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Intestinal parasitic infestation in rural communities: a focus for primary health care in Nigeria

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Summary

A study carried out in four villages in two local government areas of Oyo State in the south-western part of Nigeria, revealed that intestinal helminthiasis is still very prevalent in Nigeria. *Ascaris* is the most common helminth encountered and multiple infestation is also quite common. Schoolchildren and pre-school children are the greatest sufferers of *Ascaris*, while students and farmers are the greatest target for hookworm.

The usefulness of a community-based distribution programme of health services using trained traditional birth attendants and voluntary health workers for data collection and distribution of antihelminth drugs is discussed.

Résumé

Une étude éffectué dans quatre villages à l'Etat d'Oyo, situé au sud-ouest du Nigéria a révélé que l'helminthiase intestinale est encore très répandue au Nigéria. L'*Ascaris* est l'helminthe le plus souvent rencontré. Une infestation multiple est tout-à-fait ordinaire. Les enfants à l'ecole et ceux n'ayant pas encore atteint l'âge d'école sont le plus souvent touchés par l'*Ascaris* tandis que les cultivateurs et les étudiants constituent les plus grands victimes d'ankylostomiase.

L'utilité d'un programme de service de santé situé dans la communauté comprenant des sages femmes traditionnelles et des travailleurs volontaires dans la collection d'information et dans la distribution des médicaments antihelminthes est discutée.

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Introduction

Intestinal helminthiasis is endemic in Nigeria, particularly among the rural population and has been recognized as an important public health problem in developing countries [1–9]. Intestinal worm infestations have also been shown to contribute to malnutrition among pre-school children [6,7] and schoolchildren [1,8,10–12].

The three most common intestinal worms are *Ascaris, Trichuris* and hookworm. They are well known causes of morbidity and contribute a significant proportion to the high morbidity recorded in Nigeria [4–9,13]. *Ascaris*, which is acquired by ingestion of the infective embryonated ova, may give rise to tracheobronchitis or even severe asthmatic attacks [14]. It may also cause blockage of the pancreatic or biliary duct resulting in acute pancreatitis or cholescystitis respectively [15]. *Ascaris* may also cause intestinal obstruction, appendicitis or intestinal perforation [16]. *Trichuris*, which is also acquired by ingestion of the embryonated ova may cause diarrhoea, dysentery and/or rectal prolapse [15].

Hookworm is acquired by direct penetration of exposed skin (usually the soles of feet of people who walk barefoot on soil contaminated by human faeces) by the infective filariform larvae which have hatched in the soil under appropriate soil texture, aeration, moisture and temperature conditions. There are two species of hookworm, *Ancylostoma duodenale* and *Necator americanus*, the latter being the more prevalent species found in Nigeria [4]. Hookworm may also give rise to respiratory symptoms, including asthmatic attacks, during the

migration of the larvae through the lungs. However, the principal disease caused by hookworm is severe anaemia arising from chronic blood loss, as the worm sucks blood from the intestinal mucosa, and consequent congestive cardiac failure [5].

It is important to assess the impact of helminthic infestation among the rural population which is composed mainly of families with quite low income. This has become even more necessary because of the rapid population growth and the decline in food production in these rural areas in the last decade, because as a result of rapid westernization, there has been a massive rural to urban migration. The remaining reduced population of local farmers therefore have to be healthy and free from the fatigue and debility caused by helminthic infestation if they are to increase agricultural food production.

Similarly, schoolchildren must be kept fit and healthy if they are to maximize their potential and benefit optimally from the huge educational investments and inputs being made by governments and parents.

This work studied the prevalence of helminthic infestations in defined rural populations and the utilization of the community-based distribution (CBD) workers in data collection and primary treatment of affected individuals.

Materials and methods

The study was carried out in four villages situated in two different local government areas in Oyo State, in the south-western part of Nigeria. The sites were Ijaiye and Ikereku villages in the Akinyele local government area, 30 and 35 km north of Ibadan, respectively, and Ifewara and Faforiji villages in the Ifewara local government area, 120 and 140 km south-east of Ibadan, respectively. These villages contained populations ranging from 560 in Faforiji to 3245 in Ijaiye. They are primarily farming communities, and lack basic amenities such as electricity, piped water supply and adequate facilities for refuse and sewage disposal.

The project was discussed with the village chiefs and community leaders in order to secure their co-operation. Prior to this study, a CBD programme of basic health care had been developed in the region where traditional birth attendants (TBAs) and voluntary health workers (VHWs), who were nominated by the communities, had been given 1 month's training and were attached to the local government health services. The CBD workers in the selected villages assisted in collecting freshly passed stool specimens.

It should be noted that the CBD workers are an integral part of the subculture of these rural communities and consequently the usual suspicion often attached to highly skilled health workers coming from urban centres for specimen collection, particularly stool collection, did not apply to the CBD workers. This facilitated greatly the ease of collection of stool specimens in the study.

Houses were selected by a simple random sampling technique in each of the four villages, and stool cartons were distributed to all members of the selected households with the assistance of the CBD workers. The freshly passed stool specimens collected by the CBD worker were then carried to the laboratory in special containers and kept in the fridge until they were examined, usually within a few hours of collection. Each stool sample was mixed thoroughly using an applicator stick. A sample of it was then placed on a microscope glass slide in which a drop of normal saline had been placed. The sample was then mixed with an applicator stick and a cover-slip placed over it. The sample was then examined directly by means of Lietz Dialux 4B microscope (×100; Wetzlar, FRG). The presence or absence of helminthic ova and the type of helminths present were recorded.

After the collection and analysis of the stool specimens the CBD workers also assisted in the distribution of antihelminthic drugs (albendazole, Zentel) to the infested individuals. The drugs were supplied by Smith, Kline and French Co. (Lagos, Nigeria).

Results

A total of 827 stool samples from 404 females and 423 males were examined. Table 1 shows that 568 (68.7%) of the stool samples were found to be positive for helminthic infestation, and over one-third of the samples had two or more types of infestations. Of those infested, 48.2% had one type of helminth, 39.4% had

Table 1. Proportion of population with multiple helminth infestation

Number of infestations	Total sampled-population (%) (n=827)	Infested population (%) (n=568)
1	33.1	48.2
2	27.1	39.4
≥3	8.5	12.4
Proportion infested	68.7	100.0
Proportion not infested	31.3	—

two types of helminths, while 12.4% had three or more helminthic infestations.

The most prevalent type of infestation was *Ascaris* and was found in 58.2% of the total population sampled, followed by *Trichuris* in 14.9% and hookworm in 13.8% of the sample (Table 2). Of those infested with worms, 84.7% had *Ascaris*, 22.7% had *Trichuris* while 20.1% had hookworm. Strongyloides was present in only 1.6% of the stool samples examined. Table 3 shows that infestation with *Ascaris* and *Trichuris* was the most common combination observed in this study, being observed in 10.3% of the total population sampled, while among those infested, it accounted for 18% of helminthic infestations. This was followed by *Ascaris* and hookworm in 8.7% of the total population sampled and 12.7% of the infested population.

Table 4 illustrates the age groups infested most commonly. It is interesting to note that *Ascaris* is most prevalent among schoolchildren (5–14 years; 66.4%) followed by pre-school children and toddlers (63.4%), the lowest prevalence rate being among those 45 years and above (50.4%). On the other hand, hookworm is most prevalent among adults 45 years and above (15.8%), who by virtue of their occupation as farmers (most of whom walk barefoot) are more at risk. The prevalence of hookworm infestation was lowest among children aged 0–4 years (3.7%). The difference was significant ($P < 0.05$).

Table 2. Proportion of population with helminth infestation

Helminth	Total sampled-population (%) (n=827)	Infested population (%) (n=568)
Ascaris	58.2	84.7
Trichuris	14.9	22.7
Hookworm	13.8	20.1
Strongyloides	1.0	1.6
Others	0.1	0.2

Table 3. Proportion of population with specific multiple helminth infestations

Helminth combination	Total sampled-population (%) (n=827)	Infested population (%) (n=568)
Ascaris and *Trichuris*	10.3	18.0
Hookworm and *Ascaris*	8.7	12.7
Hookworm and *Trichuris*	2.7	3.9
Hookworm, *Trichuris* and *Ascaris*	1.7	2.5

Table 4. Helminth infestation by age

Helminth	Proportion of age group infested (%)				
	0–4 years (n=82)	5–14 years (n=220)	15–44 years (n=295)	≥45 years (n=228)	Total (n=825)
*Ascaris**	63.4	66.4	56.9	50.4	58.3
Trichuris	9.8	16.4	16.9	12.7	14.9
Hookworm*	3.7	14.9	14.9	15.8	13.8
Strongyloides	0.0	0.9	1.4	0.9	1.0

*Values significantly different ($P < 0.05$), Chi-square analysis.

Table 5 illustrates the prevalence of helminthic infestation as it relates to occupation. While schoolchildren again had the highest prevalence rate for *Ascaris* (69.3%), artisans, teachers and government employers had the lowest rates (33%). Interestingly post-primary school children had a higher rate (17.1%) of hookworm infestation than did children aged 5–14 years. Artisans and government employees again had the lowest rate of infestation (8.8%; 0%, respectively), if those with missing information on occupation (including young children) were excluded.

Discussion

This study has confirmed the persistence of high helminthic infestation rates among the Nigerian rural population that had been shown by various authors [1–6], and particularly the ubiquitous triad comprising *Ascaris, Trichuris* and hookworm [1,6,7,11–13]; multiple infestation was also found to be quite common. In this study *Ascaris* was present in 85% of the infested population. This is lower than the prevalence rate of 96.3% recorded by Fashuyi [12] in Lagos urban slums, but higher than the 71.5% prevalence rate recorded by Okpala [1], the 72% recorded by Obiamiwe [15] and the 73.4% recorded by Ejezie [11]. These differences may be geographical or seasonal, on the other hand it may be due to a different method of direct examination, the one employed in this study being a very simple qualitative but not a quantitative technique.

The high prevalence of *Ascaris* infestation among pre-school children observed in this study confirms previous findings by Gupta *et al.* [6] and Agugua [16]. The advantages of periodical de-worming on the improvement of nutritional status of *Ascaris*-infested pre-school children has been highlighted [6,16]. In addition, the high prevalence of *Ascaris* infestation

Table 5. Helminth infestation by occupation

Helminth	Proportion of occupational group infested (%)						
	Farmers	Trading	Student	Artisan	Teachers and government workers	Other*	Total
Ascaris†	52.6	56.2	69.3	32.4	33.3	58.2	59.2
Trichuris	16.1	13.9	16.7	5.9	0.0	10.9	14.2
Hookworm†	16.1	13.7	17.1	8.8	0.0	2.7	13.8
Strongyloides	1.8	0.7	0.8	0.0	0.0	0.0	1.0

*Others includes small chidren and those not providing data on occupation.
†Values significantly different ($P < 0.05$), Chi-square analysis.

among schoolchildren observed in this study (69.3%) is similar to findings by Oduntan [8], Ejezie [11] and Oyejide *et al.* [13].

The high prevalence of hookworm among farmers is not surprising as they walk barefoot in the villages and farms where indiscriminate defaecation is prevalent, thus increasing their risk of infestation. Similarly, most of the schoolchildren walk about barefoot, but artisans who lead a more sedentary life have the lowest prevalence rate for all the helminths.

The usefulness of community-based workers in primary health care cannot be overemphasized. If we are to achieve any goal in the control of communicable diseases our focus of attention should be on the adequate training and utilization of primary health-care workers such as the CBD workers.

The implication of our observation is that, despite the fact that Nigeria is a developing country, helminthic infestations are still rampant. It has therefore become necessary to look for pragmatic, simple and effective ways of reducing the reservoir of such infestations. One of the ways is the periodic de-worming of pre-school children, schoolchildren and farmers using a cheap, single-dose orally administered antihelminthic drug.

As demonstrated in this study, this deworming exercise can be conveniently and successfully carried out by CBD workers under the supervision of highly skilled health workers. This approach will not only reduce the cost of the operation but will also reach a wider population at the grassroot level.

In conclusion, a mass programme of deworming pre-school children, school children and farmers through the assistance of CBD workers will improve nutritional status, reduce morbidity risks, enhance job performance and improve agricultural food production.

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