Prevalence of Parasitic Infections Among Thai Patients at the King Chulalongkorn Memorial Hospital, Bangkok, Thailand

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Abstract

Parasitic diseases are still considered to be a major public health problem. Most patients with parasitic infections are asymptomatic and therefore remain undetected. Asymptomatic parasitic infections are usually discovered by routine parasite examination. To determine the result of parasite examination at the Parasitology Unit, Out Patient Department, King Chulalongkorn Memorial Hospital, Bangkok, Thailand, the authors collected the data of individuals examined for parasite infections from June to December 1997. A total of 6,231 Thais provided the data for analysis. Evidence of parasitic infections was found in 557 (8.94%) cases. The disease was most prevalent in males (57.3%), and in the age group >15-30 years old (11.13%). The population from the Northeast of Thailand was found to harbor parasites with the highest prevalence rate (17.03%), while it was 11.90 per cent in the northern group. The parasitic prevalence rates in the West, East, South and Central regions were 10.60 per cent, 8.90 per cent, 7.74 per cent, and 4.92 per cent, respectively. The parasite most commonly identified was Strongyloides stercoralis (33.39%), while giardiasis was the most common protozoan infection (14.36%). The highest infection rates of S. stercoralis, hookworms, Opisthorchis viverrini, and Gnathostoma spinigerum were found in northeasterners. People from the North of Thailand were infected mostly with G. lamblia. People of working-age from northeastern as well as northern regions harbored pathogenic parasites with high prevalence rates. To prevent parasitic infections, health education for these high risk groups should be provided.

Key word : Parasitic Infections, A University Hospital Study, Thailand

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Parasitic infections affect people in most developing countries worldwide. Intestinal parasitic infections are the most common parasitic infections, with high prevalence rates in many regions of the world⁽¹⁾. Malabsorption, diarrhoea, blood loss, impaired work capacity, and retarded growth due to intestinal parasitic infections constitute important health and social problems⁽²⁾. The public health significance of foodborne trematode infections is also recognized in terms of morbidity, loss of productivity and absenteeism, health care costs, and agricultural losses⁽³⁾. These trematode infections are almost exclusively found in people living in Southeast Asia and Western Pacific Regions⁽³⁾.

In Thailand, parasitic diseases have been considered a major public health problem for decades. A national epidemiological survey in 1996 showed that infections caused by parasitic helminths affected more than 35 per cent of the Thai population⁽⁴⁾. Generally, morbidity from parasitic infections is mild but chronic. The significant impact of parasitic infections on public health has mostly been ignored by the Ministry of Public Health. The problem may be worsen with the fact that many cases of intestinal parasitic infections are asymptomatic and therefore remain undetected. The authors report the result of parasite examination correlated with the regions from which the patients came, at the Parasitology Unit, Out Patient Department, King Chulalongkorn Memorial Hospital, Bangkok, Thailand.

MATERIAL AND METHOD Study population

Data of stool examination from all participants were obtained from the Parasitology Unit, Out Patient Department, King Chulalongkorn Memorial Hospital, Bangkok, Thailand from June to December 1997. The total number of subjects was 6,231. The details of sex, age, residence, and kinds of helminths or protozoa recovered were recorded and confirmed by two individuals. The provinces of all the subjects who participated in this study were grouped by regions. The prevalence rates of parasitic infections in the subjects from the northern, central, northeastern, western, eastern, and southern regions are indicated in the map of Thailand (Fig. 1).

Diagnosis of parasitic infections

To determine intestinal parasitic infections, stool specimens were examined by the direct smear

method and formalin-ether concentration technique for the presence of helminth eggs or larvae and protozoa as previously described⁽⁵⁻⁸⁾. About ten grams of each stool specimen was examined microscopically by using the direct smear technique. The rest of the specimen was processed by the formalin-ether concentration technique. To avoid contamination, specific precautions were explained to all individuals on how to handle the stool specimens before sending them to the laboratory.

Special techniques recommended by the Parasitology Unit of King Chulalongkorn Memorial Hospital were also used for diagnosis of particular parasites. Gnathostomiasis was determined by a skin test using soluble antigen extract from the thirdstage larvae of Gnathostoma spinigerum. A serologic test (Indirect hemagglutination (IHA) test, Cellognost[®] Amoebiasis) was used as an additional test for Entamoeba histolytica. ELISAs for Toxoplasma gondii IgM and IgG antibodies were performed for diagnosis of toxoplasmosis. Detection of Cryptosporidium spp. and Cyclospora spp. was done by using modified cold Kinyoun acid-fast stain. Microsporidium spp. was recovered by using Trichrome stain. Pneumocystis carinii, Plasmodium spp., and filarial parasites were examined by Giemsa stain as previously described(9,10).

Data analysis

The data were recorded and analyzed by using Excel 6.0 software program. Differences in prevalence rates were compared by the Chi square test. Statistic analysis was performed with the level of significance at p-values <0.05.

RESULTS

Of the 6,231 individuals registered for the parasite examination, 2,935 (47.10%) were male and 3,296 (52.90%) were female (Table 1). The ages of all participants ranged from 18 days to 104 years with the mean \pm SD of 40.15 \pm 18.9 years. Most study individuals were in the age group >15-30 years (33.61%). The lowest number was found in children less than 15 years (4.24%). The age group >30-45, >45-60, and >60 years comprised 1,682 (26.99%), 1,098 (17.62%), and 1,093 (17.54%) individuals were from the central region of Thailand (3,574 individuals; 57.36%) (Table 2). There were 1,662 (26.67%) individuals from the northeastern region. The num-



Fig. 1. Prevalence of parasitic infections classified by regions.

Age group			Number	examined					Number	infected		
(years)	To	otal	М	ale	Fer	nale	To	otal	M	ale	Fer	nale
		%		%		%		%		%		%
≤15	264	4.24	141	53.41	123	46.59	18	6.82	10	7.09	8	6.50
>15-30	2,094	33.61	974	46.51	1,120	53.49	233	11.13	137	14.07	96	8.57
>30-45	1,682	26.99	823	48.93	859	51.07	165	9.81	96	11.66	69	8.03
>45-60	1,098	17.62	487	44.35	611	55.65	70	6.38	35	7.19	35	5.73
>60	1,093	17.54	510	46.66	583	53.34	71	6.50	41	8.04	30	5.15
Total	6,231	100	2,935	47.10	3,296	52.90	557	8.94	319	10.87	238	7.22

 Table 1.
 Prevalence of parasitic infections classified by age and sex.

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NUCCIONS	IMMINOCI						I TO TOTITIONT	Intected by						I OLAI I	number
	examined	01	Ss	H	M	0	N	0	S		GI	Other p	oarasites	of in	fected
			%		%		%		%		%	d	%		%
North	294	16	5.44	2	0.68	10	3.40	2	0.68	9	2.04	3	1.02	35	11.90
Central	3,574	53	1.48	36	1.01	26	0.73	10	0.28	42	1.18	21	0.59	176	4.92
Northeast	1,662	101	6.08	74	4.45	86	5.17	12	0.72	27	1.62	20	1.20	283	17.03
West	151	4	2.65	5	3.31	2	1.32	0	0	I	0.66	4	2.65	16	10.60
East	382	10	2.62	12	3.14	10	2.62	2	0.52	2	0.52	1	0.26	34	8.90
South	168	5	1.19	5	2.98	0	0	0	0	2	1.19	4	2.38	13	7.74
Total	6,231	186	2.99	134	2.15	134	2.15	26	0.42	80	1.28	53	0.85	557	8.94
Ss = Strongy	oid stercoralis, HW	= hookwc	$Ov = O_{i}$	pisthorchis	s viverrini, G	s = Gnathos	stoma spinige	erum, Gl =	Giardia laml	olia, Other	parasites =	Taenia spp.,	Trichuris tri	ichiura, Ech	tinostoma

pp., Hymenolepis diminuta, Ascaris lumbricoides, Entamoeba histolytica, Toxoplasma gondii, Cryptosporidium spp., Plasmodium spp., Isospora belli, and Sarcocyctis spp.

ber of individuals from the East, North, South, and West of Thailand were 382 (6.13%), 294 (4.72%), 168 (2.70%), and 151 (2.42%), respectively.

Parasitic infections classified by age and sex

Among the 6,231 individuals examined, 557 (8.94%) cases were infected with at least one parasite (Table 1). The highest prevalence rate of parasitic infections was found in the age group >15-30 years (11.13%). The parasitic infection rates were 9.81 per cent, 6.82 per cent, 6.50 per cent, and 6.38 per cent among individuals in the age group >30- $45, \leq 15, >60, \text{ and } >45-60 \text{ years, respectively. Males}$ (10.87%) were infected with parasites more than females (7.22%) in all age groups. There was a significant difference in the infection rates of males and females in the age group >15-30 (p<0.001) and >30-45 (p<0.05) years.

Highest prevalence of parasitic infections found in the northeastern population

Parasitic infections were most common in the northeastern group (17.03%) (Fig. 1, Table 2). The prevalence rate of parasitic infections of 11.90 per cent was found in subjects from the north region. Those from the West, East, and South of Thailand were found to harbor parasites with the prevalence rates of 10.60 per cent, 8.90 per cent, and 7.74 per cent, respectively. The lowest prevalence rate of parasitic infections of 4.92 per cent was found in the central group.

Strongyloid stercoralis identified most commonly

The highest proportion of parasites identified among infected cases was S. stercoralis (33.39%) (Fig. 2). The second most common parasite identified in the infected cases was hookworms, as well as liver fluke (Opisthorchis viverrini) (24.06%). 4.67 per cent of the subjects were infected with Gnathostoma spinigerum. Other helminths found less frequently were Trichuris trichiura (1.80%), Echinostoma spp. (1.26%), Taenia spp. (1.08%), Ascaris lumbricoides (0.36%), and Hymenolepis diminuta (0.18%). Among protozoan infections, giardiasis caused by Giardia lamblia was most commonly found (14.36%). The proportions of Entamoeba histolytica, Cryptosporidium spp., Toxoplasma gondii, Sarcocystis spp., Plasmodium spp., and Isospora belli found among infected cases were 1.26 per cent, 1.08 per cent, 0.90 per cent, 0.90 per cent, 0.36 per cent, and 0.36 per cent, respectively.

Isospora belli Plasmodium spp. Sarcocystis spp. Toxoplasma gondii Cryptosporidium spp. Entamoeba histolytica Giardia lamblia Hymenolepis diminuta Ascaris lumbricoides Taenia spp. Echinostoma spp.		opro, add, drive in a second second second a second a second seco
Echinostoma spp. Trichuris trichiura		all and a second
Gnathostoma spinigerum		
Hookworms		
Strong loid starcoralis	•	
Su ongy iota ster coraus		(%)
	0 5 10 15 20 25 30 35 4 Helminthic infections	40
	Protozoan infections	

Fig. 2. Proportion of parasites identified in infected patients, except Toxoplasma gondii diagnosed by ELISA, Entamoeba histolytica by IHA and Gnathostoma spinigerum by skin test.

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PARASITIC INFECTIONS : THAILAND

Mixed infection by soil-transmitted helminths

Of the 6,231 individuals, 52 (0.83%) harbored more than one parasite (Fig. 3). The majority of mixed infections among infected cases were the combination of *S. stercoralis* and hookworm infections (15 cases; 0.24%). Interestingly, co-infection of *S. stercoralis* and *O. viverrini* (10 cases; 0.16%) was the second most common.

Prevalence of parasites commonly identified in each region

The percentages of infections caused by the helminths commonly identified, *S. stercoralis* (6.08%), hookworm (4.45%), *O. viverrini* (5.17%), and *G. spinigerum* (0.72%), were highest in the northeastern population (Table 2). *S. stercoralis*, *O. viverrini*, and *G. spinigerum* were the second most common in subjects from the North with the prevalence rates of 5.44 per cent, 3.40 per cent, and 0.68 per cent, respectively. Hookworm infections were the second most common in the western population (3.31%). The protozoan infection commonly identified, giardiasis, was found most common in the northerners (2.04%), and secondary most common in the northeasterners (1.62%).

DISCUSSION

The prevalence of parasitic infections in a population who visited the Parasitology Unit, Out Patient Department, King Chulalongkorn Memorial Hospital, Bangkok, Thailand were reported routinely and requested parasite examination. Based on the parasitic prevalence of the national survey in 1996 (35%), the present data showed lower percentages



Fig. 3. A Venn Diagram showing pattern of mixed parasitic infections.

of infected cases (8.94%). This may be due to the fact that most people infected with parasites are asymptomatic, therefore, they usually do not come for parasite examination. The high prevalence rates of parasitic infections were found in the working age groups, and especially in males (Table 1). The present study also showed that individuals from the Northeast of Thailand harbored parasites with the highest prevalence rate (Fig. 1, Table 2). It is possible that this high risk group had high risk behavior for parasitic infections. Parasitic infections were found to be lowest in those from the Central region. The results suggested that the majority had better personal and community hygiene, and sanitation compared to the other regions.

Soil-transmitted helminths, the main cause of intestinal parasitic infections, affect people worldwide including Thailand. From the national survey, hookworms are the most common parasites (22%) found in Thailand, followed by O. viverrini (12%) (4). Hookworm infections are a major health problem in the southern region of Thailand while opisthorchis is more prevalent in the northern and northeastern regions⁽⁴⁾. The authors showed that among infected cases, the most common parasitic infections were due to soil-transmitted helminths (Fig. 2). Moreover, the majority of mixed parasitic infections were also caused by soil-transmitted helminths (Fig. 3). An interesting finding was that the prevalence of strongyloidiasis in infected cases was higher than the prevalence of hookworm infection and opisthorchiasis (Fig. 2). Agriculture is the main occupation for Thai people, and as in other tropical countries, they work in fields routinely without wearing appropriate shoes, and the lack of sanitary latrines, seem to be the major causes of soil-transmitted parasitic infections⁽⁷⁾. Several other factors may contribute to the high prevalence of soil-transmitted helminth infections, including type of soil, amount of rainfall, temperature and humidity (11). The majority of the study population were from areas in which the ecosystem of wet and dry lands markedly affected the population density of S. stercoralis larvae. Further study may help to answer this question.

The authors found that the highest infection rates of *S. stercoralis*, hookworms, and *O. viverrini* were found in the northeasterners (Table 2). Farmers or plantation workers are most likely to contribute to the patterns of high soil-transmitted helminth infections⁽²⁾, while eating habits are a major cause for opisthorchiasis⁽³⁾. It could be that the majority of the participants were farmers or plantation workers, and rarely use sandals when working on their farms where larvae of soil-transmitted helminths are more prevalent. Opisthorchiasis was also more prevalent in northerners. Furthermore, infection caused by *G. spinigerum* was found to be prevalent in the northeastern and northern groups. Since both *O. viverrini* and *G. spinigerum* are carried by fish, the behavior of eating uncooked or insufficiently cooked aquatic food, especially fresh-water fish, is responsible for the increase in opisthorchiasis⁽³⁾ as well as gnathostomiasis.

Internal autoinfection may cause fatal disseminated strongyloidiasis in an immunocompromised host (12). The present data emphasize that patients who have to receive immunosuppressive therapy should be investigated for strongyloidiasis. Hookworm infections cause anemia and influence behavior and learning as well as problem-solving capacities⁽¹³⁻¹⁵⁾. The effect of hookworm infections on anemia in adults could be significant, particularly for females of reproductive $age^{(16)}$. While anemia is commonly found in Thailand^(6,8), investigation for hookworm infections in suspected cases should not be avoided. Thailand is recognized as being the most highly endemic country for opisthorchiasis due to O. viverrini. It is a serious public health problem by virtue of its association with cholangiocarcinoma (17-21). Therefore, health education to reduce the high risk behavior of consumption of uncooked or partially cooked fresh-water fish is necessary.

Giardiasis was the most common protozoan infection highly prevalent in the people from the northern region (Table 2). *Giardia* is a common major cause of outbreaks of waterborne infection (22). Inadequate quality water supply and food contaminated by fecal materials are responsible for giardiasis⁽²⁾. Therefore, strategies to control the disease are to improve personal hygiene and water quality as well as to provide health education.

For control of parasitic diseases, surveillance and mass treatment therapy should be continuously implemented to minimize host reservoirs and prevent infections⁽²³⁾. Health education to sustain positive health behavior has to be continued. Emphasis has to be given to using sanitary latrines and the sustainable habit of wearing shoes for interruption of soil-transmitted helminth infections, as well as avoiding consumption of uncooked or partially cooked fresh-water fish for interruption of opisthorchiasis and gnathostomiasis.

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โรคติดเชื้อทางปรสิตในผู้ป่วยไทยที่โรงพยาบาลจุฬาลงกรณ์ กรุงเทพมหานคร ประเทศไทย

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โรคติดเชื้อทางปรสิตยังคงเป็นปัญหาทางสาธารณสุขที่ลำคัญ ผู้ป่วยที่ติดเชื้อปรสิตส่วนใหญ่พบว่าไม่มีอาการของ โรคปรากฏ จึงทำให้ไม่ได้รับการตรวจวินิจฉัย และไม่ทราบว่ามีการติดเชื้อ การติดเชื้อปรสิตแบบไม่มีอาการมักถูกตรวจวินิจฉัย ได้โดยการตรวจหาเชื้อปรสิตที่เป็นงานประจำ ในการที่จะศึกษาผลของการตรวจหาเชื้อปรสิตที่หน่วยปรสิตวิทยา แผนกผู้ป่วยนอก โรงพยาบาลจุฬาลงกรณ์ จังหวัดกรุงเทพมหานคร ประเทศไทย ได้ทำการเก็บข้อมูลของประชากรซึ่งเข้ารับการตรวจวินิจฉัยโรค ติดเชื้อทางปรสิตในช่วงมิถุนายน–ธันวาคม 2540 ข้อมูลจากประชากรไทยทั้งหมด 6,231 คนถูกนำมาวิเคราะห์ ผลการศึกษา พบว่า ผู้ป่วยจำนวน 557 (8.94%) รายเป็นโรคติดเชื้อทางปรสิต โรคติดเชื้อดังกล่าวพบมากในเพศชาย (57.3%) และ ประชากรในช่วงอายุ >15–30 ปี (11.13%) ประชากรจากภาคอีสานของประเทศไทยพบว่ามีอัตราการติดเชื้อปรสิตสูงสุด คิดเป็นอัตราการติดเชื้อ 17.03% ส่วนอัตราการติดเชื้อปรสิต 11.90% ถูกพบในกลุ่มประชากรจากภาคเหนือ ในขณะที่พบ ในภาคตะวันตก 10.60% ภาคตะวันออก 8.90% ภาคใต้ 7.74% และภาคกลาง 4.92% พบว่าเชื้อพยาธิเส้นด้าย *Strongy– loides stercoralis* เป็นสาเหตุของการติดเชื้อมากที่สุด ส่วนในกลุ่มโรคติดเชื้อจากโปรโตชัวพบว่าผู้ป่วยเป็นโรคแกเดียเอซิส มากที่สุด พบว่าในกลุ่มประชากรจากภาคอีสานมีอัตราความชุกสูงสุดของโรคติดเชื้อจากโปรโตชั่วพบว่าผู้ป่วยเป็นโรคแกเดียเอซิส มากที่สุด พบว่าในกลุ่มประชากรจากภาคอีสานมีอัตราความชุกสูงสุดของโรคติดเชื้อจากโปรโตช้อพบว่าผู้ป่วยเป็นโรคแกเดียเอซิส มากท่อง พยาธิใบไม่ในดับ และพยาธิตัวจี๊ด ประชากรจากภาคเหนือพบอัตราการติดเชื้อ Giardia Iamblia มากที่สุด ประชากร ในวัยทำงานจากภาคอีสานรวมถึงจากภาคเหนือมีอัตราการติดเชื้อของโรคที่สูง ซึ่งการป้องกันโรคทางปรสิต จะต้องให้สุชศึกษา แก่ประชากรกลุ่มเลี้ยงเหล่านี้

คำสำคัญ : โรคติดเชื้อทางปรสิต, โรงพยาบาลจุฬาลงกรณ์, ประเทศไทย

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