THE HOMETOWNS OF MALARIA PATIENTS ADMITTED TO KING CHULALONGKORN MEMORIAL HOSPITAL, BANGKOK

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Abstract. We report the data on the hometowns of malaria patients admitted to King Chulalongkorn Memorial Hospital, Bangkok, between 1997 and 2001. A total of 162 patients was identified. Of these, 62 lived in Bangkok; all presented with a history of travelling to endemic areas in rural Thailand. Among the other 100 patients who did not live in Bangkok, 15, 6, 10, 12, 21 and 19 were from the northern, southern, western, eastern, northeastern and central regions, respectively. All of these cases were referred or moved from the endemic area and admitted to the hospital. The remaining 17 cases were foreigners, 10 migrant workers (all from Asia) and 7 travelers (2 from Asia and 5 from Europe). According to this study, there were four main groups of patients admitted to the tertiary hospital in Bangkok: a) people in Bangkok exposed to malaria when travelling to an endemic area, b) people who were infected in their hometown in an endemic area and referred or moved to the hospital, c) migrant workers from nearby countries, who bring malaria from endemic areas in their countries, and d) naïve cases, such as the travelers from Western countries, who exposed to malaria while travelling in Thailand.

INTRODUCTION

Malaria is the most important mosquito-borne disease of human beings, affecting over 200 million people and causing more than one million deaths each year. Endemic areas of this disease include Africa, South America and Southeast Asia (Phillips, 2001). Thailand is one of the tropical countries where malaria is still an important public health problem in remote areas (Thimasarn *et al*, 1995; Chareonviriyaphap *et al*, 2000). However, due to globalization, migration of rural people to the big cities can affect the epidemiology of malaria in those cities. Here we report data on the hometowns of patients infected with malaria admitted to King Chulalongkorn Memorial Hospital, Bangkok, between 1997 and 2001.

MATERIALS AND METHOD

The medical records of patients at King Chulalongkorn Memorial Hospital (KCMH), Bangkok, Thailand, who had been diagnosed as cases of malaria, between January 1997 and December 2001, were retrospectively reviewed. One hundred and sixty-two cases with conclusive confirmed diagnoses were identified for further analysis. Data about the hometowns of the patients from their discharge summary were recorded and analyzed. Multiple logistic regression analysis was used for determining the correlation between antibody titer and patient characteristics. The statistical significant level was accepted at p-value ≤0.05. All the statistical analyses were performed by the SPSS 7.0 for Windows program.

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RESULTS

At presentation, these 162 cases - 94 men (58.0%) and 68 women (42.0%), comprised 145 Thais (89 males and 56 females) and 17 foreigners (5 males and 12 females). Of these 162 patients, 93 had falciparum malaria (57.4%), 62 had vivax malaria (38.4%) and 7 had both falciparum and vivax malaria (4.2%); 62(33 men and 29 women) lived in Bangkok. All of these 62 patients had a history of travelling to rural endemic areas of Thailand, with the average period being 23.1 $\pm$ 23.1 days; 37 had falciparum malaria, 22 had vivax malaria and 3 had both falciparum and vivax malaria. The provinces in which the 62 malaria patients who lived in Bangkok visited, before the illness, are listed in Table 1.

The other 100 patients who did not live in Bangkok, 83 were Thais. Of these 83 Thai cases (46 falciparum, 33 vivax, 4 both falciparum and vivax), 15 (9 falciparum, 6 vivax) were from the northern region, 6 (4 falciparum, 2 vivax) were from the southern region, 10 (6 falciparum, 3 vivax, 1 both falciparum and vivax) were from the western region, 12 (6 falciparum, 6 vivax) were from the eastern region, 21 (14 falciparum, 7 vivax) were from the northeastern region, 19 (7 falciparum, 9 vivax, 3 both falciparum and vivax) were from central region. All of these 83 cases were referred or moved from the endemic areas for admission to the hospital (Table 2). The proportion of malaria cases by region of Thailand (except for Bangkok) compared

Table 1
Provinces visited by the 62 malaria patients who lived in Bangkok, before the present illness.

Province	Number of cases positive for			Total case	%
	falciparum (n = 37)	*vivax* (n = 22)	Both *falciparum* and *vivax* (n = 3)		
Northern region				7	
Chiang Mai	0	1	0		1.6
Lamphun	1	0	0		1.6
Mae Hong Son	1	0	0		1.6
Nan	1	1	0		1.6
Phrae	1	0	0		1.6
Tak	1	0	1		3.2
Southern region				1	
Chumphon	1	0	0		1.6
Eastern region				10	
Chachoengsao	0	0	1		1.6
Chanthaburi	2	1	0		4.8
Chon Buri	1	0	0		1.6
Sa Kaeo	2	2	0		6.5
Trat	0	0	1		1.6
Western region				40	
Kanchanaburi	19	15	0		55.0
Phetchaburi	0	1	0		1.6
Ratchaburi	4	1	0		8.1
Northeastern region				4	
Nakhon Ratchasima	1	1	0		3.2
Ubon Ratchathani	2	0	0		3.2

with the total number of all hospitalized patients in the same period, according to the registry of the hospital, are presented in Table 3.

The remaining 17 cases were foreigners (5 male; 12 female), 10 migrant workers (Asian) and 7 travelers (2 from Asia and 5 from Europe). Among the 10 migrant workers, 8 migrated from Myanmar to the western region and 2 migrated from Cambodia to the eastern region of Thailand. Five of the 7 travelers traveled to the eastern region and 2 to the western region of Thailand. Summary demographic characteristics of the 162 patients are presented in Table 4.

DISCUSSION

It is well known that the prevalence of malaria is high among low-income communities in the tropics. Southeast Asia, including Thailand, is one of the main endemic areas for malaria at present (Phillips, 2001). For a decade, malaria in Thailand has been largely confined to rural areas, mainly along the borders with Cambodia and Myanmar (Thimasarn *et al*, 1995; Zhou *et al*, 1998; Chareonviriyaphap *et al*, 2000). According to the Department of Disease Control, Ministry of Public HealthThailand (2001), the slide positive rate for malaria screening was 2.08% in the year 2000. The total number of cases was about 90,000, with a parasitic incidence 1.6: 1,000. In Thailand, the provinces where malaria is prevalent are Tak, Kanchanaburi, Mae Hong Son, Sa Kaeo, Chanthaburi, Trat, Surat Thani, Prachuab Kirikhan and Ratchaburi (Department of Disease Control, 2001).

Due to the present rapid industrial growth, some effect of population migration on the epidemiological pattern of malaria can be expected. Wiwanitkit (2002) has reported the effect of immigration on malaria in a rural district of Thailand. Therefore, study of the hometowns of patients diagnosed with malaria can be useful baseline epidemiological data.

According to this study, four main groups of patients were admitted to the hospital: a) people in Bangkok who were exposed to malaria from traveling

Table 2
Hometowns of 83 Thai cases who did not live in Bangkok.

Hometown	Number positive for			%
	falciparum	*vivax*	Both *falciparum* and *vivax*	
Northern region				
Chiang Mai	4	3	0	8.5
Mae Hong Son	2	0	0	2.4
Nakhon Sawan	1	0	0	1.2
Nan	0	1	0	1.2
Phetchabun	1	1	0	2.4
Phitsanulok	0	1	0	1.2
Sukhothai	1	0	0	1.2
Total	9	6	0	18.1
Southern region				
Chumphon	1	1	0	2.4
Surat Thani	2	0	0	2.4
Ranong	1	1	0	2.4
Total	4	2	0	7.2
Eastern region				
Chanthaburi	0	3	0	3.6
Chachoengsao	1	0	0	1.2
Chon Buri	0	1	0	1.2
Nakhon Nayok	0	1	0	1.2
Rayong	1	0	0	1.2
Sa Kaeo	3	1	0	4.9
Trat	1	0	0	1.2
Total	6	6	0	14.5
Western region				
Kanchanaburi	4	2	0	7.2
Prachuab Khiri Khan	1	0	1	2.4
Phetchaburi	1	1	0	2.4
Total	6	3	1	12.0
Northeastern region				
Buri Ram	0	2	0	2.4
Chaiyaphum	0	2	0	2.4
Khon Kaen	4	1	0	6.0
Loei	1	0	0	1.2
Nakhon Phanom	2	0	0	2.4
Nong Khai	1	2	0	3.6
Roi Et	1	0	0	1.2
Ubon Ratchathani	4	0	0	4.9
Yasothon	1	0	0	1.2
Total	14	7	0	25.3
Central region				
Lop Buri	1	4	1	7.2
Saraburi	2	2	0	4.8
Suphan Buri	4	3	2	10.9
Total	7	9	3	22.9

Table 3
Comparison between the proportion of malaria cases by region (except for Bangkok) with all hospitalized patients in the hospital in the same period.

Region of Thailand	Proportion[a]	
	Malaria cases	All patients
Northern	0.09	0.05
Southern	0.04	0.05
Eastern	0.07	0.10
Western	0.06	0.10
Northeastern	0.13	0.20
Central	0.12	0.20

[a] Number of cases in each region / total number of cases in each category.

Table 4
Summary of demographic characteristics of the 162 patients.

Demographic characteristics[e]	Groups			
	a	b	c	d
Age (years)	29.7 ± 14.5	30.3 ± 18.1	26.3 ± 16.2	28.3 ± 14.1
Sex (male: female)	33:29	56:27	3:7	2:5
Duration of present illness (days)	8.6 ± 9.6	7.6 ± 8.7	7.9 ± 8.4	8.0 ± 7.4

a) people in Bangkok exposed to malaria from travelling to an endemic area, b) people infected in an endemic area in their hometown and referred or moved to the hospital, c) migrant workers from nearby countries, who bring malaria from endemic areas in their countries, and d) the naïve cases, travelers from Western countries who are exposed to malaria while travelling in Thailand.
e) There is no significant difference in the demographic characteristics among all groups (ANOVA, $p > 0.05$).

to an endemic area, b) people who were infected in their hometown in an endemic area and referred or moved to the hospital, c) migrant workers from nearby countries, who brought malaria from endemic areas in their countries, and d) naïve cases, travelers from Western countries, who were exposed to malaria while travelling in Thailand. No differences in demographic parameters (age and duration of present illness) of the four groups were detected (Table 3). Cases of both falciparum and vivax malaria were seen in each group. A slightly higher total number of cases with falciparum than vivax malaria was observed. Similar trends can be seen in other Thai hospital settings (Suyaphan *et al*, 2001). Falciparum malaria is usually more severe and requires hospitalization.

All of the patients who lived in Bangkok presented a history of traveling into endemic areas for malaria for sightseeing, business or work. The provinces in the western and eastern regions were the main areas of travel. These provinces share borders with Myanmar and Cambodia, where malaria is still prevalent. Although malaria is a limited risk in the areas that border Cambodia and Myanmar, and no risk in the cities of Thailand (CDC, Thailand, 2002), cases of malaria in people in Bangkok have been detected. Because traveling to rural provinces is one of the pastimes/recreational activities for people in the cities, health education concerning malaria prophylaxis for urban Thais is needed (Wiwanitkit, 1998).

People in the second group, who were infected in their hometowns in endemic areas, came from various endemic provinces. Control of malaria in these areas is necessary (Thimasarn *et al*, 1995; Chareonviriyaphap *et al*, 2000). All of the patients were referred or moved themselves from rural hospitals to the KCMH for further clinical management. Malaria can be treated in the rural

hospitals, and only severe cases require management in the tertiary hospital.

In the third group, migrant workers from nearby countries, infections were first detected in Thailand, without a previous history of diagnosis or treatment in their hometowns. Apart from technical, operational and social obstacles of malaria control in Thailand (Chareonviriyaphap *et al*, 2000), another possible cause may be imported cases of malaria via migrants. At present, thousands of migrant workers live in Thailand, working as laborers. A number of these workers are illegal. In addition, these workers are usually carriers of diseases, including malaria (Wiwanitkit, 2002). Fortunately, after implementation of the recent national policy of controlling migrant workers, the annual incidence of malaria has decreased (CDC, Thailand, 2001). Therefore, control and screening programs for these migrant workers are necessary.

In the last group, foreign tourists who visited Thailand, some cases of malaria were detected. Although the total number of cases was small it may indicate the necessity of recommended prophylaxis for travelers (CDC, Thailand, 2002). Since tourism is the main revenue earner for Thailand, information for primary health prevention should be included in tourism promotion. Because tourists have no immunity to many tropical diseases, that are still prevalent in Thailand, physicians whose advise is sought from foreign tourists should be aware of these diseases (Wiwanitkit, 1998).

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