of parasitic disease among schools (P <0.05).

AGE	SEX	No Exam	A. Lumbricoides No Infec.	% Infect.	Hookworm No. Infect.	% Infect.	T. trichinus No. Infect.	% Infect.	E.vermicularis No infect.	No Infect.	S. stercoralis %	%	Total No Infect.	%
6-8	M	9	3	15.7%	0	0%	0	0%	0	0%	0	0%	3	36.8%
	F	10	4	20%	0	0%	0	0%	0	0%	0	0%	4	
9-11	M	55	20	16.8%	5	4.20%	2	1.7%	0	0%	0	0%	27	58.80%
	F	64	34	28.60%	4	3.40%	4	3.4%	1	0.8%	0	0%	43	
12-14	M	38	16	17.40%	1	1.10%	0	1.1%	0	0%	1	1.1%	18	38%
	F	54	14	15.20%	1	1.10%	2	2.2%	0	0%	0	0%	17	
15-17	M	12	6	33.30%	0	0%	2	1.1%	0	0%	0	0%	8	72.2%
	F	6	4	22.2%	0	0%	1	5.6%	0	0%	0	0%	5	

Table 1: PREVALENCE OF INTESINAL HELMINTH INFECTION AMONG HE SCHOOL CHILDREN BY AGE AND SEX

Prevalence of helminthiasis by schools is shown in Table 2. The difference in the rate of parasitic infections by school is statistically significant (P <0.05). The highest prevalent rate in a school was 85% followed by 79% while one of the schools recorded 18.5%.

	SEX	Number Exam	A.lumbricoidses No (%) Infect	Hookworm No. (%) Infect.	T. trichirura No. (%) Infect.	E. Vermicularis No. (%) Infect.	NO (%) Infect
St. Stephen Anglican Primary School 1 Alegongo (Peri Urban)	M	13	3(11.1)	0(0)	0(0)	0(0)	3(18.5)
	F	14	2(7.4)	0(0)	0(0)	0(0)	2
St. Stephen Anglican Primary School 2Alegongo	M	20	12(35)	2(6)	0(0)	0(0)	16(79)
	F	14	8(24)	2(6)	0(0)	0(0)	11
Ebenzer Anglican Primary School Orunda Abaa (Rural Area)	M	30	18(27.3)	3(5)	1(2)	0(0)	24(85)
	F	36	24(36.4)	5(7)	0(0)	0(0)	32
IDC School Akobo (Peri Urban)	M	24	7(17)	0(0)	0(0)	0(0)	7(46.3)
	F	17	12(29)	0(0)	0(0)	0(0)	12
IDC School Akobo (Peri Urban)		38	10(16)	0(0)	0(0)	1(1)	13(28)
	F	42	5(6.3)	0(0)	0(0)	0(0)	15
Total			248(40.7)	12(0.05)	1	1	107(43)

TABLE 2: PREVALENCE OF INTESTINAL HELMINTHIC INFECTION AMONG THE SCHOOL

Table 3 showed the degree of weight difference in both male and female school children compared with a marked depreciation due to the rate of infection. The weight loss affects all the children, with a marked depreciation due to the rate of infection. The weight loss increases along the age of the children but well pronounced in the age group 15-17 years old.

Generally there is a weight loss compared to the standard and this is linearly related to the rate of infection by sexes and ages with no significant difference (P >0.05), which implies that many children are nutritionally unstable. However the data analysis show significant difference in the weight loss and the infectivity rate (P <0.05), which are inversely proportional.

AGE	SEX	No. Exam.	Working Weight Mean value (kg)(W1)	Standard Weight Mean value	Weight Difference ($W_1 - W_2$)	No. Infect.	% Infectivity
6-8	M	9	20.3	23.14	2.84	3	33.3%
	F	10	19.4	23.3	3.9	4	40%
9-11	M	55	24.1	32.4	8.3	27	49%
	F	64	24.3	33	8.7	43	67%
12-14	M	38	27	45	18	18	47%
	F	54	29	48	19	17	32%
15-17	M	12	32	60	28	8	67%
	F	6	34	56	22	5	83%

TABLE 3: AVERAGE WEIGHT BY AGE, SEX AND WEIGHT LOSS AS COMPARED WITH THE STANDARD

Table 4 shows the degree of height difference with standard for both sexes. Result shows that infection retards growth rate of the children irrespective of the sex – an indicator of nutritional instability ($P < 0.05$).

AGE	SEX	No. children Exam.	Working Height (CM) Mean value	Standard Height (CM) Mean value	Difference	Total No. Infect.	Infectivity
6-8	M	9	41	48.1	7.1	3	33.3%
	F	10	40.24	48	7.8	4	40%
9-11	M	55	43.2	55	12	27	49%
	F	64	43	55	12	43	67%
12-14	M	38	47	61	14	18	47%
	F	54	47	62	15	17	32%
15-17	M	12	46	69	23	8	67%
	F	6	48	64.03	16.02	5	83%

TABLE 4: RELATIONSHIP OF AGE, SEX AND WEIGHT COMPAED WITH THE STANDARD MEAN HEIGHT/AGE DISTRIBUTION OF WITH COMPARED WITH THE STANDARD.

The result of the mean haematocrit value of both male and female school children (Table 5) shows that the higher the disease prevalence the lower the haematocrit value of the child ($P<0.05$).

AGE	SEX	NO. Exam.	Mean Heamatocit value %	No. Affected	% Infectivity.
6-8	M	9	34	3	33.3%
	F	10	32	4	40%
9-11	M	55	31	27	49%
	F	64	33	43	67%
12-14	M	38	32	18	47%
	F	54	36.	17	32%
15-17	M	12	33	8	67%
	F	6	33	5	83%

TABLE 5: DISTRIBUTION OF MEAN HEAMATOCRIT VALUE BY AGE

The prevalence and intensity categories of intestinal helminth is shown in table 5 of the 40.7% with *Ascaris* 40.6% had light infection with only 0.1% having moderate shown that all the 4.4% of the population infected with. Hookworm infection had light infection while 4.5% afflicted by *Trichuris* had moderate infection.

PARASITE	ASCARIS LUMBRICOIDES	HOOK WORMS	T TRICHURA
PREVALENCE	4.70%	4.40%	4.80%
INTENSITY (EPG)	-	-	-
NEGATIVE	59.30%	95.60%	95.20%
LIGHT	40.60%	4.40%	0.30%
MODERATE	0.10%	0.0%	4.50%
HEAVY	0.%	0.0%	0%

TABLE 6: PREVALENCE AND INTENSITY CATEGORIES OF INTESTINAL HELMINTH

A. Lumbricoides
Light – 1-4999epg
Moderate – 5,000 –49999epg
Heavy – 50,000 + epg

Hookworm
Light – 1-999epg
Moderate – 2,000 –9999epg
Heavy – 50,000 + epg.

Trichuris trichiura
Light – 1-999epg
Moderate – 1,000 –9999epg
Heavy – 10,000 + epg.

DISCUSSION

Morbidity due to soil transmitted helminthiasis has remained major problem in the study area with an over all prevalence rate of 43%. This study has shown that *Ascaris lumbricoides, T. trichiura,* hookworm, S. *stercoralis E. vermicularis*, were the commonest parasites isolates. This report is not significantly different from some previous records (7, 8). The high prevalence is not unconnected with the fact that poor sanitation, lack of knowledge on health care in the study area, compared with poor personal and environmental hygiene practice.

The commonest human gastro-intestinal parasite among the study population was *A lumbricoides* with a prevalence rate of 40.7% that is significantly lower than 43.7% infection rate among subjects in Oluyole L.G.A., Oyo State of Nigeria (9) but accord well with the 40.0% prevalence rate reported among school children in Ilorin (10). The high morbidity due to *Ascaris* is a reflection of environmental contamination and unsanitary life style in the study area. This is a dangerous trend as intestinal parasites have been shown to impact deleterious effect on children especially those of school age (2,11, 12). *Ascaris* has been implicated with nutritional states of the patients. For instance, woodruff (12) observed that the presence of *Ascaris* in children is often associated with poor nutritional states. Gupta (11) believed that *Ascaris* contributed significantly to malnutrition among India children. He submitted that control of such infection could be a valid and practical method of nutritional intervention in communities with high prevalence of both malnutrition and intestinal helminthes.

Our study has shown that light infection is more common among children with an average of 2000 epg, a clear reflection of chronic infection characterized by low number of composted eggs without prejudice to the actual burden (2). This light infection may not be unconnected with (demure) during abuse among the study population as earlier observed by Adeyeba and Akinlabi 92). The subjects confirmed that the local health official once carried out a dowering flurry on the children I not too a distant past.

The relatively low rate of hookworm (4.4%) and Trichuris (4.8%) infection respectively is constant with the report of Agi (13) – 3.5% and 5.0% respectively in higher Delta area of Nigeria. It was observed that virtually all the children in the study render them more vulnerable to soil transmitted helminthic infection – hookworm and strongyloides –as they are throne to constant contact with the soil contaminated with infection stage of the parasite.

Although the study population had light hookworm infection the impact on their health cannot be overlooked. According to Stortzfius et al (17), light intensity infection are related to a loss of less then 2mg of heamoglobin per gram of faeces in African children who are infected heartily with *Necator americanus*. As the entire study population positive for strongyle egg were infected with this parasite specie, as shown in this study, then the infected individual suffers a loss of about 2g% haemoglobine per gram of faeces and by implication they are clinically aneamic. This assertion has been confirmed in this study as the subjects were found to have very low haematocrit vlaue (15,16).

This study has shown that the weight of the subject has been adversely affected by the parasitic infection that has given a picture of low weight compare to their height and age, a clear indication of adverse effect of infection on the subject. Therefore it appears from this study that the number of worm harbourd by individual ahs directly affected nutritional status of subject. There is an adverse effect on normal growth using weight and height as growth marker. Our inference has been supported by Stephenson (17) who also reported that worm antagonize the child metabolism and diminished appetite which reduces the weight that children with heavy warm infection are usually of substandard weight and height and shows common symptoms of malnourishment. For this category of people, case management should include the treatment of positive cases, an information, education and communication (IEC) strategies has a great impact and should be extensive implemented.

The prevalence of the third commonest parasite, Trichuris trichiura was 4.8%. This finding conformed tot he previous report of 5% in the Niger Delta area (13). It was observed that the subjects in the area of study are fond of eating unwashed fruits picked from the soil that may have been contaminated with the infective stage of this parasite. It is a common sit to see children and adult like eating food wrapped with papers, leaves etc picked from doubtful sources: the practice which may promote the transmission of this parasitic infection. The worm burden in subject revealed a moderate infection using the criteria of HWO (18) with the attendant adverse effect on the normal growth of the subject, which may manifest clinically as malnutrition.

There is a general picture of high prevalence of low haematocrit value among the subject. Some other workers (8) also think likewise that the parasite infection is related to severe anaemia which present clinical picture like weight loss, occasionally recta prolapse with worms embedded in the mucosal and extreme cachexia.

The prevalence of *Strongyloides stercoralis* (0.4%) and *Engterobius vermicularis* (0.4%) were very low. The low prevalence of *Strongyloides* may not be unconnected with the climate and weather at the time of the study – the ground was so dry which may have contributed immensely to the unlivable infective stage which were unable to penetrate the unbroken skin the portal of infection.

This study has shown that more females than males were infected with intestinal parasites, though differences was not significant. Our report also shows

that the age difference has no significant effet on prevalence despite this fact, we observe a gradual decrease in prevalence rate with increasing age group. This might be due to change in attitude, habits and more awareness towards personal hygiene and knowledge of health education.

It has been shown that intestinal parasites have deleterious effect on nutritional status of the subject through competition for nutrients, pathological changes, poor utilization of macro and micro nutrients, malabsoption of nutrient loss, altered metabolism, diminshed appetite, lowered immunity, sub-standard weight and height given sign of malnutrition (2, 4, 17) in the children, there is growth retardation and reduced learning ability (19,20).

This study has shown that intestinal helminthiasis among malnourished school age children in health problem in the area and Nigeria at large.

In view of the considerable morbidity and the public health significance of these parasitic infections, coupled with the fact that children are the future of any nation, it then becomes necessary as a matter or urgency to control these infections in the community. It is therefore suggested that only well organized health education programmed on personal hygiene and community health and adequate supply of portable and safe water in addition to the provision of basic sanitation facilities like toilet, shall bring a long lasting solution to the menacing problems of the infection. The community leaders head of schools, the staff, the pupils and also the local authority have a vital role to play in the rescue operation. In accordance with the recommendation of the WHO (21) a mass treatment of the entire study population is to be advocated in view of the magnitude and scope of the infection. Periodic deworming of children should form part of child care in the area.

Effort should be geared up to improve the nutritional status of the children by parents and the authority concerned as nutrition play an important role in infection by parasites and in severity of the disease produced. The interaction of infection, nutrition and immunity suggest the reciprocal for example the intensification of the worms malnutrition and immunosupression.

REFERENCES

1. Latham M.C. Strategies for the malnutrition and the influence of the nutritional sciences *Am. J. Clin. Nutrition* 1984 10:5-31.
2. Adeyeba O.A. & Akinlabi M.A. Prevalence of intestinal helminthasis among school children in Igbo-Ora, Nigeria *Nig. J. Health Sc.* 2000 (in press).
3. World Health Organization: Prevention and control of intestinal parasitic infections Report of a WHO expert committee. Technical Report Series 749 WHO genera 1987, p. 12.
4. Tomkins, A.M: the significance of intestinal parasites in malnourished population. *Parasitology*, 1981: 82: 31-48.
5. WHO Basic Laboratory methods in medical parasitology. World Health Organization Genera 1991.
6. Dacie, J.V. Lewis S.M: In practical haematology 7th Ed. Churchill Living stone 1991, p. 70-71.
7. Adeyeba O.A. Dipeolu, O.O: A survey of gastro intestinal parasite in a Local Government Area of South-West, Nigeria *Int. J. 200n* 1984, 11: 105-110.
8. Ighogboja I.S. Ikeh, E.I: Parasitic agent in childhood diarrhoea and malnutrition. *West Afr. J. Med.* 1997 16(1): 36 – 39.
9. Adeyeba O.A. Intestinal helminthiasis and heamoparasitism in an area of endemic dracunculiasis in Oyo State of Nigeria Int. J. Zoon 1986, 13: 6-10.
10. Adedoyin, M.A. Awogun I.A.; Tim Juergeneen: Prevalence of Intestinal parsite in relationship to diarrhoea among children in Ilorin, Nigeria, West Afri. J. Med. 1990, 9(2): 83-87.
11. Gupta M.C. Pardad, N. Tandon, B.N. Effect of roundworm infection upon growth and nutritional status Ind. J. Prev. Soc. Med. 1978, 9: 31-33.
12. Woodruff A.W. In medicine the tropics 1st Ed. Churchill Living stone 1974 pg. 157-371.
13. Agi, P.I: Pattern of infection of intestinal parasites in sagbana community of the Niger Delta, Nigeria West Afr. J. Med. 1995 16(4) 223-246.
14. Stoiltzfus R.J. Albonico M: Chwaya, H.M. Savoili L. Tielsh J: Schulze, K; Yip, R: Hemoquant determination of hookworm – related blood loss and its role in iron deficiency in African children Am. J. Trop. Med. Hyg. 1996, 55(4): 399-404.
15. Roche, H. Layrisse, M. The nature and causes of hookworm anaemia Am. J. Trop. Med. Hyg. 1996, 55 1031-1102.
16. Booth M. Bundy D.A. coparative prevalence of Ascaris lumbricoides, Trichuris Trichitura and Hookworm infecion and the prospects for combined control Parasitol 1992, 105, 151-157.
17. Stephenson, L.S. Crompton, D.W.J. Latham, M.C. Relationship between Ascaris infection and growth of malnourished pre school children in Kenya. Am. J. Clin. Nutri. 1987: 33, 1165- 1172.
18. Montresor A. Crompton, D.W. T; Bundy, D.A.P. Hall, A. Savioli L. Guidelines for the evaluation of soil transmitted helminthiasis and schistosomiasis at community level. A guide for managers of control programmes WHO/CDC/SIP/98 1, 1998, P. 29-31.
19. Adams E.J. Stephenson L.S. Latham M.C. Kinoti S.N. Physical activity and growth of Kenya school children with hookworms, *Trichuris trichirua* and Ascaris lumbricoides infections are improved after treatment with albendazole J. Nutrition 1994, 124: 1199-1206.
20. Nokes C. Grantham- McGregor, S.M. Sawyer A.W. Cooper E.S. Bundy, D.A.P. Parastic helminth infection and cognitive function in school children proceeding of the Royal Society of London, 1992, 247:77-81.
21. WHO report of the WHO informal consultation on the use of chemotherapy for the control of morbidity due to soil transmitted Nematodes in Humans. World Health Organization Genera WHO/CTD/SIP/96.2 1996.