INTENSITY OF INTESTINAL PARASITE INFESTATION IN A SMALL FARMING VILLAGE, NEAR LAKE TANA, ETHIOPIA

Melake Berhan Dagnew* BSc, MPH, Dr.med, Wondwossen Hailu, Tesfaye Worku**, Elias G/Kidan**, Sissay Yefru**, Tarilru Alene**, Tibabu Demissie****

ABST'RACT: Of the 806 people in Gebaba Village, 192 were examined for intestinal parasites. The overall prevalence was 61% .The mean intensity of infestation for A. lumbrcoides generally fell with age. Of the total nematode egg counts, 41% was harboured by children below 10 years of age. The cure rate with a single dose of levamisole (ketrax) for A. lumbrcoides was 94% and for T. trichiura and Hookworm 100%. The study has an important implication in understanding the epidemiology of intestinal parasites and in the design of community based control programmes. [Ethiop. Health Dev. 1993;7(1):27-31]

INTRODUCI'ION

Intestinal parasite infestation causes considerable burden of illness. A report by the Ethiopian Ministry of Health indicates that helminthiasis is a leading cause of outpatient morbidity (I). A previous study carried out in Gondar Region showed a high prevalence of intestinal parasitism (2). Studies done so far in Ethiopia among different population groups and in various localities have reported prevalence (3,4,5). However, it is now clear that prevalence is a poor indicator of the degree of the problem caused by the infestation (6, 7,8).
This is because parasite prevalence does not reflect the suitability of conditions to parasite transmission and viability of parasite stages outside the host (8).

The objective of this study was to determine parasite distribution and intensity of nematode infestations and to provide knowledge on the local epidemiology of helminth infestations. Such information can serve baseline data in- which those treated with chemotherapy are followed-up over time so the rates of reinfestation are monitored. Thus, the study is useful in the design of community-based helminth control programmes.

The survey was done in Gebaba, a small isolated farming village in Dembia District, Gondar Region in June, 1992. The village population at the time of the study was 806 with an average of 5 persons per household. The infant mortality rate was111 per 1000 live births. The literacy rate was 18%. The only source of drinking water was a river .Average consumption of water per household was 36 liters. Only 2% of the households had usable latrines.

MATERIALS AND METHODS

Initially the house in the village were mapped and numbered. Sample size was ddermined to obtain a figure within the 5% of the true population value (n = 246). Of these, 7(2.8%) were excluded. These were infants,
pregnant women, adults over 70 years of age and people who had been treated with an antihelminthic during the past year .In addition, 12(4.9%) refused to participate and 35(14.2%) were unable to provide a stool specimen. The final study sample was 192. The population (N = 806) was stratified by age. Individuals were selected by random sampling. Each age group in the population was proportionally represented in the final sample.

Clean containers were distributed and instructions for stool sample collection were given. The samples were brought to the field laboratory and examined the same day. Although there are a number of methods for obtaining a total egg count, in our study the Sto1l method was employed. This method is the most widely used and perhaps the most accurate (9). The fo1lowing correction factors were used to convert the estimate (egg per gram)to a formed stool basis: mushy formed, x 1.5; mushy, x 2; mushy diarrheic x 3; diarrheic, x4

*Gondar College of Medical Science, Gondar
**Senior medical ItUden18

(9). Egg-count per gram (epg) measurements were done for three intestinal nematodes (A.lumbrcoides, T .trichiura and hookworm species). Other helminths and protozoa were detected by a direct method. The laboratory examination and egg-count were done by the same laboratory technician. The egg-count data were reported with arithmetic and geometric means (the antilog of the arithmetic mean of the logs of counts). Persons testing positive for intestinal worms were treated on the spot with a single dose of 40 mg. levamisole (Ketrax). Drug efficacy was estimated after 2 weeks of treatment and the cure rate was ascertained by post treatment determination of epg. Complete cure was defined as the absence of eggs from the samples. Definition of the intensity of infestation was adopted using WHO criteria. The cutoff points for light infestation for A.lumbrcoides was under 5000 epg, T.trichiura under 1000 epg, and hookworm species under 2000 epg. Moderate infestation for T.trichiura was under 10, 000 epg (10).

RESULTS

Of the 192 examined, the percentage of males (54%) was higher-than females (46%). The age distributions showed that 68(35%) were below 10 and 21(11%) above 50 years. The overall prevalence rate of intestinal
parasitism was 61% .Higher prevalence was observed in males 67% than females 54%, ($P < 0.05$).

The commonest infestations were A.lumbrcoides 66(34.4%), G.lamb1ia 12(6.3%) and T.trichiura 11(5.7%). The prevalence of. hookworm infestation and strongloidiasis" was low (fable 1). Among the 117 positive individuals, the majority (94%) had single and 6% double infestations. Of the 192 examined, only 16(8.3%)
gave a history of Ascaris worm expulsion within the past one year, though, 77(65.8%) of the total positives had reported a history of abdominal complaints within the past 2 weeks. The results also indicated that the overall prevalence rate of the three intestinal nematodes (A.lumbrcoides, 7:trichiura, and hookworm species) was 43.2%. The mean intensity of infestation for A.lumbrcoides and hookworm species was light with their epg counts under 5000 and 2000, respectively. While for T.trichiura it was moderate (epg under 10, 000) (Table 2). 22.3% and 18.8% of the total nematode eggs were harboured by children 1-4 and 5-9 years of age respectively. In additions, the number of A.lumbrcoides eggs per gram excreted declined with age except for the age group 20-29 years (Table 3).

Followingpost-treatment, egg-counts for A.lumbrcoides were reduced to 7.8% while that of T.trichiura and hookworm were reduced. The cure rate with a single dose of levamisole (Ketrax) for A.lumbrcoides was 94% and for T . trichiura and hookworm infestation it was 100% .

DISCUSSION

The method used in our study to measure intensity of parasite infestation is an indirect one. This method, according to Crolle et al, is susceptible to errors of sampling due to non homogenous distribution of eggs in faeces: variation in egg output by the female worm, differences in the male to female ratio, overcrowding of worms in the gut, and periodicity in the output of eggs by the female worm (11,12). However, despite such

Table 1. **Prevalence of intestinal parasites among 192 residents of Gebaba village, North West Ethiopia**

Type of parasites	No. of Positives	%
A. Lumbrcoides	66	34.4
T. trichiura	11	5.7
S. mansoni	10	5.2
Hookworm species	7	3.6
S. stercolaris	4	2.1
H. nana	4	2.1
Taenia species	2	1.0
G. lambilia	12	6.3
E. histolytica	8	4.2

Table 2**. Intenstity of infestations for three intestinal nematodes in Gebaba village, north West Ethiopia.**

Intestinal nematodes	Arithmetic mean Epg*	Geometric mean epg	Ranges
A. lumbrcoides	1787.9	1570.5	400.8000
T. trichiura	1490.9	1387.5	600.2200
Hookworm species	1085.7	1010.4	400.1600

*epg-egg-count per gram.

Table 3. **The total number of eggs harboured in differnt age groups for the three intestinal nematodes, in Gebaba Village, North West Ethiopia**.

Age (Yrs)	A. lumbrcoides epg	Total Positive	T. trichiura epg	Total Positive	Hookworm epg	Total	Total Epg (%)	Positive
1.4	30.400	10	-	-	1400	2	31,800(22.3)	12
5.9	23.600	13	600	1	2600	2	26,800(18.8)	16
10.14	16.200	10	4600	3	2600	2	23,400(16.4)	15
15.19	9.200	7	800	1	-	-	10,000(7.0)	8
20.29	11.000	8	2000	1	-	-	13,000(9.1)	9
30.39	9.200	5	-	-	-	-	9,200(6.5)	5
40.49	8.000	4	3400	2	-	-	11,400(8.0)	6
+ 50	11.000	9	5000	3	1000	1	17,000(11.9)	13
Total epg	118.600	66	16.400	11	7,600	7	142,600(100.0)	84

limitations egg-count in faeces is an accepted method of assessing gut worm load (11, 12). The 61% overall prevalence rate of intestinal parasite infestation is not unusual. A study done in 1985 in Gondar Region among eight rural communities indicated prevalence rates between 31.4% and 64.8%(2).

Outside the region, an overall prevalence rate of 61.6% was reported among resettlement farms in Western Ethiopia (13). Intestinal parasitism was also documented by the Ministry of Health as a leading cause of morbidity among outpatients (1). These studies indicate that the disease is a major health problem in Ethiopia. The. high prevalence and the presence of different parasite species is common under conditions of rural poverty.

Among the prevailing nematode gut infestations A.lumbrcoides was the predominent species. This is also true among other studied localities of Gondar Region and Western Ethiopia. In both areas, prevalence rates of 31.8% and 38.8% were reported, respectively (2, 13). The high prevalence of Ascaris infestation in the village is due to conditions of poverty , and poor personal and environmental hygiene. Low prevalence of T trichiuria and hookworm infestations were also observed in other communities of Gondar Region (9% and 5.3% respectively) (2). The low prevalence of these parasites in the study village might be due to the long dry season, low humidity, unfavourable soil formation and other factors. Although the reported prevalence of the three nematode gut infestations was 43.2% and for Ascaris alone 34.4%, the intensity of parasite infestation was low(fable 2). Such patterns of high prevalence with low intensity of infestation have also been observed in rural areas of India and Indonesia(8). The low intensity of infestation in the study village could be as a result of the preference of the people to defecate away from their homes; the scattered nature of the houses; and the timing of the study period (in the dry season) which affects viability of eggs and larvae. Such conditions might considerably reduce the chances of transmission and reinfestation.

The fact that 41.1% of the total nematode egg outputs in the community was harboured by children below 10 years of age indicates that this particular age group is at high risk of nematode induced morbidity. This phenomena reflecting age related changes in exposure to infestation was also observed in other studies(6, 7, 8, 14). And under conditions of poverty and malnutrition(41.5%) in the village, the impact of parasitism on child health is quiet obvious (15, 16).

The drug levamisole was well tolerated. It was cheap; a single dose cost 20 Ethiopian cents at the Health center. The cure rate of Ascaris infestation (94%) showed that the drug is very effective. Cure rates of 91% and 92.2 % have been reported in other studies (14, 17). However, the reported cure rate of Trichiuris infestation was questionable. Depending on the intensity of 1nfestations, other studies have reported cure rates ranging from 21.8% to 75% (14, 17). Reports in Africa showed that 1evamisole temporarily suppresses hookworm egg output if a count is done within two weeks after treatment (18). If this is true, then it might
explain the 100% reported cure rate in our finding. And whether this applies for Trichiuris or not is unclear and requires further investigation.

Finally, the study showed that children are at high risk and contribute most to parasite transmission within the community .We suggest the same type of study be done among those treated so that the time period needed to reach pretreatment level is determined. Moreover, there is a need for further study on this line using elaborate methods such as worm expulsion technique. There are different approaches to the control of intestinal parasitism (7, 14). But in our setup, we need to study whether selective chemotherapy of heavily infested individuals or mass treatment with or without sanitary and water supply is effective or not.

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