



THE PREVALENCE OF GASTRO-INTESTINAL TRACT PARASITES IN THE INHABITANTS OF BORI MILITARY CANTONMENT IN PORT HARCOURT LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA

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ABSTRACT

A study on the prevalence of gastro-intestinal tract (GIT) parasites was conducted on pupils of Bori Military Primary School and adults residing in the cantonment of Port-Harcourt Local Government Area of Rivers State, Nigeria. 290 stool samples from pupils aged 6-14 and adults aged 21-60 were examined. Parasites recovered included *Ascaris lumbricoides*, *Necator americanus* (hookworm), *Trichuris trichiura*, *Strongyloides stercoralis*, *Teania saginata* and *Enterobius vermicularis*. Overall prevalence rates of 84.6% in pupils and 99.0% in adults were recorded; *A. lumbricoides* formed the bulk of the infections and *E. vermicularis* the least. Multiple infections of two-three parasite combinations were encouraged, *A. lumbricoides*-hookworm combination being the most common. Higher prevalence rates of infection occurred in pupils of age groups 9-11 and 12-14. Infection was greater among pupils drinking water from river/stream and those using pit/bush for toilets. Although increasing number of adults used pipe-borne water/as source of drinking water and water cistern toilet system yet overall infection rate was high, with females having greater prevalence than the males particularly with *A. lumbricoides* infection.

INTRODUCTION

Gastro-Intestinal tract (GIT) parasitic infections are of great public health importance and have been rated among the most common infections worldwide (WHO, 1998.b; Kang et al, 1998 and Compton and Savioli, 1993). Current estimates by WHO (1998b) showed that about 3.5 billion people are infected, 450 million are ill, majority of which are children. The public health importance of GIT parasites is due to the high morbidity caused in school children and women during their child-bearing years (Ukpai and Ugwu, 2003). Children are the most affected because they harbour heavy infections due to their vulnerability to nutritional deficiencies (Mafiana, 1995 and WHO, 1992).

These infections impact negatively on the physical fitness and cognitive performance of pupils (Luka et al., 2000 and Ikon and Useh, 1999). Concomitant pathologies such as anaemia, malnutrition, intestinal obstruction, *Trichirus* dysentery syndrome (TDS), fever and colitis are potential fatal clinical symptoms of the major GIT parasites.

Ascaris lumbricoides, hookworm and *Trichuris trichiura* are among the major GIT parasites found associated in multiple infection. Poor environmental hygiene and poor socio-economic conditions are among the factors that promote the survival and transmission of GIT parasites. Faecal contamination of food or water and use of soil (contaminated with faeces) as fertilizers are the major routes of transmission of GIT parasites. Direct life cycle is exhibited by GIT parasites such

that they are transmitted from human via faeco-oral routes, during which ova or cysts are discharged in human faeces. Widespread contamination of the environment occurs and infective stages are eventually swallowed by new hosts (Variyam, 1998 and Compton and Savioli; 1993). Shortage of clean drinking water, poor standard of sanitation and personal hygiene, inadequate health education, ignorance and certain cultural practices serve to promote the widespread of GIT parasites especially in endemic areas. No previous study on the prevalence of GIT parasites exists in the study area. This study was therefore carried out to determine the occurrence and magnitude of GIT parasites in pupils and adults in the study area with a view to monitor. The community's level of sanitation and to highlight the fact that for any meaningful control measures to be achieved, problem of water disposal, supply of clean drinking water, health education and environmental sanitation must be adequately addressed.

MATERIALS AND METHOD

This study was carried out in Bori Military Cantonment (7° 7'50" E and 4° 4' 45" N) in Port Harcourt Local Government Area (LGA) of Rivers State, Nigeria. The study area has a typical tropical rainforest climate with constant high temperatures (35 ± 2°C) high rainfall and relative humidity between 80-85% during the rains.

Two educational institutions, namely Bori Military primary school and secondary school exist

in the area. Residents of the area comprised of the military personnels and their families as the dominant group, civil servants, petty traders and casual workers. The supply of pipe-borne water is inadequate so that the inhabitants resort to the use of water from boreholes and nearby river/stream. Poor waste disposal and drainage systems characterize the community, urban slums are common and indiscriminate defaecation constitute environmental hazard to both the public and individual health.

DATA COLLECTION

Permission was sought and obtained from the authorities in charge of the primary school and the cantonment. Data collection involved the use of questionnaires and stool samples. Pupils in the primary school and resident adults were randomly selected, and given well-labelled sample. Bottles. Faecal samples were collected from recipients of the sample bottles in the morning and taken to the laboratory for processing and analysis. Information sought included name, age, sex, place of

residence, occupation, source of drinking water and toilet facilities available to individuals at their homes.

In the laboratory, the faecal samples were examined for ova, cyst and/or larva of gastrointestinal tract parasites using the direct wet mount microscopic examination and the formol-ether concentration technique (Smith and Bartlet, 1991).

RESULTS

An overall high prevalence rate of six gastrointestinal tract (GIT) parasites was recorded among school children (84.6%) and adults (99.0%) in the study area. *Ascaris lumbricoides* had the highest prevalence rate in children, 36.2% and adults, 43.1%; followed closely by *Necator americanus* (17.6% in children, 22.6% in adults) and *Trichuris trichiura* (12.8% in children, 21.6% in adults). *Enterobius vermicularis* had the lowest prevalence rate of 3.7% in children, non in adults (Table 1).

TABLE 1: OVERALL PREVALENCE RATE OF GASTRO-INTESTINAL TRACT (GIT) PARASITES IN THE INHABITANTS OF BORI MILITARY CANTONMENT IN PORT HARCOURT L.G.A (N= 290)

GIT PARASTES	SCHOOL CHILDREN (n= 188) Number Infected (%)	ADULTS (n=102) Number Infected (0%)
<i>Ascaris lumbricoides</i>	68 (36.2)	44 (43.1)
<i>Necator americanus</i>	33 (17.6)	23 (22.6)
<i>Trichuris trichiura</i>	24 (12.8)	22 (21.6)
<i>Stronglyoides stercoralis</i>	17 (9.0)	9 (8.8)
<i>Taenia saginata</i>	10 (5.3)	3 (2.9)
<i>Enterobius vermicularis</i>	7 (3.7)	--
TOTAL	159 (84.6)	101 (99.0)

Sex-related prevalence showed higher values for females than in the males in both school children and adults (Table 3). Age-related prevalence showed all the age groups (6-8,9-11,12-14) in the school children and all th adult's age groups having high infection rates especially for *Ascaris lumbricoides* (Table 2). Multiple infections involving two or three parasite combinations were recorded, of which *Ascaris lumbricoides* and hookworm combinations had the highest prevalence rates in both school children (6.9%) and adults (5.9%), followed closely by *A. lumbricoides* and *T. trichiura* combinations (Table 4).

Pupils whose source of drinking water was the river/stream had high prevalence rates for all the age groups (Table 5) while age groups 9-11, 12-14, add high rates of 30.8% and 38.5% respectively for using pit and /or bush toilet (Table 6). In the adults, regardless of the source of drinking water or toilet systems, prevalence rates in all age groups showed no marked differences (Table, 5&6).

TABLE 2: AGE RELATED INFECTION RATES OF GIT PARASITES AMONG THE INHABITANTS OF BORI MILITARY CANTONMENT IN PORT HARCOURT LGA.

Ages (years)	School Children			Adults			
	6-8	9-11	12-14	21-30	31-40	41-50	51-60
	n =68	n =81	n =39	n =44	n =31	n =19	n =8
GIT parasites	N1 (%)	N1 (%)	(N1%)	(N1%)	N1 (%)	N1 (%)	N1 (%)
<i>A. lumbricoides</i>	20 (29.4)	34 (42.0)	14 (35.9)	21 (47.7)	15 (48.4)	5 (26.3)	3 (37.5)
<i>N americanus</i>	10 (14.7)	15 (18.5)	8 (20.5)	12 (27.3)	4 (12.9)	5 (26.3)	2 (25.0)
<i>T trichiura</i>	8 (11.8)	10 (12.3)	6 (15.4)	11 (25.0)	6 (19.4)	3 (15.8)	2 (25.0)
<i>S stercoralis</i>	6 (8.8)	8 (9.9)	3 (7.7)	4 (9.1)	2 (6.5)	2 (10.5)	1 (12.5)
<i>T saginata</i>	3 (4.4)	4 (4.9)	3 (7.7)	2 (4.6)	1 (3.2)	–	–
<i>E vermicularis</i>	2 (2.9)	2 (2.5)	3 (7.7)	–	–	–	–

KEY: N1 = Number Infected

TABLE 3: SEX RELATED INFECTION RATES OF GIT PARASITES AMONG THE INHABITANTS OF BORI MILITARY CANTONMENT IN PORT HARCOURT LGA.

	School Children		Adults	
	Males n = 95	Females n =93	Males n =61	Females n =41
GIT parasites	N1 (%)	N1 (%)	N1 (%)	N1 (%)
<i>A. lumbricoides</i>	30 (31.6)	38 (40.9)	23 (37.7)	21 (51.2)
<i>N americanus</i>	11 (11.6)	22 (23.7)	14 (23.0)	9 (22.0)
<i>T trichiura</i>	7 (7.4)	17 (18.3)	13 (21.3)	9 (22.0)
<i>S stercoralis</i>	8 (8.4)	9 (9.7)	5 (8.2)	4 (9.8)
<i>T saginata</i>	5 (5.3)	5 (5.4)	2 (3.3)	1 (2.4)
<i>E vermicularis</i>	4 (4.2)	3 (3.2)	–	–

TABLE 4: PREVALENCE OF MULTIPLE INFECTIONS OF GIT PARASITES AMONG THE SAMPLED POPULATION (N = 290)

GIT parasite combinations	School Children	Adults
	N1 (%)	N1 (%)
AS + HW	20 (6.9)	17 (5.9)
AS + TT	16 (5.5)	11 (3.8)
AS + SS	12 (4.1)	9 (3.8)
AS +TS	5 (1.7)	2 (0.7)
TT + SS	3 (1.0)	7 (2.4)
HW +TS	2 (0.7)	1 (0.4)
HW +SS	2 (0.7)	1 (0.4)
HW + TT + AS	5 (1.7)	2 (0.7)
HW + SS + TT	2 (0.7)	1 (0.4)
AS + TT + SS	5 (1.7)	2 (0.7)
AS + HW + EV	1 (0.4)	

KEY: AS = *Ascaris lumbricoides*, HW = Hookworm (*N. americanus*)

TT = *Trichuris trichiura*, SS = *Strongyloides stercoralis*

TS = *Teania saginata*, EV = *Enterobius vermicularis*

TABLE 5: PREVALENCE OF GIT PARASITES IN RELATION TO SOURCE OF DRINKING WATER AMONG THE SAMPLED POPULATION

Ages (years)	School Children		Ages (years)	Adults	
	River/Stream	Pipe-Borne Water		River/Stream	Pipe-Borne Water
	n =27	n =161		n =14	n =88
	N1 (%)	N1 (%)		N1 (%)	N1 (%)
6-8	10 (37.0)	19 (11.8)	21-30	4 (28.6)	23 (26.1)
9-11	8 (29.6)	35 (21.7)	31-40	2 (14.3)	15 (17.1)
12-14	4 (14.8)	13 (8.1)	41-50	2 (14.3)	9 (10.2)
			51-60	3(21.4)	1 (1.1)

TABLE 6: PREVALENCE OF GIT PARASITES IN RELATION TO TOILET SYSTEM USED AMONG THE SAMPLED POPULATION

Ages (years)	School Children		Ages (years)	Adults	
	Pit/Bush	WC		Pit/Bush	WC
	n =13	n =175		n =10	n =92
	N1 (%)	N1 (%)		N1 (%)	N1 (%)
6-8	1 (7.7)	28 (16.0)	21-30	3 (30.0)	24 (26.1)
9-11	4 (30.8)	39 (22.3)	31-40	2 (20.0)	15 (16.3)
12-14	5 (38.5)	12 (6.9)	41-50	—	11 (12.0)
			51-60	—	4 (4.4)

KEY: WC = Water Cistern System

DISCUSSION

Gastro-intestinal tract (GIT) parasites infection is endemic in the study area. In both the school children and the adults *Ascaris lumbricoides* is the most common infection, followed by *N. americanus* (hookworm) and *T. trichiura*, while *E. vermicularis* is the least prevalent infection.

The endemicity of GIT helminth infections had been reported in the Niger Delta. This had been attributed to the combination of hot, humid climate, poor sanitation and personal hygiene, ignorance and cultural practices all of which enhance multiple infections with intestinal helminths (Udonsi and Morgan, 1985).

Multiparasite combination is a common feature of the prevalence of GIT helminth infections in rural areas of the tropics (Kang *et al*; 1998). Udonsi and Morgan (1985) had reported on the triad of hookworm-*Ascaris-trichuris* as common through out much of Nigeria.

The prevalence status of individual parasites in both single and combined infections is relatively similar with *A. lumbricoides* having the highest prevalence and *E. vermicularis* the lowest among the pupils and adults in the study area. Previous investigators who noticed a similar trend attributed it to the mode of transmission since most nematodes are soil-transmitted and they depend on indiscriminate defecation and poor environmental hygiene (Nwosu 1981). High

prevalence of association between *A. lumbricoides* and hookworm may be an indication of similar ecological requirements while the weak association between hookworm and tapeworm may be attributed to competition as both requires high nutritional level to survive (Udonsi and Morgan, 1985).

A. lumbricoides being the most prevalent showed no age and sex preferences in both the pupils and adults in this study area. Pupils whose source of drinking water is the river/stream and whose toilet system is either pit, bush or both were more susceptible to infections. The reason may be because the children are more exposed to contaminated soils or water environments due to their outdoor activities, as they are fond of playing in the soil, swimming and drinking contaminated water. In contrast, despite the increasing number of individuals among the adults using pipe-borne water and WC toilet systems, infection rates were still high regardless of age, source of drinking water and toilet systems. It is not impossible to attribute this to the tendency of the adults to either resort to the use of rivers/stream as source of drinking water, or bush for their toilets due to inadequate supply of pipe-borne water or failure of the WC system to function properly due to lack of water supply. This may contribute to the high level of infection observed among the females than in the males, since the females engaged more in

domestic activities such as fetching water in the community.

Very high prevalence of GIT parasitic infections has been reported to occur in rural settings, peri-urban and urban slums by Okon and Oku (2001) and Ukpai and Ugwu (2003). It is therefore not surprising to record an overall high prevalence of GIT infections in this study area due to its peri-urban setting with slums. Subsequently, the high prevalence of GIT parasites in this study forms an index for monitoring the community's level of sanitations, economic status and nutritional standard.

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