Patterns of Helminth Infection in the Human Gut at the University of Nigeria Teaching Hospital, Enugu, Nigeria

Uchenna Chinedu Ozumba*, [a] and Nwora Ozumba[b]

[a]*Department of Microbiology, University of Nigeria Teaching Hospital, Enugu, Nigeria and* [b]*National Arbovirus and Vectors Division, Federal Ministry of Health, Enugu, Nigeria*
(Received September 10, 2001; Accepted February 18, 2002)

A two- year retrospective study between 1996 and 1997 was carried out at the University of Nigeria Teaching Hospital, Enugu, to determine the patterns of intestinal helminth infection. A total of 13385 stool samples were examined using the direct smear technique. Some samples were also examined using the formal ether concentration method when direct smears were negative. Hookworm, Ascaris, Trichuris and Strongyloides were the most common helminths. Hookworm was the most prevalent (14.3%). Generally infection was most prevalent in adolescents aged 12–17 years, except for ascariasis, where the 6–11 year age group had the highest prevalence. Multiple infections were common (12.6%), with the most common combination being hookworm and ascariasis. To reduce the prevalence of various helminth infections the level of environmental sanitation, socioeconomic status of the populace and water supply should be improved.

Key words —— helminth, formal ether concentration, multiple infection, environmetal sanitation

INTRODUCTION

Parasitic diseases, particularly intestinal infections, are recognized as important public health problems in many developing countries.[1–3)]

Geohelminths play an important role as contributory factors in the etiology of childhood malnutrition because heavy chronic infection with *Ascaris lumbricoides* and hookworm may aggravate or precipitate malnutrition, especially among already undernourished children from socioeconomically disadvantaged communities. Although the existence of numerous species of human helminths are known to medical personnel in Enugu, there is inadequate reliable information on the epidemiology of these parasites as well as the species involved.

As has been shown by Obiamiwe,[4)] information from the in-patients departments of hospitals may provide the initial information needed for planning meaningful public control programmes. This study, carried out at the University of Nigeria Teaching Hospital (UNTH), Enugu, was aimed at determining the number of species and prevalence of human intestinal parasites, and the age and sex distribution of those affected as well as suggest solutions, to help control helminth infections.

The UNTH is the only teaching hospital in Enugu state and serves as the major referral center. Enugu is situated in the south eastern part of the country with a population of 1.7 million. It has a maximum average temperature of 29–34.5°C and minimum of between 20–32°C and annual rainfall of 1500 mm.

Water supply is inadequate with the majority of the populace relying on shallow wells. Ninety-six percent of the drainage system consists of open gutters, the majority of which are usually blocked with sand and refuse. The waste disposal system is also inadequate. Waste is left in open containers and litters the surroundings.

MATERIALS AND METHODS

Faecal samples were obtained from 13385 patients, (8193 in 1996 and 5292 in 1997) at UNTH, Enugu. These patients presented with symptoms and signs of diarrhea. The samples were collected in wide-mouthed bottles which were promptly sent to the UNTH laboratory and examined on the day of collection. The direct smear and formal et her techniques were employed in sample examination. Each stool sample was well mixed and about 1 gm was emulsified in normal saline for microscopic examination. Samples that proved negative were examined again after formal ether concentration.

RESULTS AND DISCUSSION

Of a total of 13385 stool samples examined, 3730 (27.9%) were positive for various intestinal para-

*To whom correspondence should be addressed: Department of Microbiology, University of Nigeria Teaching Hospital, Enugu, Nigeria. Tel.: +234-42-259937; E-mail: unnfacmed@infoweb.abs.net

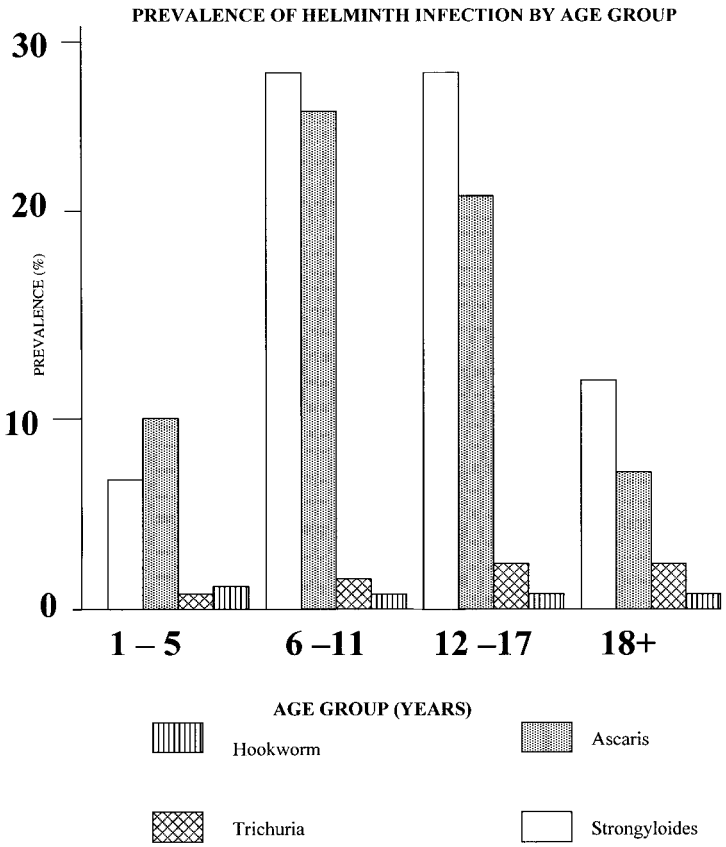

Fig. 1

sites, of which 3248 patients (96.38%) were infected by helminths (Fig. 1). This is a confirmation of the high prevalence of intestinal helminthiasis in the catchment area of the UNTH, although this pattern of helminth infection may not necessarily reflect the pattern in Enugu town. Massoud *et al.*[5] and others[1,6] have also recorded high but varying prevalence figures for most of these helminths.

Figures 2b, c, d, e show the monthly and yearly data on hookworm. *Ascaris lumbricoides*, *Trichuris trichuria* and *Stronglyloides stercoralis* infections. These were the most prevalent helminths identified, with a combined percentage of infection for 1996 and 1997 of 14.3%, 7.4%, 2.2%, and 0.9% respectively, although a total of six different helminthes were identified. This generally agrees with the results of previous studies.[4,6,7] Hookworm had the highest prevalence of 14.3% in contradiction to previous results[4,5,7] in Benin City, Nigeria, and Iran, respectively, where Ascaris sp. predominated. The prevalence of hookworm infection in this study was comparable to that found by Massoud *et al.*[5] and Obiamiwe[4] at 16% and 16.8% respectively.

Ashford *et al.*[8] in Papua New Guinea, however reported Strongyloides sp. to be most common helminth. It is probable that a larger proportion of the inhabitants of Enugu walk bare footed than the inhabitants of those other areas, and this may be responsible for the higher prevalence of hookworm infection in this study, since hookworm infection is mainly contracted by penetration of the skin. The difference in prevalence may also be due to climatic conditions and soil composition in the areas studied. Climatic conditions may partly account for the lower prevalence of hookworm infection in other studies, since Collins and Edwards[6] stated that hookworm eggs are much more dependent on the vagaries of soil composition and moisture content than other parasites. It is thus probable that the soil in other area is much less favorable for the survival of hookworm eggs.

There was no significant difference in the infection rates among the different helminths between the rainy season (mid-March to mid-October) and dry season (mid-October to mid-March $p > 0.05$ (Figs. 2b,c,d,e). There was also no significant difference in the infection rates between males and females, $p > 0.05$, (chi-square for independence test).

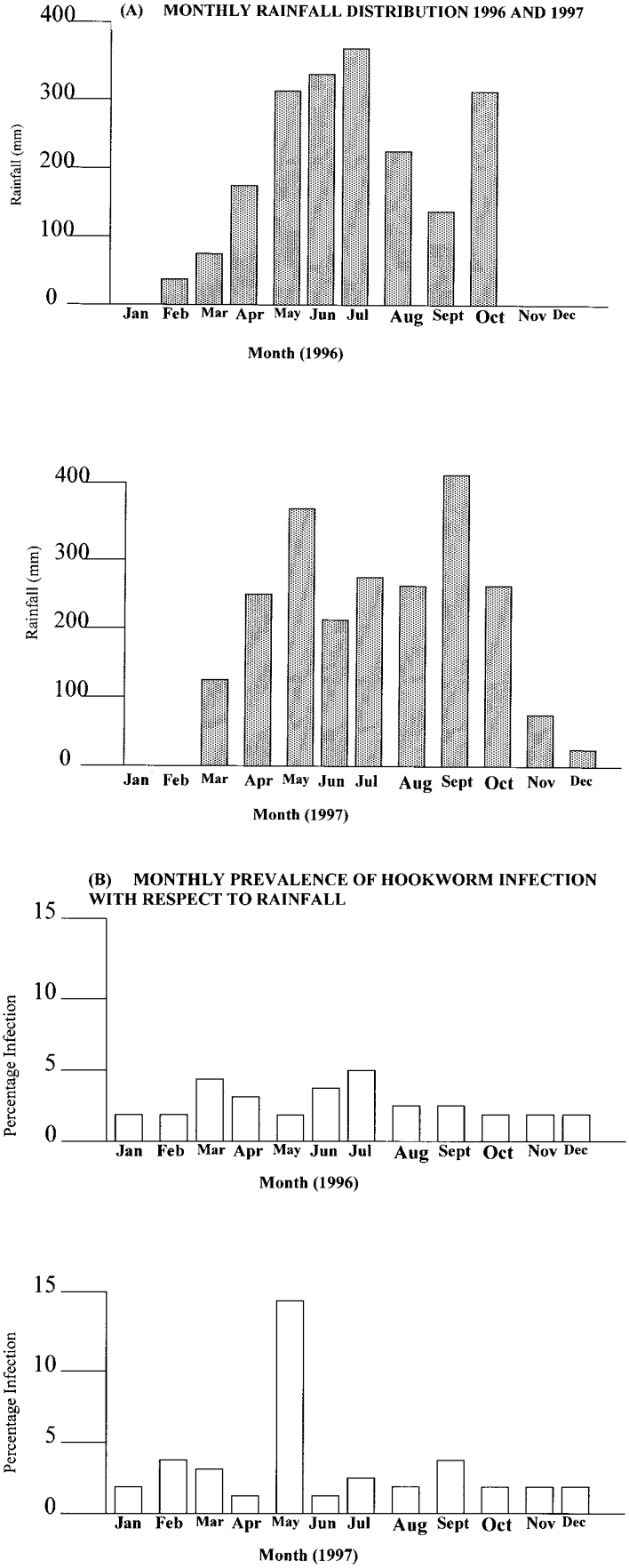
(A) MONTHLY RAINFALL DISTRIBUTION 1996 AND 1997
Rainfall (mm)
400
300
200
100
0
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Month (1996)
Rainfall (mm)
400
300
200
100
0
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Month (1997)
(B) MONTHLY PREVALENCE OF HOOKWORM INFECTION WITH RESPECT TO RAINFALL
Percentage Infection
15
10
5
0
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Month (1996)
Percentage Infection
15
10
5
0
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec
Month (1997)

Fig. 2

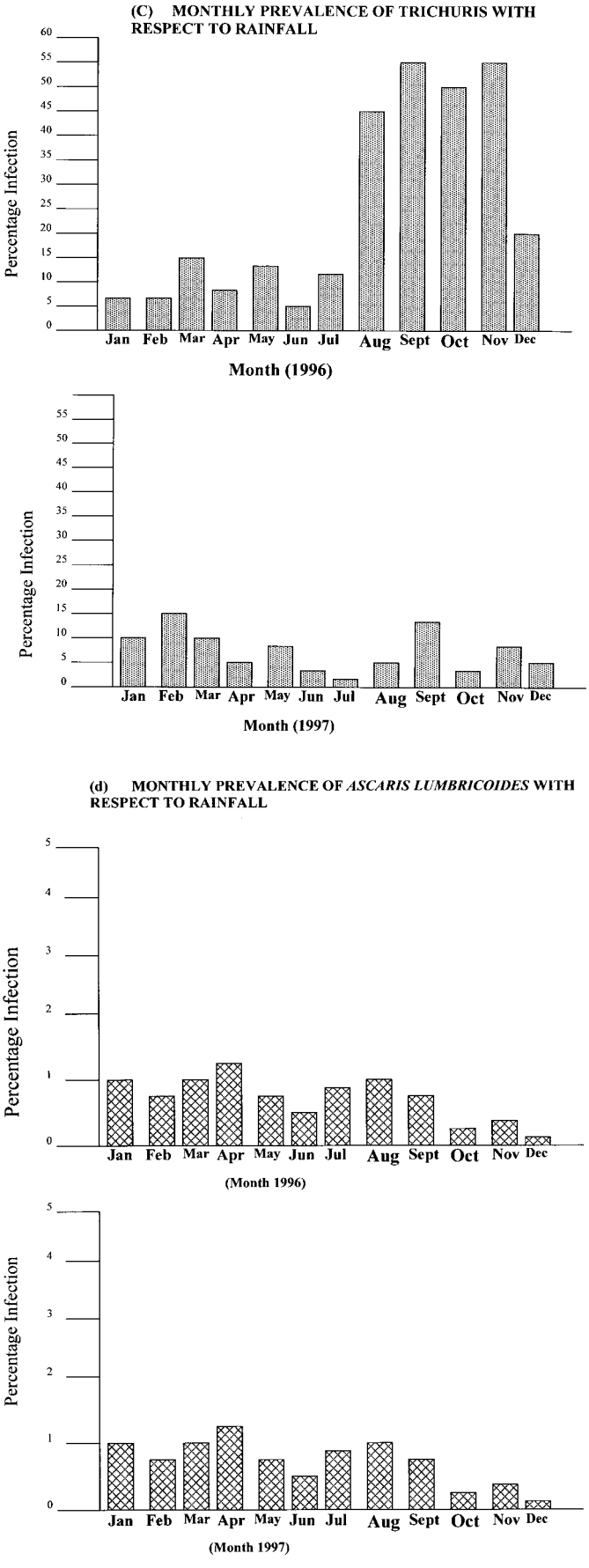

Fig. 2. Continued

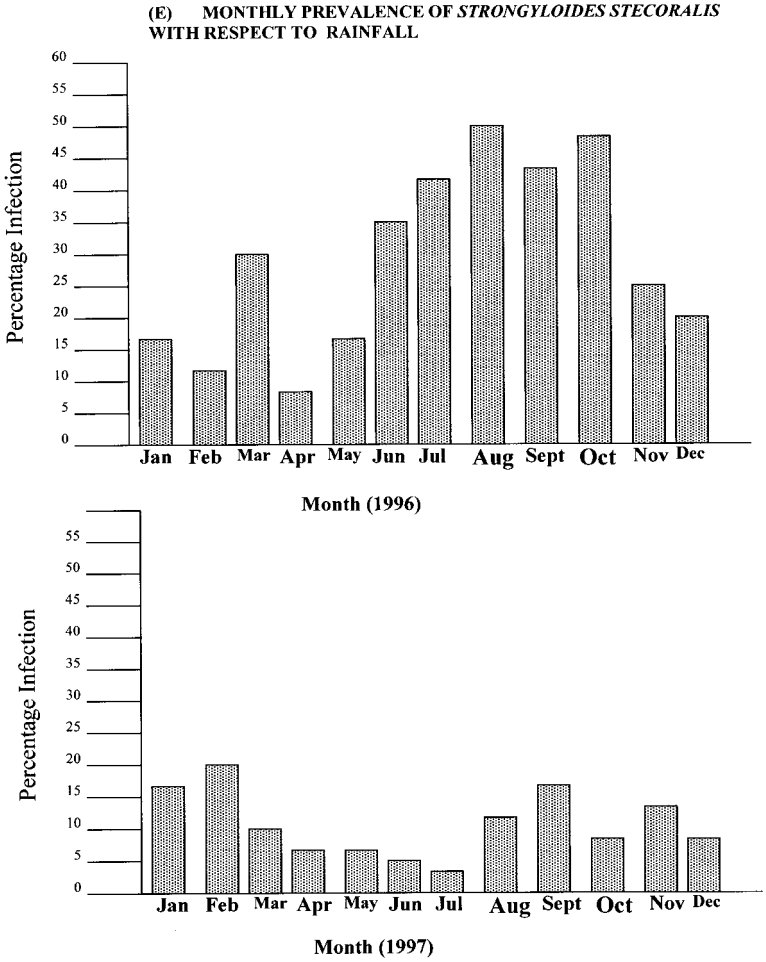

Fig. 2. Continued

As shown in Fig. 1 adolescents aged 12–17 years had the highest rates of infection except for ascariasis, for which the age group of 6–11 years had highest rate of infection (21.7%). Massoud *et al.*[5] and Collins *et al.*[6] observed the highest prevalence of hookworm infection in the 6–10 year age group.

The highest prevalence of these helminth infections in the 12–17-year age group in this study is probably due to their poor hygienic standards and to greater mobility outdoors that brings them into contact with conditions favoring the transmission of these helminthes. These outdoor activities includes playing, working on farms where human feces are used as night soil, and eating outdoors. However, Massoud *et al.*,[5] observed that infants were much more commonly and heavily infected with Strongyloides sp. than children or adults. Strongyloides infection is most commonly contacted by the larvae penetrating the skin. The 12–17-year age group in Enugu, unlike infants, come into contact with conditions like human feces that facilitate contact with the larvae since they are outdoors more than infants. The prevalence of *S. mansoni* infection was much lower (0.03%) than reported by others.[9] This was probably due to the absence of snail vectors for schistosomiasis. There was a complete absence of *Enterobius vermicularis* from the 13395 samples examined, which agrees with previous results.[1,10] Multiple infections also occurred. Three hundred and twenty (86%) of the infections were double, with most common combination being hookworm and ascariasis, while 40 (1%) were triple, with the most common combination being hookworm, ascariasis and trichuriasis. This study shows that intestinal helminthiasis is still a major health problem among the inhabitants of Enugu. It is also an indication of the poor environmental sanitation of the town, which includes poor methods of waste disposal. Most importantly, the poor socioeconomic status of the great majority of the inhabitants resulting from economic hardship in the country has contributed to the high prevalence of these intestinal helminths. Potable

water is lacking in most parts of the town coupled with the absence of public toilets. Thus improvement in the water supply, environmental sanitation, and the economy in general will help reduce the prevalence of helminth infections.

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