

Hookworm Infection among School Children in Vom, Plateau State, Nigeria

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Abstract: This study was carried out in two secondary schools in a sub-urban area of Vom in Jos to determine the prevalence of hookworm infection among the students. Stool and finger prick blood sample were collected by stratified random sampling and processed according to standard parasitological techniques. Out of the 463 samples collected 15 (3.2%) were positive for hookworm with peak infection in age group 13-15 years (3.9%), followed by age group 16-18 years (3.8%) then age group 10-12 years (2.6%). There was no case of infection in the age group 22 and above? The haematocrit value reduced with infection ($p < 0.05$). More females (6.5%) than males (1.9%) were infected and were significant ($p < 0.05$).

Key words: Prevalence • hookworm • students • haematocrit value

INTRODUCTION

Parasitic diseases have contributed immensely in undermining the health status of people and jeopardizing the economic development of nations in the tropics [1, 2].

Hookworm belongs to the Phylum Nematoda and Family Ancylostomatidae. The two common species of hookworm-Ancylostoma duodenale and Necator americanus, currently infect about 1.2 billion persons worldwide [3]. They occur in predictable areas where sanitary and environmental conditions favour the development of filariform larvae and infection of hosts. Hookworms are the “vampires” of the gut, feeding by sucking blood from the capillaries of the intestinal mucosa. There can be little doubt that hookworm infections contribute to the severity and persistence of iron-deficiency anaemia in many populations in developing countries. It has been estimated that 2.1 billion persons are iron deficient and that about half of them suffer from iron deficiency anaemia secondary to hookworm infestation [4]. Many of the affected populations live in rural communities of developing countries where hookworm infections are endemic [5, 6].

Hookworm infection occurs both in adults and children but it is more common in children [5]. The susceptibility in children is due to their lower immune response compared to that of the adults and to poor hygiene [4]. In view of the insidious nature of infection and paucity of report on this infection in this part of

the country, it is thought germane to determine the prevalence of hookworm infection among secondary school students in Vom in order to provide base line data for the control programme of government in the study area.

MATERIALS AND METHODS

Study area: This study was carried out in two secondary schools in Vom, a sub-urban area located about 50 km East of Jos capital of Plateau State. The two schools were randomly selected from the list of schools in the area. National Veterinary Research Institute (NVRI) Staff Secondary School and Saint Joseph’s Secondary School were sampled for Hookworm infections between January and March, 2002. Both Junior Secondary School (JSS) and Senior Secondary School (SSS) students participated in the study. For the purpose of subject selection, the class attendant register was used. Subjects were selected randomly. The major occupation of the people which are predominantly Hausa speaking is farming, although some engage in distributive trade and civil service work.

Sample collection: Students were provided with wide mouthed specimen bottles with screw caps and with specific instruction to collect sample in the morning. Blood samples were taken by finger prick into heparinized capillary tube sealed with plasticine. A total of 463 students of both sexes were examined in the two schools:

238 and 225, respectively. All sample were collected with the full co-operation of teachers, students and parents.

Sample analysis: The faecal samples were examined for parasites using the method described by WHO [7]. Microscopic examination of stool samples was followed by direct saline preparation for ova iodine preparation for cysts. Mounted wet saline and iodine preparations were examined under microscope using x10 and x40 objective lens. Negative samples were subjected to concentration method as described by WHO [7]. Packed Cell Value (PCV) was determined using the microhaematocrit method described by Dacie and Lewis [8]

The data were analysed using chi-square and Duncan Multiple Range test.

RESULTS

Prevalence of Hookworm infection in the school by age and sex is shown in Table 1. Out of 463 samples collected, only 15 (3.24%) were positive. Results showed that peak infection occurred in the age group 13-15 years (3.9%), followed by those in age group 16-18 years (3.8%), then age group 10-12 years (2.6%) and none was infected in age group 22 years and above. Data revealed that there are no significant different in sex and age of students regarding disease prevalence (p>0.05).

Table 1: Prevalence of Hookworm infection among the students by age and sex

Aged (Years)	Sex	No. Examined	No. Infected	% Infection
10-12	M	50	2	2.6
	F	28	0	
13-15	M	82	1	3.9
	F	46	4	
16-18	M	152	3	3.8
	F	32	4	
19-21	M	29	0	2.0
	F	21	1	
>22	M	12	0	0.0
	F	11	0	
Total		463	15	3.2

Table 2 shows the comparison of the prevalence of hookworm infection in the school by sex. More subjects in NVRI staff secondary school 14 (5.9%) than St. Joseph Secondary School 1(0.4%) were infected (p<0.05). Female subjects 9(6.5%) were more infected than male 6(1.9%) in both schools (p<0.05).

Table 3 shows the distribution of mean haematocrit value by sex and age. The infection rate and haematocrit value are inversely related (p<0.05).

DISCUSSION

The public health importance of hookworm diseases is best demonstrated by considering how hookworm induced blood loss and associated iron-deficiency anaemia in pair events in human life cycles and in human activities [4]. This study has shown that hookworm infection has an overall prevalence rate of 3.2%. The total prevalence of hookworm in this study is however very low when compared with finding of Ibrahim *et al.* [9] (25.5%). This could be attributed to the strict personal hygiene observed by subject in the study area. Besides, Adeyeba and Essiet [10] gave reasons for the low rate recorded among school children in Igbo-ora in Oyo state in Nigeria. The use and abuse of drug administration may account for the low shedding of eggs by infected people thereby giving a false impression of low infection rate in the study area. Nutritional status of individual is a factor to be considered. The prevalence rate of hookworm in NVRI staff school was higher (5.9%) compared to St. Joseph’s College (0.4%). This may be associated with boarding facilities provided by the school authority of St. Joseph’s College which regimented the movement of student and also emphasis placed on good sanitary habit being a mission school. The high prevalence of hookworm infection among student of NVRI staff school could be explained by the fact that students in this school do engage in outdoor activities such as helping on the farm, playing at the backyard on moist soil that may be contaminated with filariform larvae there making the children to be more at risk.

Table 2: Comparison of the prevalence of Hookworm infection in the two school by sex

School	Male		Female		Total	
	No. Examined	No. Infected (%)	No. Examined	No. Infected (%)	No. Examined	No. Infected (%)
Nvri staff secondary school	100	5(5.0%)	138.0	9(6.5%)	238	14(5.9%)
St. joseph secondary school	225	1(0.4%)	000.0	0(0.0%)	225	1(0.4%)
Total	325	6(1.9%)	138.0	9(6.5%)	463	15(3.2%)

Table 3: Distribution of mean haematocrit value by sex and age

Age (Years)	Sex	No. of examined	Mean		% Infected
			haematocrit value (%)	No. of infected	
10-12	M	50	27	2	4.0
	F	28	31	0	0.0
13-15	M	82	35	1	1.2
	F	46	28	4	8.7
16-18	M	152	32	3	2.0
	F	32	30	4	2.5
19-21	M	29	36	0	0.0
	F	21	31	1	4.8
>22	M	12	39	0	0.0
	F	11	34	0	0.0

This result is amazing as NVRI school children who are supposed to maintain high standard of hygiene being located in research station recorded high level of prevalence rate. It is suggested that experiment materials may also contaminate the surrounding and render the children more vulnerable.

It was observed that the prevalence of hookworm infection is higher in females (6.5%) than in males (1.9%). This result does not correlate with previous findings of some workers who reported otherwise. Hormonal, immunological and mechanical factor had been suggested to play a role in limiting infection in females. This report might be due to the work load of female household activities, such as food preparation, cleaning of surroundings and water fetching. There is increase risk of infection especially when they work barefooted in their compound [11, 12]. It was observed that female subjects culturally engage in farming activities more than male counterpart in the study area. This practice of course render female more vulnerable to infection as the surrounding ground may have turned nursery for parasite. There is a general picture of high prevalence of low haematocrit value among the students in the study area. Finding in this study shows that prevalence rate of hookworm infection is inversely related to blood level in the children. This agree with earlier report of Adeyeba and Tijani [2].

The highest prevalence was recorded in the age group 13-15 years (3.9%), followed by age group 16-18 years (3.8%). This agrees with the finding of Holland [12] who observed that the bulk of helminth infections was within the age group 10-15 years and Beaver [14] who also observed that though all ages can be infected, but infected is more common among children than in adults. As a rule, children carry the heaviest worm and egg burdens also because of their defaecation practices,

they are principal disseminators of infection. This should be worrisome to the public because a range of studies has shown that iron deficiency can undermined the growth, appetite and physical fitness of children and may impair their educational performance [15].

Measures to control the disease should aim at reducing morbidity and improve iron status of subjects. This objective may be approached by reducing the intensity of infection or relieving the iron deficiency by mean of iron supplementation. The measures may be used in combination and would probably be more effective if folate supplementation could also be included. High prevalence rates in the younger age group generally indicate intense transmission and special attention should be given to the treatment of children. However, treatment alone is not enough in poor undernourished and often underserved communities, where re-infection can be expected to occur. Environmental measures have to be involved and government support such as the provision of adequate and safe water, research and development and the introduction of sanitation system that are acceptable and the improvement of personal and community hygiene practices.

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