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GEOPHAGY AND INTESTINAL PARASITES AMONG PRIMARY SCHOOL CHILDREN IN CALABAR METROPOLIS

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Abstract

The study was aimed at assessing common geophagy among children from high and low income areas of Calabar, and to elucidate to what extent it has influenced the epidemiology of intestinal parasitic infections. A structured questionnaire was administered and bottles were distributed for stool sample collection. A total of 598 faecal samples were examined from school children; 208 in the high income catchment schools and 390 from the low income catchment schools. Geophagy was significantly higher among children from the low income catchment schools ($p<0.05$). A significantly higher prevalence of geophagous children was positive for intestinal parasites than non-geophagous children. Majority of geophagous children also had parents who have little or no education. A comparison of the prevalence of all intestinal parasites pooled together showed a significantly higher prevalence among children in the low-income catchment schools ($p<0.05$). *Ascaris lumbricoides* and *Necator americanus* were the commonest intestinal parasites observed. The various epidemiological indices were comparable in both sexes. It is concluded that geophagy is a risk factor in the epidemiology of intestinal parasites in Calabar metropolis.

Introduction

Geophagy, or soil eating, is a phenomenon that has been reported in many part of the world (Abraham, 1997). In some parts of the world, such as in the southeastern United States, where it is quite evident, it is regarded as pica (that is abnormal behavior), whereas in some other regions, there could be some sort of cultural acceptance of the practice, and it fills a physiological need for nutrients (Abraham, 1997; Wiley and Solomon, 1998).

Geophagy has been incriminated as a source of geohelminth infection. Many workers have reported its association with one or many helminth infections (Anell and Lagercrantz, 1958; Halsted, 1968; Marmor *et al*., 1987; Wong *et al*., 1991; Holland *et al*., 1995). However, it was only Geissler *et al*. (1998) that carried out their work in a rural area in a developing country, Kenya. Most of the other workers carried out their studies in hospitals and orphanages. It is expedient to carry out a study on geophagy among school children in an urban area, with a view to understanding its relationship to geoparasitic infections status and to economic status of their parents. The specific objectives are to (i) assess common geophagy among children from high and low income areas of Calabar (ii) determine the prevalence and intensity of geoparasitic infections in geophagous and non-geophagous children.

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Materials and Methods

Three schools each were selected from Calabar Municipality as well as from Calabar South area based on their school fees regimen. Children that attend schools that charge relatively very high fees were considered as children from high income background, whereas, children that attend public schools from Calabar South were considered as children from low income background. A structured questionnaire was administered on the children and bottles were distributed for stool sample collection. Two standard methods were employed in the fecal examination in the laboratory. They were the direct saline method with Dobelle's iodine preparation as vital stain for identification of parasites ova, larvae and or cysts, and the formol-ether concentration technique after Cheesbrough (1998).

Results

A total 598 faecal samples were examined from school children; 208 in high income catchment schools and 390 from the low income catchment schools. The intestinal parasites found were *Ascaris lumbricoides, Trichiuris trichiura, Necator americanus*, *Entamoeba histolytica, Strongyloides stercoralis,* and *Giardia lamblia.*

Overall, 361 (61.2%) of all the children included in the study were geophagous: 201 (66.1%) of them were males and 160 (51.1%) were females. The difference in prevalence of geophagy between the two sexes was not statistically significant ($p > 0.05$). The prevalence of infection with intestinal parasites was significantly higher among the geophagous children than among the non-geophagous children from both the high income and the low background ($p < 0.05$).This is shown in Figure 1. The intensity of intestinal parasites was also significantly higher among the geophagous children ($p < 0.05$) as shown in Table 1. The total parasites burden was also significantly higher among the geophagous children ($p < 0.05$). The prevalence and intensity of infections in relation to income status are presented in Figure 2 and Table 2. Prevalence and intensity were significantly higher among the children from low-income background ($p < 0.05$), but comparable between males and females. *A. lumbricoides*, *Necator americanus*, and *T. trichiura* were the commonest intestinal parasites observed. Geophagy was significantly higher among children from the low income catchment schools ($p<0.05$). A significantly higher prevalence of geophagous children was positive for intestinal parasites than non-geophagous children. Majority of geophagous children also had parents who have little or no education.

Table I. Intensity of intestinal parasites among the geophagous and non-geophagous children

Parasite	Geophagous	Non-geophagous
*Ascaris lumbricoides**	67	43
*Trichiuris trichiura**	46	29
*Necator americanus **	63	46
Entamoeba histolytica^{+}	22	19
*Strongyloides stercoralis**	19	10
Giardia intestinalis^{+}	9	7

Key: * $p < 0.05$ $^{+}$ $p > 0.05$

Table II. Geometric mean intensity of parasitic infections in relation to sex and income status

Parasite	Males	Females	Total
Ascaris lumbricoides			
High-income	23	22	23
Low-income	88	72	81
Trichiuris trichiura			
High-income	33	34	33
Low-income	46	39	45
Necator americanus			
High-income	51	48	51
Low-income	63	60	61
Entamoeba histolytica			
High-income	7	10	9
Low-income	18	23	20
Strongyloides stercoralis			
High-income	11	9	11
Low-income	16	13	15
Giardia intestinalis			
High-income	5	3	4
Low-income	8	8	8
Overall parasite burden			
High-income	130	126	131
Low-income	239	215	230

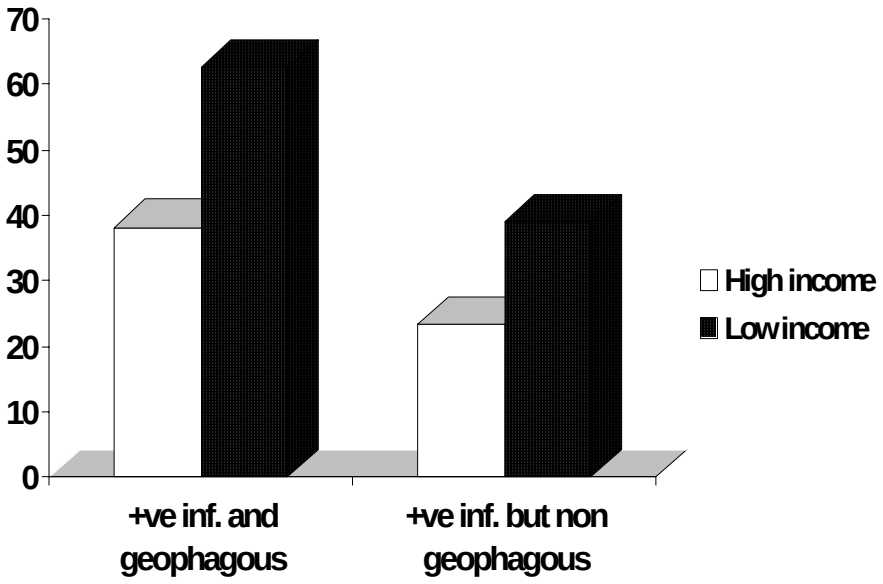

Figure 1. Relationship between geophagy and intestinal parasitic infection among children from high and low income backgrounds

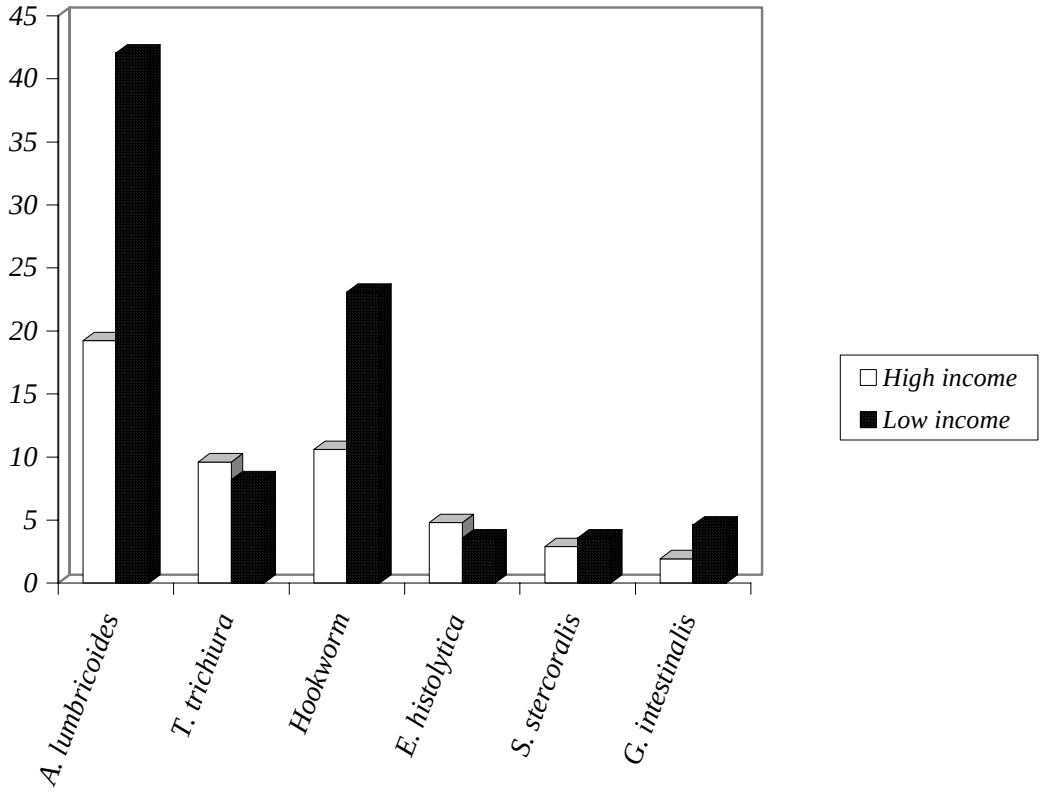

Figure 2. Prevalence of intestinal parasitic infections among children from high and low income backgrounds

Discussion

The prevalence of geophagy among Primary School children in Calabar metropolis was high in both children from the low and high income backgrounds. This could be as a result of a combination of factors principal of which include tolerant background, hunger and peer pressure. Nutritional status influences the desire to eat soil (More and Sears. 1994) and many children consumed soils inadvertently and are considerably non-selective in sites they choose to eat (Wiley and Solomon, 1998). Geophagy could be the principal reason for infection with intestinal parasites among the children from high income background

Although geophagy has some beneficiary aspects as a source of mineral supplementation (Abraham. 1997), its association with geoparasitic infections has been widely reported (Geissler *et al.,* 1997, 1998). Expectedly geophagy and the prevalence of infection with intestinal parasites were significantly higher among children from low income background than among those from high income background. Geophagy and intestinal parasites are known to be more prevalent in children from poor background (ATSDR Workshop 2000). However the intensities of the parasites were significantly higher among the geophagous for *Ascaris lumbricoides, Trichuris trichiura, Necator americanus*, and *Strongyloides stercoralis* but not for *Entamoeba histolytica* and *Giardia lamblia.* In their work in Kenya Geissler *et al*. (1998) reported significantly higher intensities among the geophagous children for only *A. lumbricoides* and *T. trichiura* but not for *Necator americanus*. In this study the overall picture depicts the likely presence of confounders which could be poverty and poor education or awareness (of the children's parents). This is corroborated by the fact that almost all the children in the low income study group belong to parents with very little formal education. Lack of adequate education, lack of awareness and poverty make up the triad that has made sub-Saharan Africa the parasites' paradise (Ukoli, 1981). Geissler *et al.* (1998) reported association between geophagy and the intensity of infection with *A. lumbricoides* and *T. trichiura* but not with *Necator americanus*. In this study there was association between geophagy and all the parasites which is proof of confounding effect of socio-economic background of the children (Geissler *et al.,* 1998).

It is concluded that geophagy is a risk-factor in the epidemiology of intestinal parasites in Calabar metropolis. It is practiced by children from both the high and low income backgrounds and is perhaps the principal source of geo-parasitic infections among the former group.

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