

Original Article

INTESTINAL PARASITES AND NUTRITIONAL STATUS OF NIGERIAN CHILDREN

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The nutritional status of children with heavy intestinal parasites was studied as compared to children of similar socio-economic background and characteristics with non parasitic infections. The result revealed the fact that the children with heavy intestinal parasites were shorter in heights and lower in weights than non infected children. They also exhibited more skin infections, angular scars and dental caries than their non infected counter parts.

Key Words: Intestinal Parasites, Child Nutrition and Home Environment.

INTRODUCTION

Intestinal Parasitic infections are among the most prevalent of human parasitic infections world wide (Jeliffe, 1966; Toriole, 1990; WHO, 1986). They had been longed recognized as an important health problem especially among Nigeria Children (Kow, 1986; Janes, 1974; Oduntan , 1974; Ajayi, 1999; Olusi, 1975; Salimon, 1980). Several epidemiological studies had indicated a high prevalence rates of intestinal infections among Nigeria children, (Salimon and Akinyemi 1986; WHO, 1978, 1987; Fasuyi, 1984; Graitcher, 1988). Few studies had also indicated a direct correlation between the intensity of infection with hook worms and with *Ascaris lumbricoides* and non deficiency anaemia and intestinal obstruction (Salimon, 1980). Majority of Nigerian Children from low socio-economic class has been found to be anaemic, stunted with retarded growth and under weight due to malnutrition (WHO, 1987; Onadeko and Oladipo, 1989).

Consequently, this study was carried out to determine the prevalence of intestinal parasites among three major sectors of Ibadan Urban metropolis and to correlate the findings to child's health status and environmental sanitation in a major urban community in Nigeria. The main objective is to be able to design a good programme that can improve the

health status of Nigerian children, their home environment and personal hygiene.

MATERIALS AND METHODS

This study was carried out in Ibadan the capital of Oyo State and one of the largest urban cities in Nigeria. It has a population of 2.5million. This study was conducted using the multistage sampling method and the residency areas were stratified based on Awe and Mabogunje stratification pattern (Jeliffe, 1966). The inner core area, the working class area and the peripheral area mostly for top civil servants and upper class members of society were stratified for the sample selection

The children were therefore categorized according to the three areas. A multistage random sampling technique was used to select the children in each category. The number of children studied in each group was calculated by probability proportional to the size of the actual number of children in each locality. Selection of the children were then made by systematic sampling with a random chart, having calculated the sampling interval for each neighborhood.

A total number of 1,273 children from 312 families were examined. The children were examined for body build, skeletal development and condition of

the skin, face and mouth. Information on date of birth and sex, were also collected and anthropometric measurement was made, using a wooden measurement stadiometer for height measured and baby weighted scales for children below one and digital electronic scales were used for older children. Also stools specimens were also collected for all the children in ages 0-15 for examination for parasites in the intestine. Protozoa including intestinal flagellates inhabiting the alimentary canal were examined for and also for helminthes.

Statistical Analysis: Heights and weights were measured using the technique described by Jelliffe (1966) Janes (1974). Comparisons were made between the three groups of children of sex and age using chi-square test and analysis of variance. Difference were shown to be statistically significant where $P < 0.05$ to determine the proportion of wasting under weight and over weight, the following cut off points were used for stunting 2 score of height for age 2-2SD wasting. 2 score of weight for height L-2SD underweight for age L-2.OSD overweight 2 score of weight for height 7+2.00 (cut off points of L 3.0SD was used to determine score forms of malnutrition in the children standard (WHO 1986).

Laboratory Investigations: The stool specimens were examined for parasites in the intestine, the protozoa including intestinal flagellates inhabiting the alimentary canal and also for helminthes. Saline wet preparation and formol-ether sedimentation were carried out on each specimen; approximately 19m. faeces was emulsified in 20ml of distilled water, strained through cheese cloth, centrifuged 1500r.p.m. for two minutes. Discarded the supernatant washed with distilled water centrifuged and discarded this too, then added 10ml 4% formol-saline and 3ml ether. Shaken vigorously centrifuged 2000r.p.m. for two minutes and loosened the fatty debris at the interface of liquids with a swan stick and poured off the supernatant. The small

deposit at the bottom of the centrifuge was shaken before poured on to a slide and examined.

Socio-Economic Group: For the Nutritional Status study, A total of 60 children from twelve families were examined. The families were randomly, but proportionally, selected from three stratified homogeneous residential areas of the city of Ibadan. Representing three socio economic group i.e the low socio economic group at the inner core of the city alternatively called the traditional group, working class (i.e. the middle class), and the upper class group.

RESULTS

From Table 1, 55.8% of the children had no intestinal parasites while 44.2% of the children were found to have one form of the intestinal parasites or the other. For the helminthes, 39% were ascaris, 28.4% trichuria, 26.5% for hookworm. The protozoa, 35.3% were for *E. coli*, 32.5% entamoeba and 19.7% trichomas.

- (a) *Intestinal Parasites and Age of the Children:* 92.8% of the infected children were in age between 1-4 years. 69% were in age 5-9 and 34.6% in age 10-15 (Table 2).
- (b) *Intestinal Parasites and Socio-economic Characteristics:* 33.4% of the infected children were from low socio-economic class whilst 86% of the children in the upper class harbours no intestinal parasites (Table 3)
- (c) *Socio-Economic Variables of Selected Children for Nutritional Status Infected. (IF) and Non Infected (NF):* The median age of the two categories of the children were 64% to 65% in months respectively. The median family were 6.3 (IF) and 5.8 (NF) social class based on father's example were two each respectively. Number with in-doors plumbing eight and nine, and number with pit latrine were seven and respectively. (Table 4)

Table 1:
Percentage Distribution of Intestinal Parasites Found in the Stool Specimen of the Children

	No	%
Helminthes		
<i>Ascaris lumbricoides</i>	128	39.0
<i>Trichuris trichuria</i>	93	28.4
Hookworm	87	26.5
<i>Strongyloides stercoralis</i>	4	1.2
<i>Taenia saginata</i>	14	4.3
<i>Enterobius vermicularis</i>	2	0.6
<i>Schistosoma mansoni</i>	5	-
Sub total	328	25.8
Protozoan		
<i>Trichoma homines</i>	46	19.7
Entamoeba histolytic	76	32.5
Entamoeba coli	85	35.5
Giardia Lamblia	3	1.3
Chilomastix mesnili	13	5.5
Endolimax nana	5	2.1
Lodamoeba butschilii	3	1.3
Balantidium coli	2	0.8
Blastocyst is homines	1	0.4
Sub total	234	18.4
No parasites	711	55.8
Grand total	1273	100

Table 2
Percentage Distribution of all children with Ascaris and hookworm and non infected children.

Age	Total No of children	Infected	Non infected
Under 1	412	36 (6.7)	37.6(91.3)
1-4	294	273 (92.8)	21 (7.2)
5-9	307	212(69.0)	95 (31.0)
10-15	228	79 (34.6)	149 (65.4)
Unknown	32	4 (12.5)	28 (87.5)
N	1273	562 (44.1)	711 (55.8)

(d) Dietary habits of the children IF & NF (Table 5):

Carbohydrates and Protein: 3.7% of the infected children were on carbohydrates diets, and 2.1% of the non infected, 1.9% of the none infected were on protein diet as against 1.3% of those with infections.

Vegetables: 5.1% of the infected children were on vegetables and 5.2% of the non-infected children were also on vegetables.

Bread and Cereals: 3.6% of the children with non infection were on bread and cereals and 3.4% of the infected were also on bread and cereals.

Milk: 1.2% of the non infected children were on milk while 6.2% of the infected were also on milk as their diet.

Table 3:
Distribution of children with Intestinal parasites by class

Class	Infected		Non Infected	
	No	%	No	%
Upper class	69	16.0	361	86.0
Middle class	242	37.1	411	62.9
Lower class	25	33.4	501	66.6
N	562	44.1	1273	1273

Table 4
Socio-Economic and age variables among infected children and non infected children

Variables	Infected N = 60	Uninfected N = 60
Median Age (Months)	64	65
Median Family size	6.3	5.8
Median father's social Class	21	22
Number with indoor plumbing	8	9
Number with pit latrines	7	8

Table 5:
Dietary intake of the infected and non Infected Children

Food group	Infected N = 60	Percentage of children with inadequate intake Non infected N = 60
Protein (Meat, fish etc)	1.3	1.9
Mainly carbohydrates	3.7	2.1
Milk	0.2	1.2
Vegetables	5.1	5.2
Bread & Creeds	3.4	3.9

(f) Intestinal Parasites and Weight and Height of the Children (Table 6)

i. 73.2% of the non infected children were below 25 percent and compared to 55.7% of the infected children,. Whilst 10.4% were above 74 of the non infected and 1.6% in the infected children.

ii. On Weight for Age: A higher percentage were above in the non infected children,.23.7% as against the 17.2% of the infected children.

iii. Weight for Height: 58.9% of the non infected children were below 50.74 in

percent as against 28.9% of the infected children.

Table 6:

Percentage Distribution of all heavily infected children with Ascaris and hookworm and non infected (matched control) by Janes and Jelliffe percentiles for height.

Percentile	Heavily infected children	Non infected children (N = 60)
Height for Age		
<25	58.7	73.2
25-49	8.4	12.3
50-74	31.3	4.1
74	1.6	10.4
Weight for Age		
<25	44.8	32.4
25-49	28.3	29.6
50-74	9.7	14.3
<74	17.2	23.7
Weight for height		
<25	9.3	3.2
25-49	45.6	23.4
50-74	28.9	58.9
<74	16.2	14.5

Table 7

Percentage of children with selected clinical findings among heavily infected children with Ascaris and hookworm and non-infected children

Clinical Findings	% of infected children	% of non infected children
Skin		
Nasolabial seborrhea	14.3	3.1
Follicular hyperkeratosis	18.7	15.0
Xerosis	3.4	10.7
Lips		
Angular scars	32.3	1.3
Tongue		
Fungiform papillary Hypertrophy	43.2	24.6
Teeth		
1 - 3 caries	21.3	12.4
4 - 8 caries	22.4	13.2
9 caries	7.3	0.2

(g) *Intestinal Parasites and skin, lips and teeth and Tongue of the Infected and Non Infected Children (Table 7).*

- I. Skin: 14.3%, 18.7% and 3.4% of the infected children had nasolabial seborrhea, follicular and xerosis as compared to 3.1%, 15% and 10.7% of the non infected children respectively.
- II. Lips: 32.3% of the infected children had angular scars as against 1.3% of the non-infected children.

III. Tongue: 43.2% of the infected children had fungi form papillary hypertrophy as against 24.6% of the non infected children.

IV. Teeth: 21.3% of the infected children had 1-3 caries, 22.4% had 4-8 caries and 7.3% had 9 caries as against non infected with 12.4% for 1-3 caries, 13.2% for 4-8 caries and 0.29 for 9 caries.

CASE REPORT

T.A, a 2.5 year old girl, was found to be anaemic and have weak vascular development. According to the mother the child has not walked since birth, she would only sit or just stand holding on to a chair. She was put on a worm expeller (Antepar) and some vitamin supplement. According to the mother, she passed a lot of worm and within one week, she was able to walk. The anaemia disappeared and she gained weight. Suddenly she changed from a cheerless, shy and unfriendly child to an active, alert and happy girl.

DISCUSSION

The children studied belonged to various socio-economic classes. Those in low socio-economic families were found to be more prone to poor dietary habit, to be more anaemic and thinner than children from high and moderately middle income families. More importantly children infected with intestinal parasites tended to be thinner than non infected children.

The weight for height measurement showed a remarkable difference between ascaris and hookworm infected children and inadequate weight gain. Clinical evidence of riboflavin deficiency (Angulastomatitis and nasolabial seborrhea) was more common in infected than non infected children. A gender percentage of the infected children were also found to have follicular hyperkeratosis and xerosis of the skin associated with vitamin A deficiency. Fungi form papillary hypertrophy of the tongue, a non specific sign of nutritional deficiency (though common in both groups) was more common in infected

children. Consequently, there is no doubt that *Ascaris* infection and hook worm produced a remarkable and significant adverse effect on the weight gain, skin and mouth condition of the infected children compared to non infected children. There is no doubt that the infection make a significant contribution to the development of nutritional deficiencies in the group the children studied. The case study of infant T.A. particularly highlighted is a vivid example of the delimitating effect of heavy infection of *Ascaris* and hookworm on the growth, and developmental process of the children who are the victims of these types of intestinal parasites. Therefore, programmes (similar to vaccination) aimed at eliminating intestinal parasites in children from developing countries are needed.

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