

## ORIGINAL ARTICLE

Hookworm Infection and its Problems  
in Central Java

by

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## Abstract

*The correlation of worm load, haemoglobin level and the nutritional status in children who had hookworm infection were estimated. The iron deficiency anaemia in the school age children was caused by hookworm infection. The worse the nutritional status of the child, the lower was the haemoglobin level. Besides anthelmintics treatment and the iron supplementation, primary health care education was also given simultaneously.*

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## Introduction

Hookworm infection remains a public health problem. According to surveys from some regions the prevalence of hookworm infection is regarded such as 23,2% in Boyolali (Cross et al., 1968); 52,3% in Yogyakarta (Nurhayati and Sumarmo, 1973); 67,0% in West Java; 65,0% in South Kalimantan and 66,0% in West Kalimantan (Bintari Rukmono, 1978; cited by Soemantri et al., 1979). The prevalence of hookworm is more than 80,0% (Oemijati, 1970; Holz, 1963; Darwin Kariadi et al., 1973). Kosim (1973) reported that in rural areas in North Sumatra the prevalence rate was high although the number of worms were low; among those people in that area, 70,0% suffered from hookworm infection with the range of worm load of 50.

*Necator americanus* was the predominant species, and severe anemia was found when the socio-economic level was low. In autopsies Machfudin (1973) found that 62,2% were *Necator americanus* and 46,8% were *Ancylostoma duodenale*.

Belding (1952) and Roche and Layrisse (1966) stated that anemia is due to bleeding of the guts. The theory of the toxic effect of the blood vessels has not been proved yet. The higher intensity of the worm load will increase the severity of undernutrition and anemia (Scrimshaw et al., 1968). A rich diet will compensate the hookworm infection, so thus iron deficiency anemia will be overcome (Walker, 1955). Roche and Peree Gimi-

nes (1959) proved that 44,1% of iron loss will be absorbed.

There are correlations between haemoglobin and worm load, a more severe worm load will reduce the haemoglobin level (Vinke and Jansen, 1962); Iron deficiency anemia is caused by blood loss (Hall, 1976).

## Material and method

Two hundred forty six children from 3 elementary schools in Banjarharjo, Tegalarharjo and Tonegoro (Central Java) were examined. All were in good nutritional status. The modified Kato's method was used. Culture of the larvae was performed with the modified Harada Mari method (Kosin, 1973).

Socio-economic conditions of the parents of the examined children and other factors such as the environmental condition and the daily iron requirement were obtained.

## Results and discussion

The prevalence of intestinal parasite (92,7% *Ancylostoma duodenale*) is shown on table 1; the result of *Ancylostoma* larvae culture (78%) is shown on table 2; and the relationship between worm load and hemoglobin level is shown on table 3.

The diagnosis of megaloblastic anemia was based on peripheral blood smear with the criteria "five of rule" (Herbert, 1971) and the result was 10,2% folic acid deficiency and 30% vitamin B<sub>12</sub> deficiency anemia caused by hook-

worm; the serum folic acid concentration was decreased.

The consumption pattern of the main food of school age children both in anemia and non-anemic group is shown on table 5 and 6. It is concluded that there was no significant difference between the non-anaemic group.

TABLE 1: Result of the intestinal worms infection

Intestinal Parasites	246 children positive	Percentage (%)
Hookworm	228	92,6
Ascaris Lumbricoides	246	100
Trichuris Trichuria	246	100
Entamoeba Histolytica	17	6

TABLE 2: Result of Cultivate Ancylostoma

Type of worm	Total of cases	Percentage (%)
Necator Americanus	181	76,0
Necator Americanus and Ancylostoma Duodenale	28	12,0
Nil	23	10,0
Total	232	100,0

TABLE 3: The relationship between the total egg count and Hb according to Martin (1972)

Classification of eggs count	Interpretation	Total of cases	Percentage (%)	Mean Hb (g%)
0 — 10	Normal	13	5.60	14.65 ± 0.36
20 — 2.300	Light	130	56.03	12.21 ± 0.77
2.400 — 12.300	Moderate	73	31.47	10.13 ± 0.48
12.400 —	Heavy	16	6.90	7.63 ± 0.31
			100.00	

Based on those findings the anthelmintic treatment was given besides the iron supplementation during the three months duration. During the treatment of hookworm infection with anthelmintics and iron supplementation (3 months duration), primary health care education was also given simultaneously.

TABLE 4: The prevalence of Iron deficiency anemia, folic acid and/or Vitamin B12

Location	Total of cases	Percentage of iron of anemia	Percentage of serum iron less than 50 ug%	Percentage of saturated transferin less than 15%	Percentage of anemia B12 and/or folic acid deficiency
SD Banjarharjo	101	39.60	29.70	37.62	10.20
SD Tegalharjo	86	82.56	62.79	76.74	12.00
SD Tonegoro	48	97.92	83.33	89.58	19.30

TABLE 5: The prevalence (%) of deflation of iron cases based on saturated transferin less than 20% in non-anemic group

Saturated transferin (%)	Total of cases	Percentage (%)
20%	33	42.67
20%	44	57.33
Total	77	100.00

TABLE 6: The prevalence (%) of deflation of iron cases based in serum iron less than 80 ug% in non-anemic group

Serum iron (ug%)	Total of cases	Percentage (%)
80 ug%	57	74.03%
80 ug%	20	25.97%
Total	77	100.00%

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