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The parasitic diseases of school children in Lagos State, Nigeria

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Summary

A survey of 5,595 primary school children in Lagos State showed that most of the children were over-loaded with parasitic infestations which included malaria (37.7%), schistosomiasis (13.4%), ascariasis (74.2%), trichuriasis (75.8%), hookworm (29.5%) and tungiasis (49.5%). Multiple infections were observed with about 16.2% harbouring *all* the causative organisms of the parasitic diseases enumerated above. The high prevalence of parasitic infestations among these children is an index of the community's low level of health and also of inadequate health education, because most of these diseases are preventable if the people are told what to do.

Key words: primary school pupils; parasitic infestations; inadequate health education.

Introduction

Parasitic infestations constitute major public health problems in developing countries. Most of these parasitoses are preventable, and their high prevalence rates may suggest inadequate preventive measures and/or undue emphasis on cure rather than prevention. This inadequacy could be a consequence of unreliable surveillance data, without which effective control measures would be difficult to achieve.

The aim of this study therefore is to provide the much needed information on the epidemiology of the major parasitic infestations which affect the children of this area, as well as the environmental factors contributing to their spread, as a prelude to the planning and execution of effective control measures.

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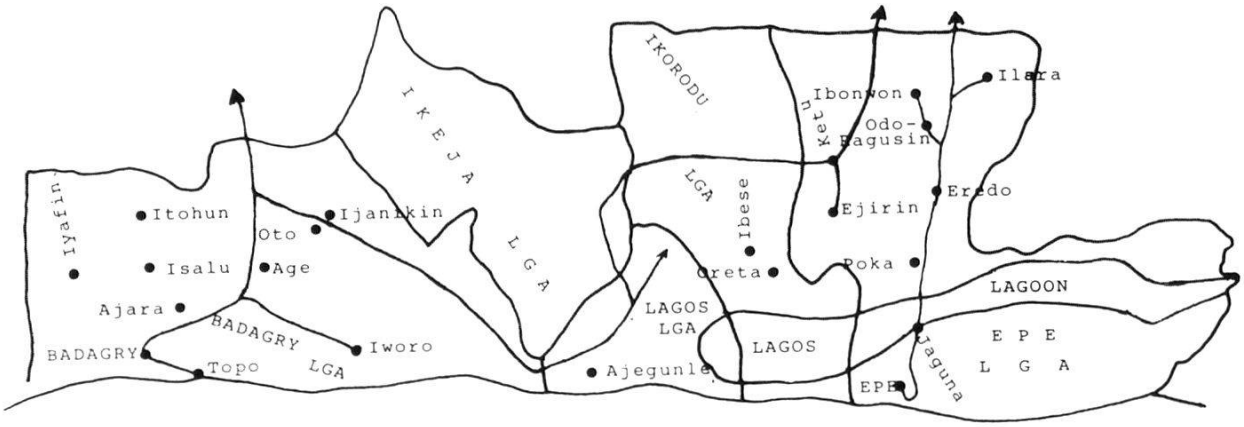

Fig. 1. Map of Lagos State of Nigeria. ● = Areas covered by the survey.

Materials and methods

The area covered by this survey is scattered in 25 villages in and around Epe, Ikorodu, Badagry and Ajegunle areas of Lagos State (Fig. 1). A total of 5,595 school pupils aged between 6 and 15 years were screened as follows: 4,485 for urinary schistosomiasis, 2,897 for malaria, trypanosomiasis and filariasis, 810 for intestinal helminths and 600 for tungiasis. The schools were randomly selected from each geographical area of the state[1].

Thin and thick blood smears were made on the same slide from finger pricks. The smears were dried, stained with Giemsa and examined under the microscope for common blood parasites. The gametocyte rate for malaria parasite was determined using identifiable crescents of *P. falciparum* (Fasan, 1969). Parasite density was determined by counting the parasites against 400 leucocytes in the same fields as the parasitized red blood cells and their density per mm^3 of blood calculated using the method of Bruce-Chwatt (1958).

Capillary blood was collected from all the children to determine their packed cell volume (PCV), and haemoglobin concentration was measured on a drop of whole blood by means of a Spencer Haemoglobin Meter (American Optical Co.) and the level read as g/100 ml of blood.

Mid-stream urine was collected from the pupils between 10 a.m. and 2 p.m. during the weekly visits. Urine analysis was carried out immediately using Bili-Labstix reagent strips to determine the amount of protein and blood in the urine. *S. haematobium* egg counts were made as already described (Ejezie and Ade-Serrano, 1979).

Faecal samples collected from the pupils were processed on the spot by the method of KATZ et al. (1972). These were examined later under the microscope for helminth ova.

For tungiasis, the subjects had their thoroughly washed toes examined for the usual sign of "white patch with a black dot" of the burrowed gravid female *Tunga penetrans.*

Results

Blood film examination

The results of the blood film examinations are shown in Table 1. 37.7% of all the children examined were infected with *Plasmodium falciparum.* The parasite density was 1,550 per mm^3 of blood with a mean gametocyte rate of 3.1. Both the packed cell volume and the haemoglobin concentration were found to be similar in both age groups. A few of the pupils (0.7%) were infected by *Dipetalonema perstans* microfilariae. No cases of trypanosomiasis were found.

[1] Weekly surveys were conducted in the primary schools from February 1977 to December 1979.

Table 1. Relationship between parasite density, gametocyte rate, packed cell volume (PCV), haemoglobin concentration and age group in malaria patients

Age (years)	No.	Bloodsmears: % positive	Parasite density/mm³	Gametocyte rate	PCV %	Haemoglobin g/100 ml
6–9	1,840	39.9	1,670	4.1	36.9	11.5
10–15	1,057	35.6	1,430	2.1	37.5	11.00
Mean/Total	2,897	37.7	1,550	3.1	37.2	11.2

Table 2. Prevalence of urinary schistosomiasis and intensity of the infections in the two age groups studied

Age (years)	No.	Urine analysis: % positive	Mean egg count ova/ 10 ml urine	Mean proteinuria mg/100 ml	Haematuria %
6–9	2,642	8.9	267.2	158.8	57.6
10–15	1,843	21.0	264.9	119.4	72.7
Mean/Total	4,485	13.4	266.0	139.1	65.2

Table 3. Distribution of intestinal helminths among the two age groups

Age (years)	No.	*Ascaris* % infection	*Trichuris* % infection	Hookworm % infection	*Ascaris* and *Trichuris* % infection	Hookworm, *Ascaris* and *Trichuris* % infection
6–9	218	77.6	73.5	38.6	59.1	35.7
10–15	592	72.9	76.7	21.9	60.9	14.8
Total	810	74.2	75.8	29.5	60.4	24.3

Urine examination

Eggs of *Schistosoma haematobium* were found in 13.4% of all the urine samples examined. Local foci of vesicular schistosomiasis were found in Ajara (35.5%), Oto-Ijanikin (25.0%), Epe (8.8%), Ejirin (4.2%) and Ketu (3.4%). The mean egg count was 266.0 ova/10 ml urine. Mean proteinuria was 139.1 mg/100 ml while 65.2% of all the infected children had haematuria (Table 2).

Stool examination

Examination of the 810 faecal samples showed that 74.2%, 75.8% and 29.5% were infected by *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm, respectively (Table 3). 60.4% of these were infected by both *Ascaris* and *Trichuris* while 24.3% had all the three parasites. The mean egg load of the ascariasis patients was 2,544 eggs/g faeces, while the value in trichuriasis was 1,752 eggs/g faeces. Where these two occur together in the same host, the mean egg loads were 432 and 24 eggs/g faeces for *Ascaris* and *Trichuris*, respectively. 21.2% of these patients had urinary schistosomiasis also. No eggs of *S. mansoni* were found.

Toe examination

Of the 339 boys and 261 girls whose toes were screened for tungiasis, 39.5% had the gravid female of *Tunga penetrans* embedded in their toes. These were made up of 136 boys and 101 girls. The prevalence rate of tungiasis was found to decrease with increasing age, such that at the age of 15 years it has decreased by about 50%. More boys than girls were infested. The records of the local dispensary showed that 1,773 patients were treated in the previous year. 845 of these (47.7%) were for sores alone. No cases of dracontiasis were observed.

Discussion

The evidence available from this work shows an intense transmission of a wide variety of parasitic infections among primary school children in this area. There were many cases (16.2%) of multiple infections – the same individuals being infected by *Plasmodium falciparum, Schistosoma haematobium, Ascaris lumbricoides* and *Trichuris trichiura,* all at the same time.

The overall malaria parasite rate of 37.7%, with a higher rate among those under 9 years old, is similar to the results of other workers in this holoendemic area (Okpala, 1975). This is, however, lower than the value of 65.9% recorded by Fasan (1969), in this same State. However, most of the villages have rural dispensaries where antimalarial drugs could be administered. Some anti-malaria activities are in fact being carried out by government agencies in some of the areas covered by this study.

The high gametocyte rate of 4.1 observed among the 6–9-year olds suggests that active transmission is still going on and any chemotherapic control measures should be concentrated at this age group.

This survey has revealed some other local foci of endemic urinary schistosomiasis in addition to those already known in the State (Okpala, 1961). These are located at Ajara and Oto-Ijanikin. In both these areas, infection is accompanied by high egg output, proteinuria and haematuria. Although the mortality and morbidity attributable to *S. haematobium* infection is low (Ejezie and Ade-Serrano, 1980) high prevalence of urinary schistosomiasis is associated with renal function impairment, and post-treatment studies suggested bladder calcification and structural lesions of the ureters and kidneys in the affected children of this State (Oyediran, 1976).

The examination of faecal samples of the pupils showed that 92.3% were infected with either *Ascaris, Trichuris* or hookworm. Multiple infections by *Ascaris* and *Trichuris* occurred more often probably because both organisms share similar modes of transmission. The double infection is followed by reduced egg output when compared with single infections. The customary habit of indiscriminate defaecation coupled with the eating of contaminated fresh fruits and vegetables with equally contaminated unwashed hands are the principal sources of infection.

Results from the toe and ankle examination show a high prevalence of sores among the pupils. This finding is confirmed by the records in the local dispensary register. In the absence of any cases of dracontiasis, the ulcers probably result from secondary microbial infections of the wounds left by asceptic removal of the *Tunga penetrans* (Chandler and Read, 1961). Lots of pigs were found to be roaming about in this area. The presence of this animal host probably contributes to the prevalence of tungiasis (WHO, 1979).

Generally, this work has shown that an average rural primary school pupil in this State (and probably elsewhere in this country) is over-loaded with parasitic infections, most of which are preventable through well-planned and carefully organised health education programmes. Basic sanitation should aim at the provision of safe water, safe environment and a safe place to live for all the people. The high prevalence of parasitic diseases, particularly among children is an index of not only their community's low level of health, but also of inadequate health-education. The school teachers have a tremendous role to play in order to change the situation.

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