

MALARIA: A RETROSPECTIVE STUDY IN HOSPITAL TENGGU AMPUAN RAHIMAH (HTAR), KLANG, SELANGOR, MALAYSIA (2004 - 2006)

I Jamaiah, M Rohela, V Nissapatorn, A Amriana, MN Sumaiyah, M Lila and A Norzawati

Department of Parasitology, Faculty of Medicine,
University of Malaya, Kuala Lumpur, Malaysia

Abstract. This retrospective study was carried out to determine the prevalence of malaria among patients admitted to Hospital Tengku Ampuan Rahimah, Klang, Malaysia, from January 2004 to May 2006. A total of 37 malaria cases were analyzed. Most cases occurred among foreigners, 81% (30 cases), while Malaysians constituted 19% (7 cases). Among foreigners, Indians constituted the majority, 40.5% (15 cases). Among Malaysians, most cases occurred among Malays, 16% (6 cases), followed by Indians, 3% (1 case). Males, 89% (33 cases), were more commonly affected. The majority of cases were within the 20-39 year age group (84%). Most cases occurred among laborers (24%). Two species of malaria parasites were reported, of which *Plasmodium vivax* constituted the most, 70% (26 cases), followed by *Plasmodium falciparum*, 30% (11 cases). In this study, 40.5% (15 cases) developed chloroquine resistance: six cases of *P. falciparum*, and nine cases of *P. vivax*. The most common complications were thrombocytopenia, 65% (24 cases), and anemia, 54% (20 cases), followed by jaundice, 32% (12 cases), and hepatosplenomegaly, 22% (8 cases). There were no reported deaths. This new source of malaria coming from foreigners must be given serious attention, as it has great potential of increasing malaria cases in urban Malaysia.

INTRODUCTION

Malaria (from medieval Italian, *mala aria*, or “bad air”; formerly called “ague,” or “marsh fever”) is an infectious disease that is widespread in many tropical and subtropical regions. It causes between one and three million deaths annually, mostly among young children in Sub-Saharan Africa. Malaria causes about 350-500 million infections in humans and approximately 1.3-3 million deaths annually (Campbell and Reece, 2005). This represents at least one death every 30 seconds. The vast majority of cases occur in children under the age of five years, and pregnant women are vulnerable (Greenwood *et al.*, 2005). The death rate is expected to double in the next twenty years. Precise statistics are unknown because many cases occur in rural areas where people do not have access to hospitals and/or the means to afford health care. Consequently,

many cases are undocumented (Hull, 2006). Sub-Saharan Africa accounts for 85-90% of malaria fatalities, but it is also prevalent in northern South America and South and Southeast Asia (Layne, 2005).

Malaria remains an important public health issue in remote areas of Malaysia. Approximately 70% of the cases occur in Sabah, East Malaysia. The high morbidity is because this country is located within the equatorial zone, with high temperature and humidity, which is important for the transmission of this disease. It affects mainly the rural and semi-rural population, especially in the areas where clearing of jungles for development is going on (Palmer, 2002). Recently a new source of malaria has been introduced into the country. These cases were in immigrant workers (legal/illegal) and the large number of tourists coming into the country. The number of reported cases has increased nationwide, together with the increased incidence of drug resistance in Southeast Asia, which raises more concern among both health workers and clinicians (Sidhu and Ng, 1991; Leo *et al.*, 1994; Moore and Cheong, 1995; Jamaiah *et al.*, 1998, 2005).

Correspondence: I Jamaiah, Department of Parasitology, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia.
Tel: 603-7967-6618; Fax: 603-7967-4754
E-mail: jamaiah@umm.edu.my

This study was carried out to determine the number of malaria cases admitted to Hospital Tengku Ampuan Rahimah, Klang (HTAR), Klang, Malaysia, and to analyze the epidemiological data and complications.

MATERIALS AND METHODS

All cases of malaria admitted to HTAR, Klang, Malaysia, from January 2004 to May 2006 were analyzed. A total of 37 confirmed cases were reviewed and analyzed.

RESULTS

During the period from January 2004 to May 2006, 37 confirmed cases of malaria were admitted to HTAR, Klang, Malaysia. The majority of the infections occurred in the 20-39 year age group (Table 1), and this accounted for 84% (31/37) of all malaria cases studied. Malaria was much less common among females than males as there were only four cases of malaria infection reported in females. Foreigners from India represent 40.5% (15/37) of those infected, and Indonesians 24% (9/37). Among Malaysians, Malays constituted the most cases (16%). There was only one case in an Indian, and no cases were reported among Chinese. Laborers represent the

highest number of those infected with malaria, with 9/37 (24%) cases, followed by those unemployed, 7/37 (19%), factory workers, 5/37 (14%), and unknown occupation, 4/37 (11%).

About 97% of those infected had fever, and almost 70% had fever associated with chills and rigors. Other major symptoms included vomiting (70%), abdominal pain (59.5%), urinary symptoms and headache (40.5%), and others (51%).

Plasmodium vivax was the predominant species (70%). *P. falciparum* constituted 30% of malaria cases. No patient was infected with *P. malariae* or *P. ovale*. More than half of the malarial patients developed complications of some medical importance (Table 2). The most common complication was thrombocytopenia (65%), followed by anemia (54%), and jaundice (32%). Most of the complications were caused by *P. vivax*.

The majority of patients were treated with a combination of chloroquine and primaquine for both *P. falciparum* and *P. vivax*. About 27% cases had chloroquine resistant strains and were treated with Fansidar.

DISCUSSION

In this study, the majority of the malaria cases

Table 1
Malaria distribution by age, sex, and race/ nationality (January 2004 - May 2006).

Age (year)	Race/Nationality														Total		
	Malaysians						Foreigners										
	Malay		Chinese		Indian		Indonesia		India		Myanmar		Bangladesh			Pakistan	
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
0 - 9																0	
10 - 19							1									1	
20 - 29	1						3	1	8	1	1				1	16	
30 - 39	3						3		4	1	2		1		1	15	
40 - 49	1						1		1							3	
50 - 59																0	
60 - 69					1											1	
70 - 79	1															1	
Total	6	0	0	0	1	0	7	2	13	2	3	0	1	0	2	0	37
%	16.2		0.0		2.7		24.3		40.5		8.1		2.7		5.4		

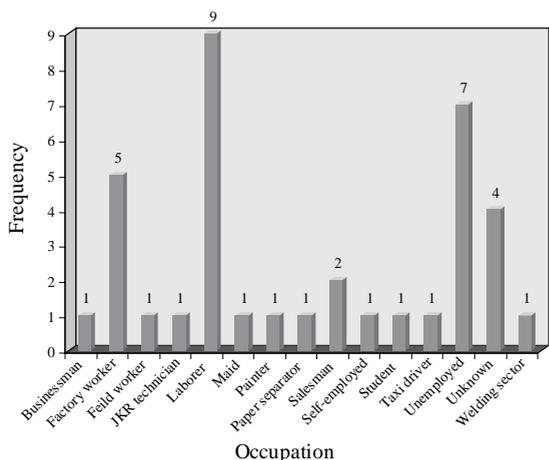


Fig 1- Distribution of malaria according to occupation.

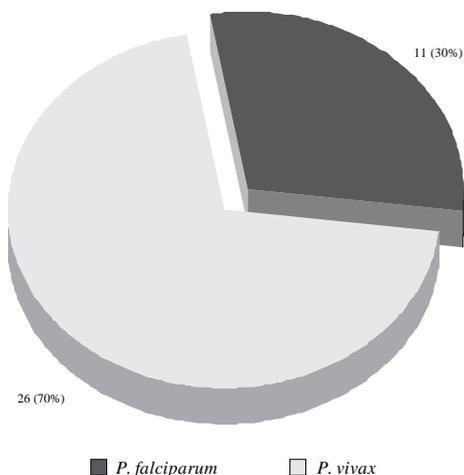


Fig 2- Distribution of malaria according to species.

occurred in the 20-39 year age group (84%). Most of the cases occurred in males (89%). Moore and Cheong (1995) and Jamaiah *et al* (1998; 2005) also reported similar findings. Foreigners from India constituted the most cases (40.5%) and were followed by the Indonesians (24%). Jamaiah *et al* (1998, 2005) reported that, among foreigners, Indonesians constituted the most cases. This could be because more Indians from India were recruited by the many plantations in Klang, Selangor, Malaysia. Moore and Cheong (1995) and Sidhu and Ng (1991) pointed out that the main problem in the future will be the increasing number of imported malaria in the main cities of Malaysia. Leo *et al* (1994) also reported that the majority of malaria cases in Singapore were due to imported cases. All foreign workers entering Malaysia must be screened for malaria to prevent resurgence of malaria in Malaysia. Among Malaysians, Malays constituted majority of the cases (16%). There were no cases reported among the Chinese.

Laborers constituted the highest number of those infected with malaria (24%). This was followed by those unemployed (19%). This was to be expected as most male foreign workers (legal/illegal) were employed as laborers in the various sectors.

The most common species in this study was *P. vivax* (70%), followed by *P. falciparum* (30%). Moore and Cheong (1995), Norhayati *et al* (2001), and Jamaiah *et al* (2005) also reported similar findings. Chuah (1985), Oothuman (1988), Sidhu and Ng (1991), Jamaiah *et al* (1998), and Koh *et al* (2004) reported *P. falciparum* to be the commonest species, followed closely by *P. vivax*. There were no reported cases of *P. malariae*, nor

Table 2
Complications of malaria according to species.

Complications	% cases	<i>P. falciparum</i> (%)	<i>P. vivax</i> (%)
Jaundice	32	32	68
Anemia	54	35	65
Hepatomegaly	13.5	20	80
Splenomegaly	5	50	50
Hepatosplenomegaly	3	50	50
Thrombocytopenia	65	21	79

cases of mixed infection.

Most of the malaria cases in this study presented with fever associated with chills, rigors, vomiting, and abdominal pain. Koh *et al* (2004) and Jamaiah *et al* (2005) also reported similar findings.

In this study, the two most common complications were thrombocytopenia (65%), followed by anemia (54%). Most of these complications were due to *P. vivax*. There were no reported cases of cerebral malaria or black water fever. Chuah (1985) reported that anemia was the most common complication. Jamaiah *et al* (1998) reported that cerebral malaria was the most common complication (40%), whereas in 2005 she reported that jaundice and anemia were the most common complications. Hepatomegaly, hepatosplenomegaly, and anemia were significantly associated with malaria (Norhayati *et al*, 2001). Koh *et al* (2004) reported a case of *vivax* malaria that was complicated by septicemic shock, and disseminated intravascular coagulopathy. Therefore, the presumption that *P. vivax* is a benign species must be revisited.

Most patients received a combination of drugs, chloroquine, and primaquine. This is because chloroquine and primaquine are the first-line drugs for treatment of *vivax* and uncomplicated chloroquine-sensitive *falciparum* malaria. The concept of combination therapy is based on the synergistic or additive potential of two or more drugs to improve therapeutic efficacy and also delay the development of resistance to the individual components of the combination. Chloroquine is used to alleviate symptoms and prevent spread. It is a blood schizonticidal and gametocytocidal drug. Primaquine is a tissue schizonticidal drug and is used to prevent relapses. We also reported chloroquine resistance in both species, six cases among *falciparum* malaria and nine cases among *vivax* malaria. These chloroquine resistant species were successfully treated with Fansidar.

Methods used to prevent the spread of disease, or to protect individuals in areas where malaria is endemic, include prophylactic drugs, mosquito eradication, and the prevention of mosquito bites. Insecticide-treated bed-nets (ITN) provide a simple but effective means of preventing malaria.

One malaria vaccine, RTS S/AS02, has shown promise in endemic areas (Greenwood *et al*, 2005).

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to the staff of the Records Office, Hospital Tengku Ampuan Rahimah, Klang for providing the latest data and to all individuals that have helped in this study.

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