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Nutritional Status and Intestinal Parasitic Infestation Among Rural Fulani Children in Vom, Plateau State

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Summary

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Background: Intestinal parasitic infestation among children may affect their growth and mental ability and may also cause decreased intake or functional increase in the body's nutrient requirement.

Objectives: To assess the nutritional status of rural Fulani children and to establish the relationship between their nutritional status and intestinal parasitic infestation.

Methods: A total of 191 children, aged six months to 18 years were studied. Their weights and heights were measured, while specimens of their stools were collected and analysed.

Results: Seventy seven (40.3 percent) of the 191 were males and 114 (59.7 percent) were females. Eighty three (43.4 percent) were aged 5-9 years, and 58 (30.4 percent) were aged 10-14 years. Forty seven (24.6 percent) of the children had intestinal parasites in their stool samples. Of these, 28 (59.6 percent) were females. The commonest intestinal parasites were E histolytica in 20 (42.7 percent) and *Ascaris lumbricoides* in nine (19.1 percent); others were hookworm in six (12.8 percent), and *Schistosoma mansoni* in one (2.1 percent). The most common mixed infestation was with *Entamoeba histolytica* and hookworm in five (10.7 percent), E histolytica/*Strongyloides stercularis* in 2.1 percent and E histolytica/A lumbricoides in 2.1 percent. Comparisons of weight-for-age and height-for-age measurements between those with intestinal parasites and others without intestinal parasites showed that most of those with intestinal parasites fell below the 5th centile compared with those who had no parasites. Similarly, all the subjects with *Entamoeba histolytica* as the only intestinal parasite, had weight-for-age and height-for-age measurements below the 5th centile.

Conclusion: There was a high prevalence of intestinal parasites and undernutrition among the Fulani children studied and it is postulated that the intestinal parasites probably worsened their nutritional status.

Introduction

NUTRITION has become very important in both preventive and curative health care. Studies have shown that communities with the highest infant and childhood mortality and morbidity rates are also those with the highest prevalence of malnutrition.[1-3] Important causes of undernutrition include poverty, poor sanitation, low food intake, diarrhoea and infection.[4-5] Overall, undernutrition causes impaired physical growth and development. Intestinal parasitic infestation remains an important cause of morbidity and mortality among children in developing countries.[6] Although these infestations are often asymptomatic, it may be dangerous to assume they are innocuous. The migration of larvae and the obstructive nature of some of these parasites may affect growth and mental ability of the children.[6] They may also cause a decreased intake or a functional increase in the body's nutrient requirement.[7] This is achieved through interference with absorptive surfaces, physical obstruction, production of proteolytic substances, loss of macronutrient fluid and electrolyte, direct depletion of red blood cells and consumption of nutrients intended for the body.[7]

Many surveys have demonstrated high prevalence of intestinal parasitic infection in children living in slums, shanty towns and squatter settlements.[8-10] These parasites persist and flourish wherever poverty, inadequate sanitation, insufficient health care and overcrowding are entrenched.[11] Childhood intestinal parasitism is a mirror of socioeconomic status, reflection of environmental sanitation practice and

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an indicator of the presence or lack of health awareness and health education of the mother.[11] There is increasing evidence not only of synergistic relationship between malnutrition and infection but also between one infection and another in the case of ascariasis.[12,13] These infections are most common and heaviest in children of pre-school age who are also most likely to suffer from, or succumb to protein energy malnutrition. The present studywas designed to study the interrelationship between nutritional status and intestinal parasitic infestation among Fulani children in Vom, Plateau State.

Subjects and Methods

All children aged six months to 18 years in the selected Fulani community of Vom were recruited for the study. The weights of the children were measured using a Bastinet scale for children aged six months to two years and a standing scale for children older than two years. The heights were measured for children two years and above using a stadiometer, while lengths of children less than two years were measured with non-stretchable measuring tapes using two flat vertical boards. Weight was recorded to the nearest 0.1kg while length or height was recorded to the nearest 0.1cm. Stool samples were collected from each participant and stored in formalin-ether concentration until analysed; this was to preserve the helminth ova and protozoan cyst. The stool samples were analysed using light microscopy.

Data collected were entered into *Microsoft Excel* 2000 and analysed using EPI Info statistical software 2002.

Results

One hundred and ninety one children comprising 114 (59.7 percent) females and 77 (40.3 percent) males participated in the study. One hundred and forty one (73.8 percent) of the children were aged between five years and 14 years (Table I). Forty seven (24.6 percent) of the subjects had one or more intestinal parasites in their stool specimens (Table II). Of this, 28 (59.6 percent) were females, while males accounted

Table I

Age and Gender Distribution of the 191 Children Investigated

Age (yrs)	*Male*	*Percent*	*Female*	*Percent*	*Total*	*Percent*
<1	1	1.3	1	0.9	2	1.0
1-4	15	19.5	23	20.2	38	20.0
5-9	34	44.1	49	43.0	83	43.4
10-14	22	28.6	36	31.6	58	30.4
15-19	5	6.5	5	4.3	10	5.2
Total	77	100.0	114	100.0	191	100.0

X^2=9.9 p=0.8

Table II

Pattern of Infestation

Parasites	*Males*	*Percent*	*Females*	*Percent*	*Total*	*Percent*
Present	19	24.6	28	24.5	47	24.6
Absent	58	75.4	86	75.5	144	75.4
Total	77	100.0	114	100.0	191	100.0

X^2 =0.02 P=0.87

for the rest ($\div^2 = 0.02$; P = 0.87). The mean ages of the infested children were 8.1 ± 4.5yrs for males and 8.9 ± 3.4yrs for females (Table III). The mean age in those infested with parasites was 8.5 ± 3.9years (ANOVA T- statistics = 0.013 P = 0.52). Table IV shows the frequency distribution of parasites by age. The most common intestinal parasite was E histolytica in 42.7 percent and most infections occurred in those aged 5-9 yrs and 10-14 yrs. The most common mixed infection was by E histolytica and hookworm in 10.7 percent.

Weight-for-age (WFA)

Figures 1-3 show the weights-for-ages of the males with intestinal parasites, those with only E histolytica and those without intestinal parasite, respectively. Most of the males who had intestinal parasites were below the 5th centile of WFA as against the males without intestinal parasites who had significant number of subjects above the 5th centile. All the males with E histolytica had WFA below the 5th centile. Figures 4-6 show the WFA graph for females with intestinal parasites, for those with only E histolytica and for

Table III

Age Distribution of 47 Children with Intestinal Parasites

Age (yrs)	*Male*	*Percent*	*Female*	*Percent*
<1	1	5.3	0	0.0
1-4	3	16.0	2	7.1
5-9	7	36.8	15	53.6
10-14	6	31.3	10	35.7
15-19	2	10.6	1	3.6
Total	19	100.0	28	100.0

Mean age: Males 8.1 ± 4.5yrs, Females 8.9 ± 3.4yrs. ANOVA T Statistics - 0.013 P = 0.52

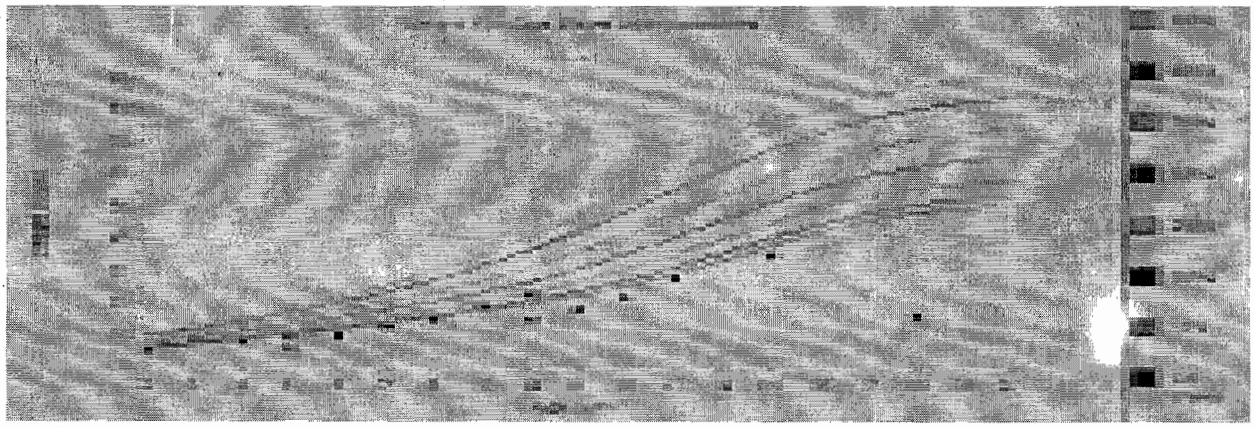

Fig: 1 WFA males with Intestinal parasites

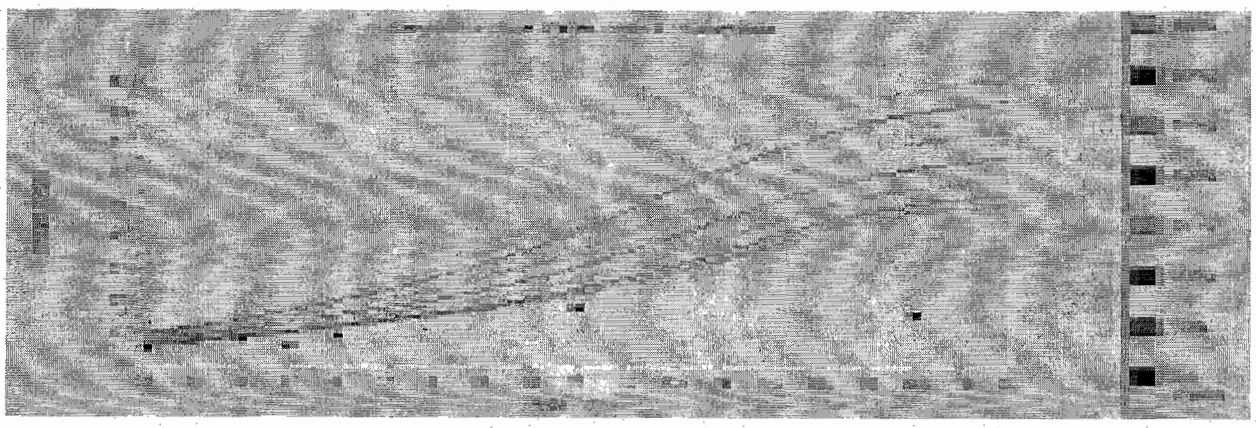

Fig 2: WFA males with E. Histolytica

those without intestinal parasite. Similar patterns were observed in both sexes.

Height-for-age (HFA)

Most of the males with intestinal parasites fell below the 5th centile (Fig 7). All those with E histolytica only were below the 5th centile (Fig. 8). Figure 9 shows those without intestinal parasites. Most of them were above the 5th centile. This pattern was similar in the females (Figs. 10-12).

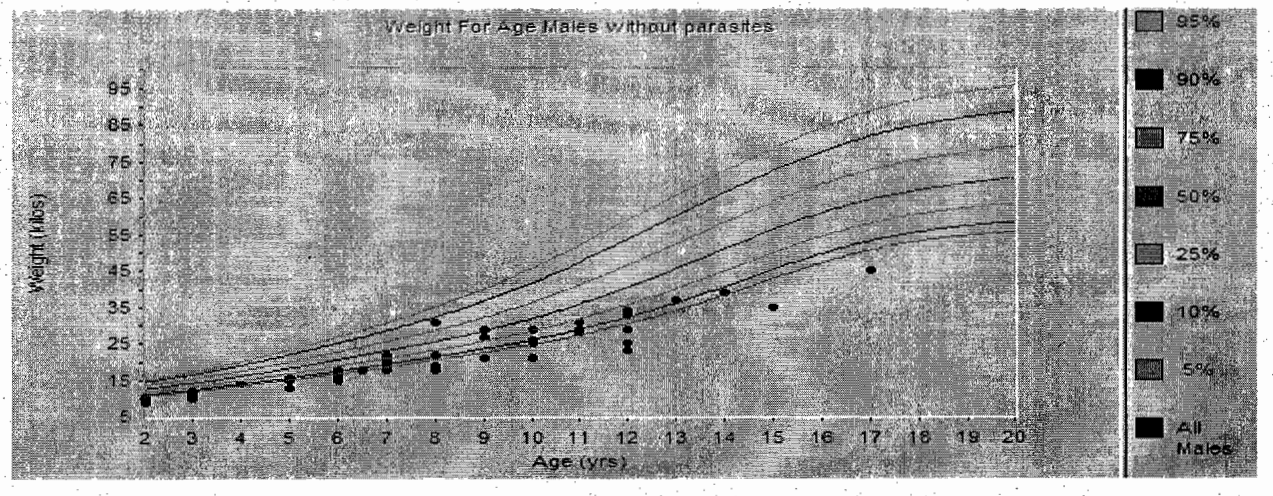

Fig 3: WFA males with Intestinal parasites

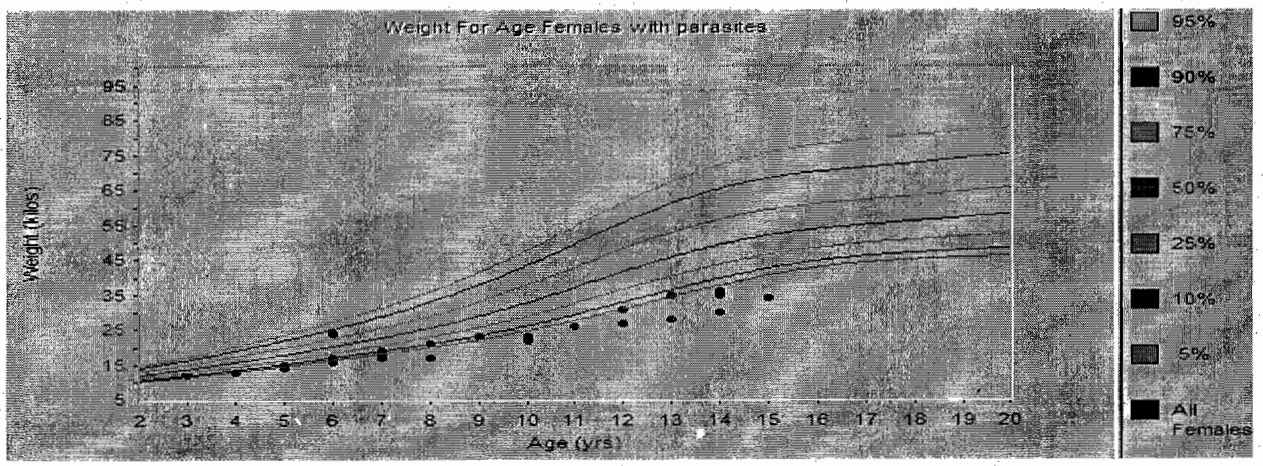

Fig 4: WFA in females with intestinal parasites

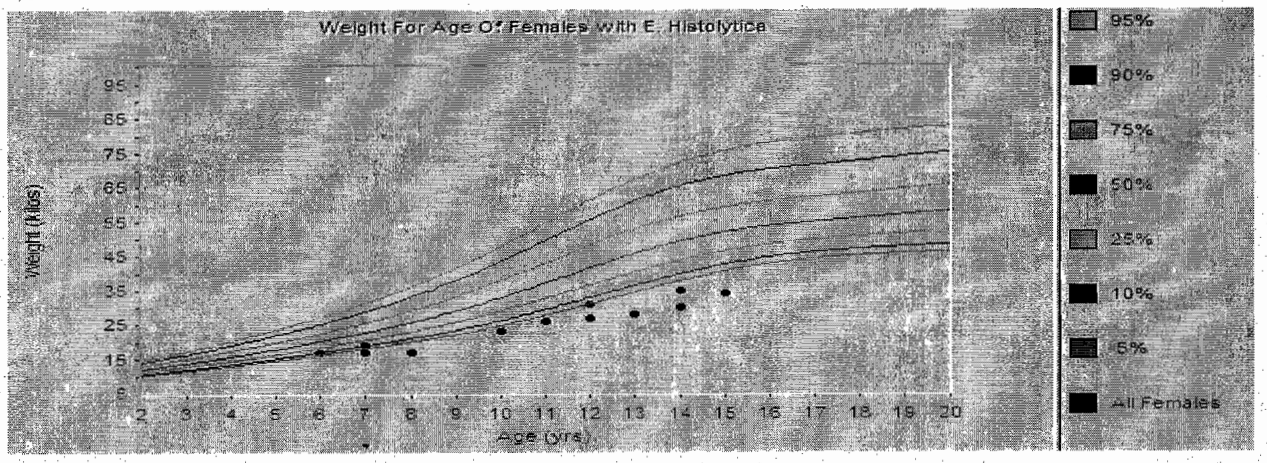

Fig. 5.: WFA in females with E histolytica

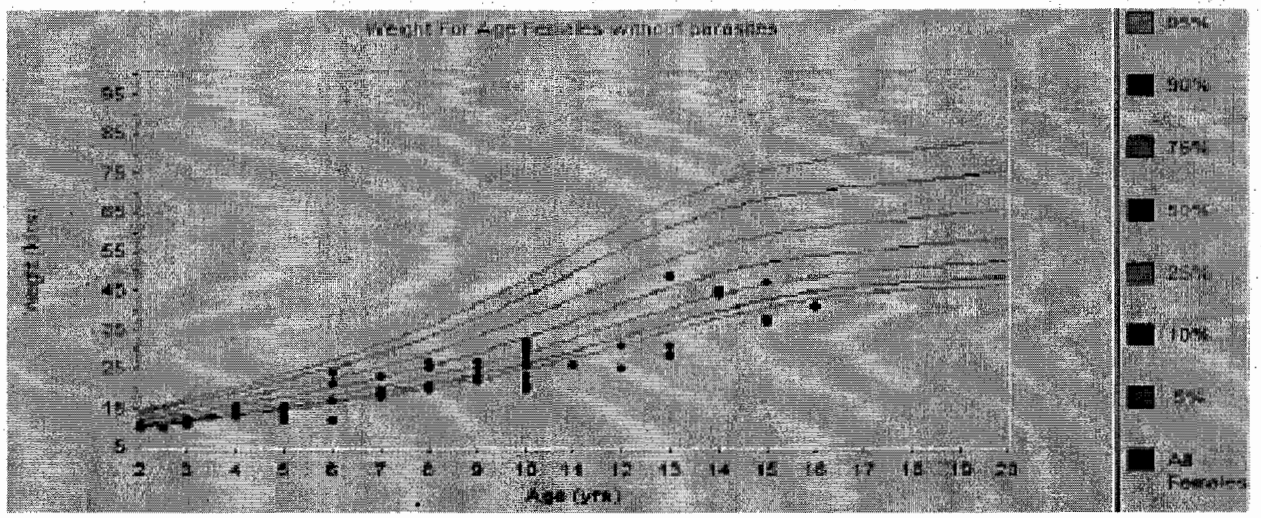

Fig. 6.: WFA in females without intestinal parasites

Table IV

Distribution of Parasites by Age (yrs) in 47 Children positive for Intestinal Parasites

Parasites	*< 1yr*	*Percent*	*1-4 yrs*	*Percent*	*5-9 yrs*	*Percent*	*10-14 yrs*	*percent*	*15-19 yrs*	*Percemt*	*Total*	*Percent*
E histolytica	1	100.0	2	40.0	7	32.0	8	50.0	2	66.7	20	42.7
Ascaris	0	0.0	1	20.0	6	27.3	1	0.3	1	33.3	9	19.1
Hookworm	0	0.0	0	0.0	4	18.2	2	12.5	0	0.0	6	12.8
Enterobius vermicul.	0	0.0	0	0.0	1	4.5	0	0.0	0	0.0	1	2.1
Hymenolepsis Nana	0	0.0	0	0.0	1	4.5	0	0.0	0	0.0	1	2.1
S mansoni	0	0.0	0	0.0	0	0.0	1	6.3	0	0.0	1	2.1
S stercularis	0	0.0	0	0.0	1	4.5	0	0.0	0	0.0	1	2.1
Asc/Hworm/ E histolytica	0	0.0	0	0.0	0	0.0	1	6.3	0	0.0	1	2.1
E histolytica/ S Stercularis	0	0.0	1	20.0	0	0.0	0	0.0	0	0.0	1	2.1
E histolytica/ Hookworm	0	0.0	0	0.0	2	9.0	3	18.7	0	0.0	5	10.7
E histolytica/Ascaris	0	0.0	1	20.0	0	0.0	0	0.0	0	0.0	1	2.1
Total	1	100.0	5	100.0	22	100.0	16	100.0	3	100.0	47	100.0

$X^2 = 134.6$ p =0.8

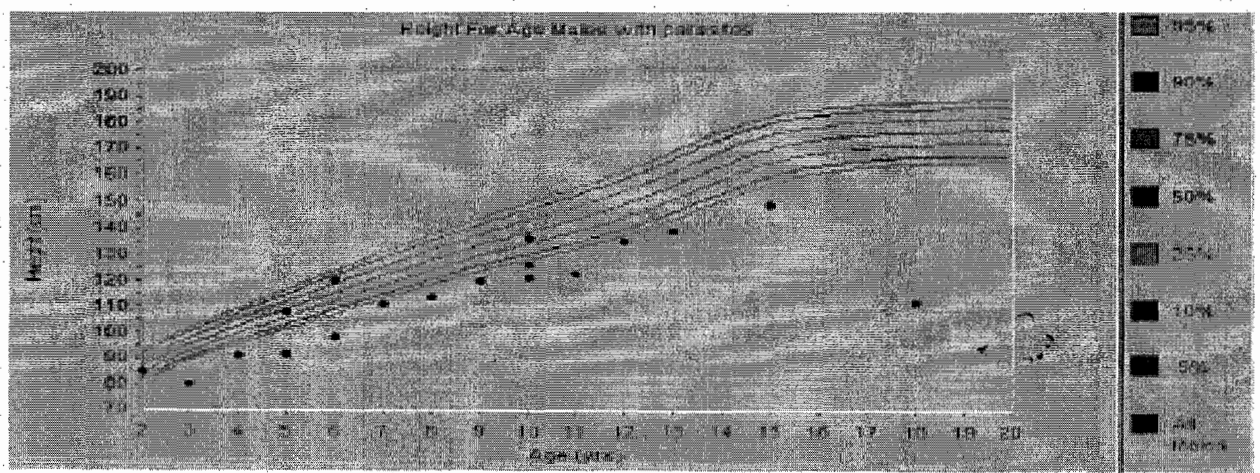

Fig. 7.: Height-for-age (HFA) in males with intestinal parasites

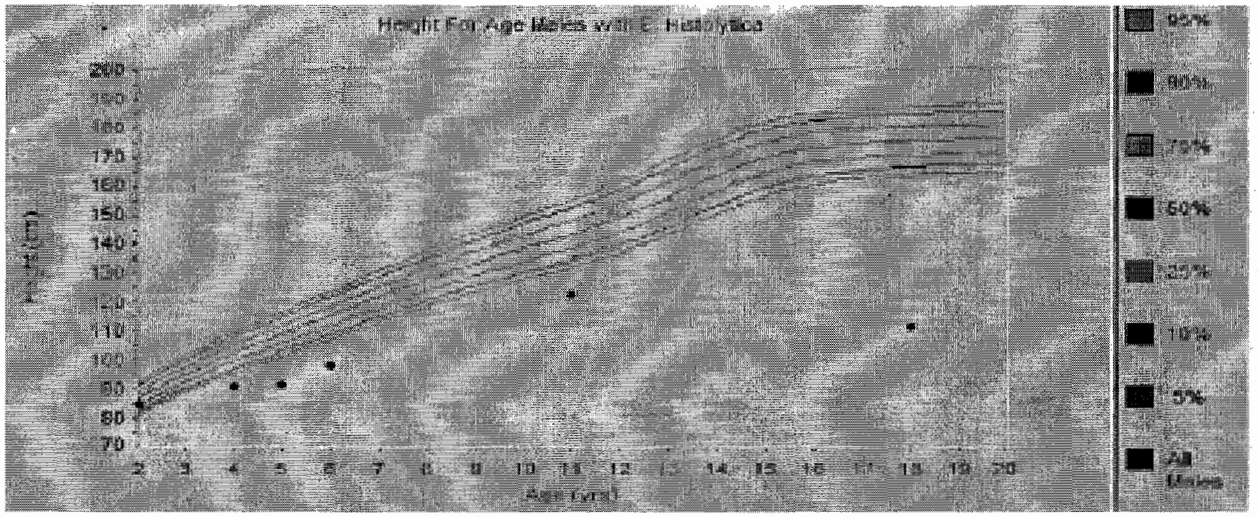

Fig 8: HFA in males with E histolytica

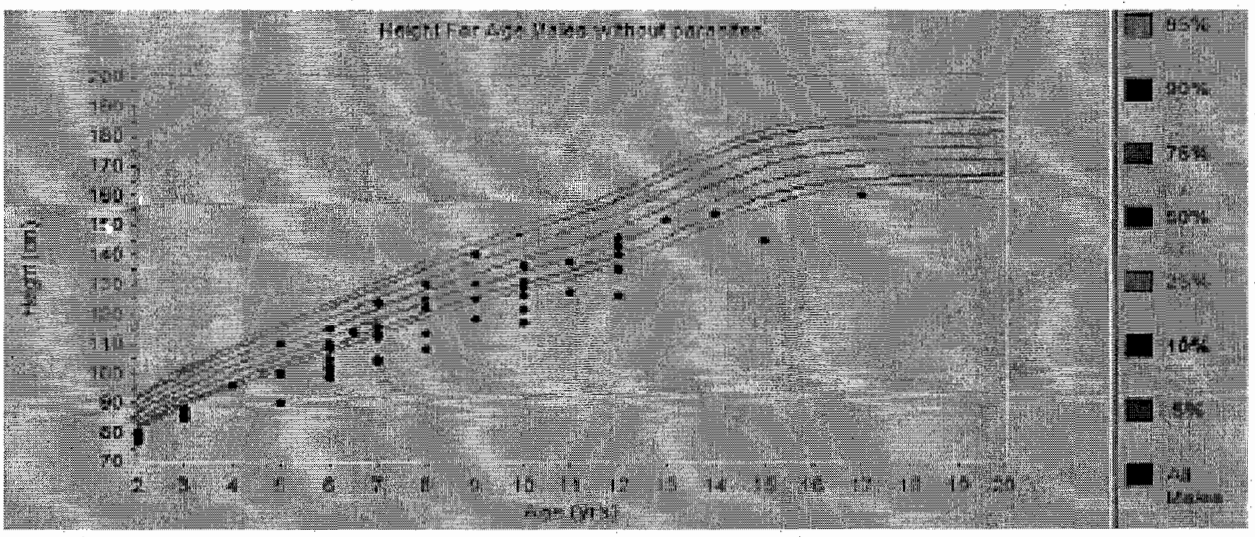

Fig 9: HFA in males without intestinal parasites

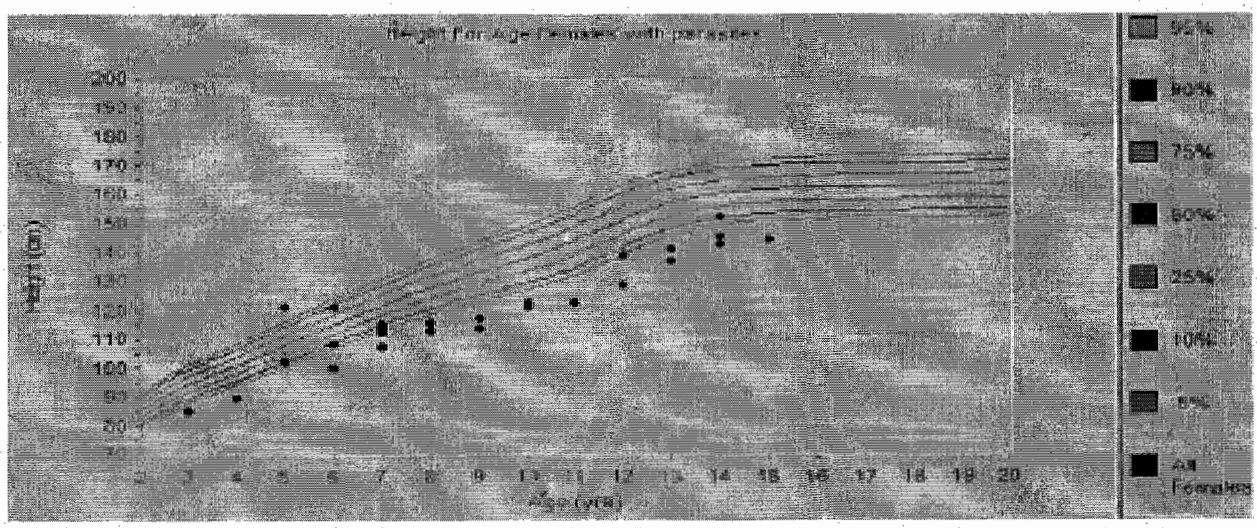

Fig 10: HFA in females with intestinal parasites

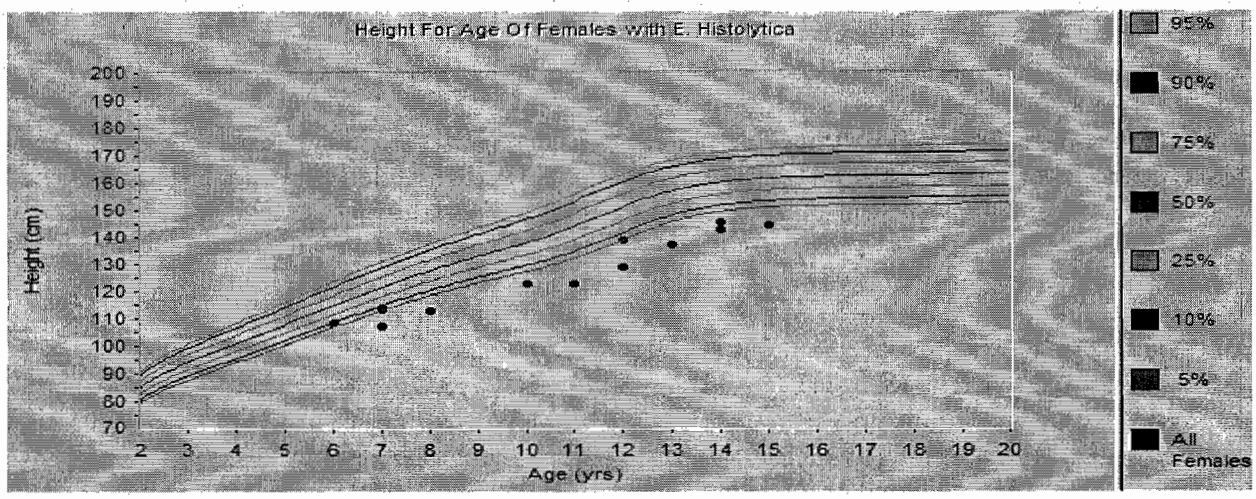

Fig 11: HFA in females with E Histolytica

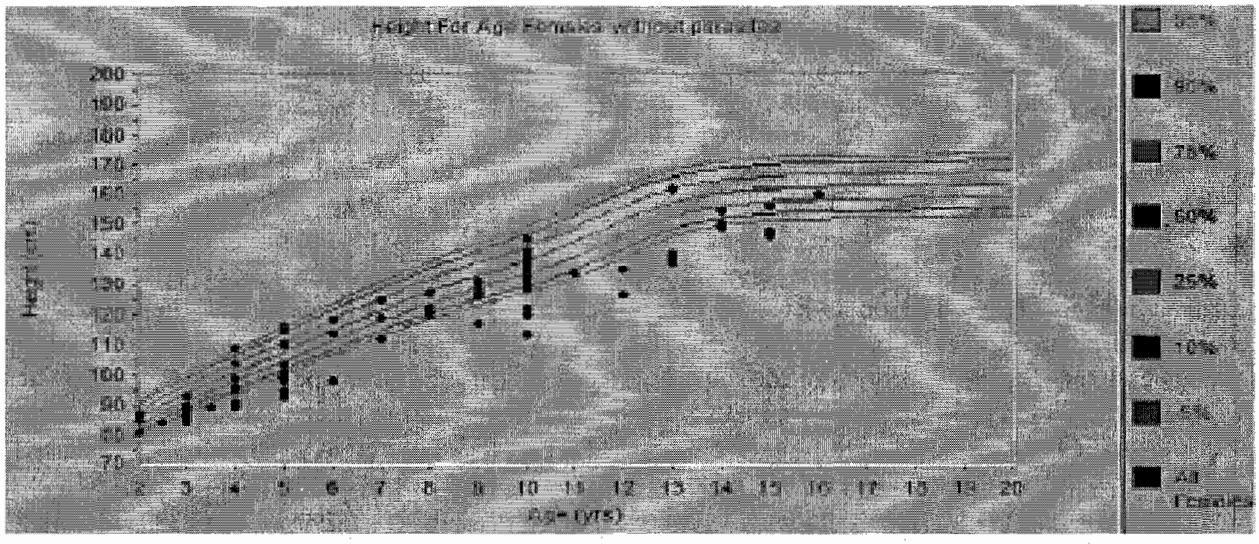

Fig 12: HFA in females without intestinal parasites

Discussion

As observed in the present study, there was a high level of intestinal parasitaemia among Fulani children in Vom, with a prevalence rate of 24.6 percent. The sex prevalence rate was similar for the sexes, being 24.7 percent in males and 24.5 percent in females. However, in a previous study in Vom, Okafor and Azubike[14] found an overall prevalence rate of intestinal parasite of 42.3 percent, and a sex difference of 22.7 percent in males and 19.7 percent in females. Although both studies were carried out in Vom, the different laboratories and subjects used in the studies probably accounted for the differences in the results. The Fulanis, despite not having appropriate waste disposal method, keep a fairly neat environment, perhaps partly because defaecation is usually carried out deep in the bush during cattle rearing and grazing. In Port Harcourt,[15] an overall prevalence rate of 46.3 percent intestinal parasitemia with a higher female prevalence (52.9 percent vs 47. 06 percent) has been reported. These figures are higher than those observed in our studies. The difference may be due to fact that the Fulanis have a wider area for disposing of their waste which therefore has less contact with humans.

The commonest intestinal parasite isolated in the present series was the protozoan E histolytica, while the commonest intestinal helminth was *Ascaris lumbricoides*. The other parasite with comparatively high incidence was the hookworm. These findings differ from those reported in other series[6,16-18], in which the commonest organism isolated had been *Ascaris lumbricoides*. In our study, ascaris accounted for only 19.1 percent, which was lower than the percentages reported in most of the other series from various parts of the country.[6,16-18] However, it is noted that apart from hookworm, a previous report by Ighogboja and Ikeh[19] among patients with diarrhoea

in Jos[19] showed a lower prevalence rates of 9.1 percent for ascaris compared with 19.1 percent found in the Fulanis in this study. The observed differences in the two studies may be due to Ighogboja's focus on patients with diarrhoeal diseases who, during the course of their diarrhoea might have been expelling the parasites with the stools.

The prevalence of multiple infection or poly-parasitism noted in this study was 17.0 percent; this compares with one of 14.2 in the series by Ighogboja.[19] However, the prevalence of double infestation of 17.0 percent in our series, was lower than one of 25.1 percent reported from Lagos.[16] Poor drainage and overcrowding in Lagos may be responsible for this difference. Double infection with ascaris and trichuris are commonly reported[16] but in the present study, the organisms that were commonly involved were E histolytica and hookworm. This in essence, makes hookworm infestation a very highly prevalent helminthic infection occurring in more subjects than any of the other helminthes.

Most of the subjects infected in our study were aged between 5 and 14 years. This is similar to the finding reported by Fashuyi[18] in Ondo where infestation was commoner among the 6-15 years olds. This age group is prone to walking barefoot, hawking goods on the streets and roads, playing in unsafe and dirty environments. The finding also compares favourably with that reported from India by Awasthi *et al*[20] who found an intestinal parasitic rate of 17.5 percent and noted that 67.6 percent of the subjects were underweight, 62.8 percent were stunted while 26.5 percent were wasted. This is also similar to Sawaya's[21] report. In our series, the children with intestinal parasites were observed to be generally undernourished, with WFA and HFA indices hovering between 5th and 25th centile marks.

Conclusion & Recommendation

From the findings in this study, it is concluded that there is a high prevalence of intestinal parasitic infestation among Fulani children who also suffer from chronic malnutrition. Based on the observation of a high prevalence especially among 5-9 years old or the 10-14 years old subjects which are the school age and early junior secondary school age respectively, a programme of antihelminthic therapy should be incorporated into the school health service with drugs given to all school children at various times during their school years.

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