

# PARASITOLOGICAL SURVEY IN GORONTALO NORTH SULAWESI, INDONESIA†

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## INTRODUCTION

In Indonesia autochthonous human *Schistosoma japonicum* has been reported only from the Lindu and Napu valleys of Central Sulawesi (Celebes). Examination of stools of more than 5,000 persons from other areas of Central and South Sulawesi failed to reveal schistosome ova except from individuals who had lived or visited the endemic areas (Sudomo and Carney, 1974). Nevertheless, efforts at further delineating the distribution of this debilitating pathogen are required and this paper presents prevalences of human intestinal and blood parasites from the Gorontalo area of North Sulawesi. This study is a continuation of a series of such projects by NAMRU-2 and the Directorate General of Communicable Disease Control of the Indonesian Ministry of Health.

## DESCRIPTION OF AREA

Villages surveyed were Bilungala, Tambulilato and Taludaa southeast of the municipality of Gorontalo on the Minahasa peninsula of North Sulawesi (Fig. 1). The study area is situated north of the equator (120°12'-123°28'E, 00°18' - 00°23'N) in a low coastal area (altitude 10 m) bordering the Molucca sea. Inhabitants of this sparsely populated

†This study was supported through funds provided by the Naval Medical Research and Development Command, Navy Department for Work Unit MR041.-09.01-143.

The opinions and assertions contained herein are those of the authors and are not to be construed as official or as reflecting the views of the Navy Department or the Naval Service at large.

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area are primarily fishermen and traders, although some coconut and clove cultivation is being attempted. Apparently there has been no controlled immigration into the area and the population consists of indigenous mountain people who are predominantly of the Moslem religion.

## MATERIALS AND METHODS

Capillary blood was obtained from finger tips between the hours of 2000 and 2400. Thick and thin malaria smears were made onto glass microscope slides and air dried for 12 hours. Thin smears were fixed in methanol and both thin and thick smears were stained in 3-4 per cent Giemsa (pH 6.8 - 7.2) for 1 hour. The thick preparation dehaemoglobinized while staining. Thick smears for microfilariae examination were prepared by dispersing 20 µl of heparinized capillary blood onto glass microscope slides and drying for 12 hours. These preparations were dehemoglobinized for 10 minutes with tap water, dried, fixed in methanol and stained with Giemsa.

At the time of blood collections, subjects were given stool boxes and instructed to return the following day with a sample of their faeces. One or two grams of faeces was placed into screw cap vials containing 15 ml of 10% formalin and mixed thoroughly. Specimens were subsequently examined by direct and formalin-ether concentration methods.

## RESULTS

A total of 156 stool specimens were examined. Table 1 lists prevalences of parasites

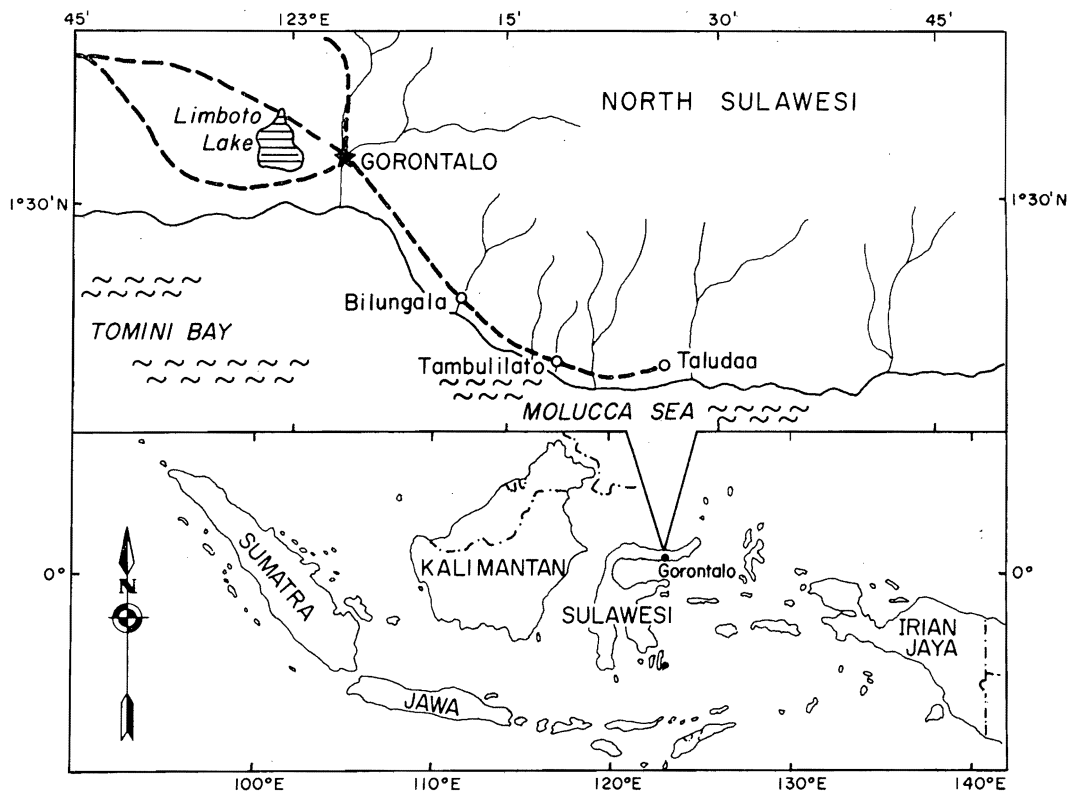


Fig. 1—The Gorontalo Region of North Sulawesi.

from the three villages surveyed while Table 2 lists the distribution by age, sex, and the total or overall prevalences. The most common helminths were *Trichuris trichiura* (79%) followed by *Ascaris lumbricoides* (72%), hookworm (54%) and dicrocoeliid-like egg (25%). *Enterobius vermicularis* was found in 3% of the stools examined.

*Entamoeba coli* (19%) was the most prevalent intestinal protozoan while the prevalence rates of other intestinal protozoans were *Entamoeba histolytica* (10%), *Iodamoeba bütschlii* (6%), *Endolimax nana* and *Giardia lamblia* (5%) and *Chilomastix mesnili* (1%).

Most parasites were evenly distributed between the sexes although hookworm, occurred more frequently in males (males 65%, females 42%) and *G. lamblia* more common in females (females 8%, males 2%).

*A. lumbricoides* and *T. trichiura* occurred commonly in all groups as did hookworm, however, the prevalence of hookworm appeared to increase with advancing age and *A. lumbricoides* and *T. trichiura* either occurred at a constant rate throughout or declined in older age groups (Table 2). The occurrence of *E. vermicularis* appears not to be affected by age, but the presence of dicrocoeliid-like ova was much more pronounced in the 50 year age group (60%). There was little correlation between age and the prevalence of *E. histolytica*, *E. coli*, *E. nana*, *I. bütschlii*, *G. lamblia* or *C. mesnili*, but a decline in the prevalence of most intestinal protozoa was seen in persons in the 50 year age group.

Two hundred twenty-six blood films were examined for evidence of filariasis and 6%

Table 1

Prevalences of intestinal and blood parasites in populations in three villages in Gorontalo, North Sulawesi, Indonesia.

Parasite	Taludaa	Tambulilato	Bilungala	Total
<b>Intestinal</b>	(99)*	(30)	(27)	(156)*
<i>Entamoeba histolytica</i>	11%**	10%	4%	10%
<i>Entamoeba coli</i>	19	20	19	19
<i>Endolimax nana</i>	8	0	0	5
<i>Iodamoeba bütschlii</i>	4	7	11	6
<i>Giardia lamblia</i>	5	3	7	5
<i>Chilomastix mesnili</i>	1	0	0	1
<i>Ascaris lumbricoides</i>	78	50	74	72
<i>Trichuris trichiura</i>	78	83	78	79
Hookworm	67	43	22	54
<i>Enterobius vermicularis</i>	3	3	0	3
Dicrocoeliid-like ova	13	70	19	25
<b>Blood</b>				
<i>Brugia malayi</i>	(90)* 2%	(39) 21%	(97) 4%	(226)* 6%
<i>Plasmodium falciparum</i>	(121) 0	(40) 0	(102) 1%	(263) 1%

( )\* Number examined.

\*\* Percentages to nearest whole number.

were positive for microfilariae of *Brugia malayi* (Table 1). The village of Tambulilato had the highest prevalence (21%) with infections occurring more commonly in males (9%) than females (4%) in the older age groups (Table 2). Only one person of 263 examined had *Plasmodium falciparum*. This infection occurred in a male in the 10-19 age group from the village of Bilungala.

## DISCUSSION

Since the Minahasa peninsula of North Sulawesi is situated geographically between two endemic foci of *S. japonicum* (Mindanao in the Philippines and the Lindu and Napu Valleys of Central Sulawesi), the area could also be suspected as being endemic for the parasite. The results of this limited survey

however, indicate that the trematode is not present. Human infections were not detected by stool examination, nor were small mammals collected and examined found infected. Furthermore, no oncomelanid snails were found.

The prevalences of other intestinal parasites did not vary remarkably from the results of other such surveys conducted in Sulawesi (Cross *et al.*, 1972; Carney *et al.*, 1974a,b; Clarke *et al.*, 1974). Infections were generally distributed evenly between the sexes and among different age groups with the single exception of the high prevalence of dicrocoeliid-like ova. These ova were equally present in males and females and in all age groups but tended to become more common in older persons.

Table 2

Prevalences of intestinal and blood parasites by age and sex in three villages populations in Gorontalo, North Sulawesi, Indonesia.

Parasite	Age in years						Sex		Total
	0-9	10-19	20-29	30-39	40-49	50-	Male	Female	
<b>Intestinal</b>	(33)*	(44)	(27)	(20)	(17)	(15)	(83)*	(73)	(156)*
<i>Entamoeba histolytica</i>	12%**	9%	11%	10%	0	13%	10%	10%	10%
<i>Entamoeba coli</i>	18	25	19	25	18	0	22	16	19
<i>Endolimax nana</i>	3	2	7	10	12	0	4	7	5
<i>Iodamoeba bütschlii</i>	9	7	7	0	6	0	5	7	6
<i>Giardia lamblia</i>	6	9	0	5	0	7	2	8	5
<i>Chilomastix mesnili</i>	0	0	4	0	0	0	1	0	1
<i>Ascaris lumbricoides</i>	88	77	74	60	71	33	71	73	72
<i>Trichuris trichiura</i>	97	77	59	75	76	87	81	77	79
Hookworm	30	55	70	60	59	67	65	42	54
<i>Enterobius vermicularis</i>	6	0	4	0	0	7	2	3	3
Dicrocoeliid-like ova	9	25	19	35	24	60	25	25	25
<b>Blood</b>									
<i>Brugia malayi</i>	(44)*	(93)	(31)	(22)	(18)	(18)	(117)*	(109)	(226)*
	2%	5%	0	5%	17%	17%	9%**	4%	6%*
<i>Plasmodium falciparum</i>	(47)*	(106)	(39)	(25)	(25)	(21)	(136)	(127)	(263)
	0	1%	0	0	0	0	1%	0	1%

( ) \* Number examined.

\*\* Percentages to nearest whole number.

Digenetic trematodes from the family Dicrocoeliidae are parasitic in the biliary passages of sheep, goats and other herbivorous and omnivorous mammals throughout the world. Infections with *Dicrocoelium dendriticum* have been reported in Asia, and while the majority of these were considered spurious, some were genuine as determined by controlled diets (Faust and Russell, 1964). Carney *et al.*, (1975) reported dicrocoeliid-like ova in human stools from Timor, Indonesia and suggested that these were spurious infection. A 25% prevalence in both males and females as demonstrated in this study is noteworthy and a reflection upon the customs, economic circumstances and eating habits of the people involved.

The identification of adult helminths on the basis of egg morphology is hazardous and it is possible that the eggs observed in this study are not from dicrocoeliids. Carney *et al.*, (1975) raised the possibility that similar ova from human stools on Timor, Indonesia were didymozoid eggs which may be acquired by humans when eating marine flying fish. This interesting observation is further enhanced by the fact that all three villages in this study were coastal and the primary occupation was fishing.

The species of hookworm reported in this study is unknown although Clarke *et al.*, (1974) identified *Necator americanus* larvae in stools from persons in Central Sulawesi. The low prevalence of *E. vermicularis* reported here (3%) is probably a methodology artifact since the direct and formalin-ether concentration methods of stool examination are not adapted to recovery of *E. vermicularis* eggs and *Strongyloides stercoralis* larvae. The true prevalence of these two nematodes, therefore, is probably considerably higher than reported here.

Both *B. malayi* and *Wuchereria bancrofti* occur in Sulawesi (Lie, 1970) but only *B.*

*malayi* microfilariae were detected in persons from Margolembo in the Luwu regency of South Sulawesi (Partono *et al.*, 1972) and from the Lindu Valley in Central Sulawesi (Clarke *et al.*, 1974). Similarly, only *B. malayi* microfilariae were recovered from persons in the present study and the prevalences compared to other studies has varied; Partono *et al.*, (1972) reported a prevalence of 0.6-33%, Clarke *et al.*, (1974) approximately 5%, and the present findings, 6%.

The finding of only one person infected with *P. falciparum* (0.5%) is lower than has been found in other surveys in Sulawesi. Cross *et al.*, (1972) reported nearly 19% of the individuals examined at Margolembo in the Luwu regency of South Sulawesi positive for malaria while Carney *et al.*, (1974a) reported approximately 4% in the Poso Valley of Central Sulawesi and Clarke *et al.*, (1974) reported approximately 3% from the Lindu Valley.

## SUMMARY

A survey for blood and intestinal parasites was carried out in the municipality of Gorontalo on the Minahasa peninsula of North Sulawesi. A total of 156 stool specimens were obtained from 83 males and 73 females. *Trichuris trichiura*, *Ascaris lumbricoides*, hookworm, unidentified dicrocoeliid-like ova and *Entamoeba coli*, in that order, were the most common intestinal parasites detected. Other intestinal parasites found less frequently were *Entamoeba histolytica*, *Iodamoeba bütschlii*, *Endolimax nana*, *Giardia lamblia*, *Enterobius vermicularis* and *Chilomastix mesnili*.

*Brugia malayi* microfilariae were detected in 6% and *Plasmodium falciparum* in less than 1% of the population sampled.

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