

## Prevalence of Hookworm infection and hemoglobin status among rural elementary school children in Southern Ethiopia

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### Abstract

A cross sectional survey was conducted to assess the prevalence rate of intestinal parasites with emphasis on hookworm infection on apparently healthy 421 elementary school children of Boloso Sorie woreda. The prevalence of intestinal parasites among the studied children was found to be 69.4%, of *Ascaris lumbricoides* dominating (40%) followed by hookworm (26.8). Low level of hemoglobin was not significantly associated with hookworm infection. The overall prevalence of anemic condition (below normal level of hemoglobin) was found to be 20.6% (87/422). Promotion of appropriate solid and liquid waste disposal, supply of safe water and feet wearing are recommended. [*Ethiop. J. Health Dev.* 2002;16(1):113-115]

### Introduction

The hookworm spp, which most commonly infect man, are *Anclostoma duodenale* and *Nector americanus*. Their prevalence rates are highest in developing countries (1). In endemic areas rates may range from 20% to 80% (1). They occur in predictable areas where sanitary and environmental conditions favor the development of filariform larvae and infection of hosts.

Children may suffer several years of retardation in mental and physical development due to hookworm infection. In severe cases of infection the hemoglobin may be reduced by thirty percent or less (2). Anemia is a major public health problem throughout the world, especially in developing countries (3). Anemia is known to have multiple etiology. Particularly in tropics deficiency of essential substances resulting from the effect of blood loss due to hookworm infection is one of the most important factors (4).

The objective of this study was to determine the prevalence of intestinal parasitic infection and the related risk factors.

### Methods

A descriptive cross sectional study was conducted during the months of February - March 2000 on 421 apparently healthy students (7-25 years old) attending in 6 out of 36 rural and sub-urban elementary schools.

During the study period the study schools had about eight thousand students. The students were selected using random sampling technique. If the selected student was not present or not willing to be included in the study, the next student was taken. Also the selected students were asked for recent malarial Attacks case and treatment with anti-helmenthic drugs. Students with fever and diarrhea were excluded from the study.

A questionnaire addressing, availability of latrine and drinking water, shoe wearing habit, demography, knowledge, attitude and practices of personal hygiene was administered by members of the research team in order to identify the determinants of hook-worm

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infection.

**Hematological analysis:** finger blood\* was collected from all subjects using pricking lancet and hemoglobin (the iron-carrying part of the blood cells) was read and recorded using HEMOCUE blood Hemoglobin photometer at the same day on the field. (Produced by Hemocue AB, Angelhom, Sweden). According to the Procedure of the HEMOCUE photometer, the universal cut-off value to be anemic was taken as <13 g/dl and <12 dl for males and females respectively.

**Parasitological analysis:** Stool samples of approximately one gram from all subjects were collected into test tube containing 5 ml of 10% formalin and transported to Awassa, Center for Health Research and Laboratory. Then using Formol ether concentration technique microscopic examination was carried out to identify intestinal parasites (5).

The intensity of hookworm infection (hookworm egg count), determination of serum iron level and RBC morphology were not done due to resource limitation.

The laboratory examination was done by senior Medical Laboratory Technicians with several years' experiences in the Regional Health Research Center. Double slides were prepared for each sample in order to increase the accuracy of result.

Data entry, cleaning and analysis were done using an Epi-Info Version 6.4 Statistical Software. Statistically significant differences were measured by estimating Odds ratios (OR) with 95% confidence intervals. The students were asked for verbal consent to participate in the study. Children found to be positive for intestinal parasites were treated with anti-helminths. Appropriate hygienic measures regarding school compounds and students personal hygiene were addressed and discussed with the school directors, Woreda Health Office, Woreda Education Office and Woreda Council. Feed back of the study findings was sent to concerning partners of the Woreda.

### Result

A total number of 421 students aged 6-25 years with mean age of 10.9 years were recruited from six randomly selected elementary schools of Boloso Sorie Woreda. The over all pre-valence rate for intestinal parasites was found to be 69.4%. Of the 292 positive children, 1.4% had quadruple infection, 9.3% triple infection 30.0% double infection and 59.3% single infection. Eight species of parasites were recovered, the most dominant were *Ascaris lumbricoides* (40%) followed by hookworm species (25%) and *Trichurius trichuria* (14.7%). This shows that on an average one child hosts more than one parasite.

Table 1: Risk factor for Hookworm infection

Types of factors	Hookworm Infection status		OR	CI
	Positive	Negative		
Sex			1.50	(95%CI = 0.89 < OR < 2.54) (Not significant)
Male	85	206		
Female	28	102		
Availability of latrine			1.64	1.04 < OR < 2.62
Absent	54	110		
Present	59	198		
Availability of shoes			1.76	1.10 < OR < 2.81
Absent	72	154		
Present	41	154		

The over all prevalence of hookworm infection was found to be 26.8% (113/421). More than 75% (85/113) of the hookworm infected students are Males (Odds ratio=1.50, 95% CL=0.89<OR<2.54). One hundred and ninety five (46.3%) students' responded that they wear shoes. Out of those shoes wearing students 105 (53.3%) were females. Ninety five (22.5%, 94/421) of them responded that they wear shoes sometimes only. The association of hookworm infection with the absence of shoes and with the absence of latrine shows statistically significant association among the students studied. (Odds ration of 1.76 (95% CL = 1.10<OR<2.81 and 1.64 (95% CL = 1.04<OR<2.62) respectively. The mean and minimum values for hemoglobin were 13.70 g/dl for male and female respectively according to the procedure of the HEMOCUE photometer.

#### Discussion

Compared to similar studies of Ali et al (6), our finding on intestinal parasitism and related risk factors appears to be below. This difference might be due to the differences of the study period. In the cases of Ali et al the period of survey was November. It is after heavy rain season that might favor high rate of harboring of intestinal parasites. Our study was conducted in March, end of the dry season which probably reduces the viability of infective stage of intestinal parasites, hence reducing the infection. The finding of a prevalence rate for *A. lumbricoides* and hookworm 40% and 26.7% respectively in this study is in agreement with the finding of Ali et al, who reported a prevalence rate of 56.4% and 25.5% respectively (6).

The high proportion of hookworm infection among children aged between 9 and 12 years could be explained by the fact that children in this age group having high out door activities such as helping in farming, playing at the back yard in moist soil etc, resulting in higher exposure to infective egg and filariform larvae in the soil. The present study has also attempted to examine the absence of shoes and latrine as a risk factor for infection of hookworm. The association was found to be statistically significant. Odds ratio were 1.76 and 1.64 (95% CL=1.10<OR <2.81 and (95% CL=1.04<OR<2.62) respectively.

The findings indicate that there is a need to provide appropriate solid and liquid waste disposal systems and clean drinking water in schools.

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