

MALARIA: A 10-YEAR (1994-2003) RETROSPECTIVE STUDY AT UNIVERSITY MALAYA MEDICAL CENTER (UMMC), KUALA LUMPUR, MALAYSIA

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Abstract. Malaria is still one of the most important vector-borne diseases in Malaysia, particularly in remote areas. This retrospective study was carried out to find the prevalence of malaria among patients admitted to UMMC Kuala Lumpur, from 1994-2003. A total of 86 malaria cases were analyzed. Most cases occurred among foreigners [57% (49 cases)] while Malaysians constituted 43% (37 cases). Among foreigners, Indonesians constituted the most [57% (28 cases)]. Among Malaysians, most cases occurred among the Chinese [35% (13 cases)] followed by the Malays [30% (11 cases)]. Males [70% (60 cases)] were more commonly affected. The majority of cases were within the 20-39 year age group (69%). Three species of malaria parasites were reported, of which *Plasmodium vivax* constituted the most [55% (47 cases)], followed by *Plasmodium falciparum* [29% (25 cases)], and only four cases (5%) of *Plasmodium malariae*. Nine percent (8 cases) were mixed infections. In this study, 12% (10 cases) developed chloroquine resistance: 7 cases of *P. falciparum*, and 3 cases of *P. vivax*. The most common complications were jaundice and anemia [77% (23 cases)], followed by blackwater fever [13% (4 cases)] and cerebral malaria [10% (3 cases)]. Most of the complications were due to *P. falciparum* [43% (13 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 is a protozoan disease transmitted by the bite of infected female Anopheline mosquitoes. It is the most important parasitic disease of humans, affecting more than 500 million people and causing between 1 to 3 million deaths each year (White and Breman, 1998).

In Malaysia, malaria remains an important public health problem. This is because Malaysia is located within the equatorial zone with high temperatures and humidities, usually important for the transmission of malaria (Rahman *et al.*, 1997). Approximately 70% of cases occur in Sabah, where chloroquine resistance is emerging as a major problem. The district of Kudat has one of the highest and most persistent malaria transmission levels in Sabah, with an annual parasite incidence of 102 per 1,000 inhabitants per year (Hii *et al.*, 1996). In Peninsular Malaysia, infection rates are highest among the aboriginal Orang Asli minority group and soldiers. Illegal land scheme workers, often foreigners, also exhibit high infection rates. At highest risk are forest workers (loggers, rattan collectors and forest product gatherers), followed by plantation workers and other aboriginal communities (Palmer, 2002). Some factors contributing to the continued

transmission of malaria are the development of drug resistant *Plasmodium falciparum*, changes in vector behavior, and ecological changes due to socio-economic reasons (Mak *et al.*, 1992).

Malaysia has one of the oldest malaria control programs in the world, dating to the formation of the Malaria Advisory Board in 1911. Malaria Control Programs actively promote community participation, with insecticide-treated bed nets being the tool of choice for prevention. Volunteer workers in Sabah have been trained to take blood films, dispense antimalarial drugs, and promote insecticide-treated bed nets; this has been associated with an improvement in the situation in recent years (Palmer, 2002).

There has been a decrease in confirmed cases since 1996 from 51,900 in 1996 to 26,600 in 1997 to 13,500 in 1998 to 12,705 confirmed cases in 2000. There were 11,053 confirmed cases in 2002. Malaria deaths have remained relatively stable over the 1992-2000 period, within a range of 23 to 40 deaths annually. Reported malaria deaths decreased to 21 in 1999, but then increased to 35 in 2000 and 38 in 2002. Incidence rates increased during the early 1990s, peaking at 2.99/1,000 population in 1994. Incidence rates have been significantly down since 1998 (0.63 in 1998, 0.56 in 2000 and 0.46 in 2002) (Palmer, 2002).

Jamaiah *et al.* (1998) did a retrospective study of malarial cases admitted to UMMC from 1983-1992 and found that 33% were due to imported cases, the majority of which were Indonesians. Sidhu and Ng (1991)

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reviewed malaria cases from 1984-1988 at UMMC and they reported 25% cases of imported malaria; the main problem in the future will be the increase in imported cases of malaria. Moore and Cheong (1995) reviewed malaria cases admitted to General Hospital, Kuala Lumpur (GHKL) from July 1988- June 1994 and found that 49% of the cases were imported. In contrast to the past, many cases are now diagnosed in foreigners who have entered the country either legally or illegally. The large influx of illegal immigrants to Malaysia has resulted in a surge of malaria infection, and a source of chloroquine resistance. Health authorities must act urgently to counter this threat if it is not to stretch our health resources any further (Moore and Cheong, 1995).

In Singapore, Leo *et al* (1994) stated that an average of 200 cases of malaria have been reported annually, the majority of which are imported cases. Kambili *et al* (2004) studied malaria cases from the New York Hospital and found that 37% of the cases were immigrants living in the United States who had visited their countries of origin. His major concern was the low use of chemoprophylaxis, particularly among immigrants.

The aim of this retrospective study is to determine the total number of malaria cases among Malaysians and foreigners admitted to UMMC for the past ten years.

MATERIALS AND METHODS

The case notes of all malaria cases admitted to University Malaya Medical Center (UMMC), Kuala Lumpur between the years 1994-2003 were carefully analyzed. Data were collected from Pusat Teknologi Maklumat (PTJ), UMMC and were recorded. A total of 86 case notes of malaria patients was analyzed.

RESULTS

Malaria distribution by age and nationality or race is presented in Table 1. Foreigners constituted 57% (49 cases) and Malaysians constituted 43% (37 cases). Among foreigners, Indonesians constituted the most cases [57% (28 cases)], followed by Pakistanis [12% (6 cases)], Indians [10% (5 cases)], Bangladeshis and Burmese [6% each (3 cases each)], and others [8% (4 cases)]. Among Malaysians, Chinese constituted the most cases [35% (13 cases)], followed by Malays [30% (11 cases)], Indians [24% (9 cases)], and others [10.81% (4 cases)].

Among all the nationalities, males [70% (60 cases)] were more commonly affected. The majority of the cases were between 20-39 years age group [69% (59 cases)] (Fig 1).

Three species of malaria (Fig 2) were reported, of which *Plasmodium vivax* constituted the most (55%, 47 cases). *Plasmodium falciparum* was confirmed in 29% (25 cases) and there were only four cases (5%) of *Plasmodium malariae* infection. There were 8 cases (9%) with mixed infection. Mixed infection with *P. falciparum* and *P. vivax* constituted 4 cases while mixed infection with *P. falciparum* and *P. malariae* constituted 3 cases. There was only one case with mixed infection of *P. vivax* and *P. malariae*.

A total of 12% (10 cases) developed chloroquine resistance: 7 cases of *P. falciparum*, and 3 cases of *P. vivax*.

The most common complications (Table 2) were jaundice and anemia [23 cases (77%)], followed by 4 cases (13%) of blackwater fever and 3 cases (10%) of cerebral malaria. Most of the complications were caused

Table 1
Malaria distribution by age and nationality/race (1994-2003), UMMC.

Age (year)	Malaysian				Indonesian	Pakistani	Indian	Bangladeshi	Burmese	Others	Total
	Malay	Chinese	Indian	Others							
0-9	-	-	-	-	1	-	-	-	-	1	2
10-19	2	-	-	-	1	-	-	-	-	-	3
20-29	5	2	5	3	11	4	4	2	1	-	37
30-39	-	2	-	1	12	2	1	1	2	1	22
40-49	4	6	3	-	2	-	-	-	-	2	17
50-59	-	2	-	-	1	-	-	-	-	-	3
60-69	-	1	1	-	-	-	-	-	-	-	2
70++	-	-	-	-	-	-	-	-	-	-	-
Total	11	13	9	4	28	6	5	3	3	4	86

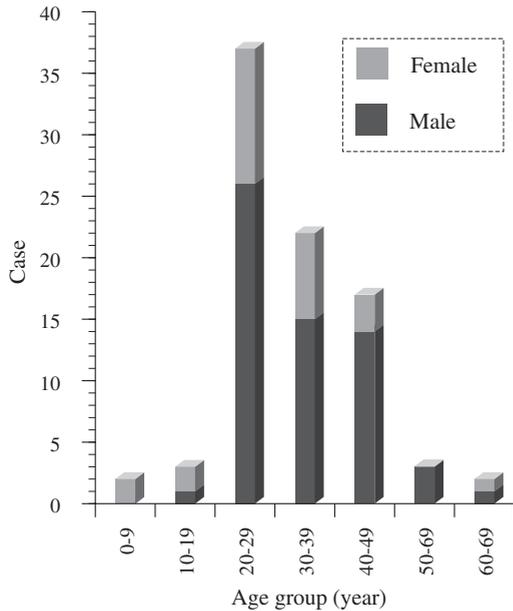


Fig 1- Distribution of malaria by age and sex (1994-2003) UMMC.

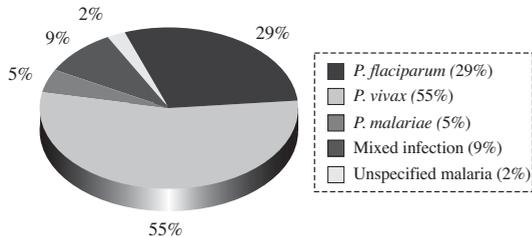


Fig 2- Distribution of malaria by species.

Table 2
Species of malaria vs complications.

Malaria species	Complication			Total
	Cerebral malaria	Jaundice and anemia	Blackwater fever	
<i>P. falciparum</i>	3	9	1	13
<i>P. vivax</i>	-	10	2	12
<i>P. malariae</i>	-	-	-	-
Mixed infection	-	4	1	5
Total	3	23	4	30

by *P. falciparum* [13 cases (43%)], followed by *P. vivax* [12 cases (40%)]. Five complication cases were due to mixed infection. There were no reported complications

due to *P. malariae*, and no reported deaths.

DISCUSSION

In this study we found that malaria was seen more among foreigners (57%) than Malaysians (43%). This was due to the increased influx of foreign workers to Malaysia. Among foreigners, Indonesians constituted the most cases (57%) and the majority of foreign workers in this country are Indonesians. This percentage has increased from 33% in a study done by Jamaiah *et al* (1998) from 1983-1992. Arasu in 1992 claimed that the occurrence of malaria among illegal immigrants and indigenous groups, staying in risk prone areas where conditions are favorable for transmission, highlights the behavior pattern of these groups. In these areas, the usual anti-malarial measures are less effective and thus there is a need to identify control measures suited to that particular condition (Arasu, 1992). Sidhu and Ng (1991) stressed that the main problem in the future will be the increase in imported cases of malaria. This new source of malaria among foreigners must be given serious consideration. It has the potential of increasing the number of malaria cases in urban centers.

Among Malaysians, the majority of cases occurred among Chinese (35%). This is not surprising, since the majority of patients admitted to UMMC are Chinese as they are mainly concentrated around big cities of Kuala Lumpur and Petaling Jaya. Jamaiah *et al* (1998) also reported similar findings.

Males were more commonly affected. The majority of cases occurred between the age group 20-29 years (43%). This is also similarly reported by Jamaiah *et al* (1998), and Moore and Cheong (1995). This could be explained by the fact that males are more active outdoors.

Plasmodium vivax is the most common species of malaria reported in this study (55%), followed by *P. falciparum* (29%) and 4 cases of *P. malariae*. Moore and Cheong (1995) also reported similar finding. It differs from the findings of Chuah (1985), Sidhu and Ng (1991), Mak *et al* (1992), Lim (1992), Jamaiah *et al* (1998), and Koh *et al* (2004), which reported *P. falciparum* as the most common species.

The most common complications due to malaria reported in this study were jaundice and anemia [23 cases (77%)] followed by 4 cases of blackwater fever (13%), and 3 cases of cerebral malaria (10%). A previous study by Jamaiah *et al* (1998) showed that cerebral malaria was the most common complication, followed by jaundice and anemia. Koh *et al* (2004) found that the common complications caused by malaria from Sarawak General Hospital, Kuching, Malaysia were: renal failure,

acute respiratory distress syndrome, cerebral malaria, disseminated intravascular coagulopathy, hemolytic anemia and liver dysfunction. In our study, 40% of the complications were caused by *P. vivax*. Thus, the notion that *P. vivax* is 'benign' must be reviewed. Koh *et al* (2004) also found that a single case of vivax malaria was complicated by septicemic shock and disseminated intravascular coagulopathy.

There were no reported cases of death due to malaria in this study. It is of great interest that malaria mortality remains low in Malaysia despite high levels of resistance. What sets Malaysia apart from many other countries is the quality and coverage of the basic health services (Palmer, 2002). Chloroquine-resistance was reported in 12% of cases; the majority occurred in *P. falciparum* infection. This was similar to previous findings by Jamaiah *et al* (1998) and Moore and Cheong (1995). Chloroquine-resistance was reported in Peninsular Malaysia as early as 1963. A 1996 study of outpatients at several sites in Peninsular Malaysia showed RII-RIII resistance in 54% of cases treated with chloroquine and 37% of cases treated with sulfadoxine-pyrimethamine (S-P). Drug resistance levels appear less advanced in Sarawak than in Sabah and Peninsular Malaysia. First line treatments are S-P in Sabah, chloroquine + S-P in Peninsular Malaysia, and chloroquine in Sarawak (Palmer, 2002).

Chemotherapy of life-threatening malaria with chloroquine and quinine has been countered by the emergence of resistant strains. Artemisinin derivatives may become the treatment of choice during the coming decade. Control of malaria now involves the use of insecticide-impregnated bed nets and new entomological strategies, including genetic manipulation of mosquitoes and selective chemoprophylaxis (Warrell, 1996).

ACKNOWLEDGEMENTS

The authors wish to thank YBhg Prof Dato' Mohd Amin Jalaludin, Director of UMMC, Mr Teh Ah Huat, Miss Mariah, staff of PTJ records office, UMMC and the Medical Ethics Committee.

REFERENCES

- Arasu GD. Risk behavior in malaria in Malaysia. *Southeast Asian J Trop Med Public Health* 1992;23 (suppl 1):51-6.
- Chuah SK. Report of 59 malaria cases and the treatment and management of complications seen at the District Hospital, Kuala Kangsar, Perak, over a two-year period, from July 1982-June 1984. *J Malaysian Soc Health* 1985;5:25-30.
- Hii JL, Chee KC, Vun YS, Awang J, Chin KH, Kan SK. Sustainability of a successful malaria surveillance and treatment program in a Runggus community in Sabah, East Malaysia. *Southeast Asian J Trop Med Public Health* 1996;27:512-21.
- Jamaiah I, Anuar AK, Najib NARN, Zurainee MN. Imported malaria: a retrospective study in University Hospital, Kuala Lumpur, a ten-year experience. *Med J Malaysia* 1998;53:6-9.
- Kambili C, Murray HW, Gologhtly LM. Malaria:30 years of experience at a New York City teaching hospital. *Am J Trop Med Hyg* 2004;70:408-11.
- Koh KH, Chew PH, Kiyu A. A retrospective study of malaria infections in an intensive care unit of a general hospital in Malaysia. *Singapore Med J* 2004;45:28-36.
- Leo YS, Chew SK, Allen DM, Monteiro EH. Malaria: Prophylaxis and therapy. *Singapore Med J* 1994;35:509-11.
- Lim ES. Current status of malaria in Malaysia. *Southeast Asian J Trop Med Public Health* 1992;23 (suppl 4):43-9.
- Mak JW, Jegathesan M, Lim PK, *et al*. Epidemiology and control of malaria in Malaysia. *Southeast Asian J Trop Med Public Health* 1992;23:572-7.
- Moore CS, Cheong I. Audit of imported and domestic malaria cases at Kuala Lumpur Hospital. *Br J Clin Pract* 1995;49:304-7.
- Palmer K. Combating communicable diseases. Geneva: World Health Organization 2002. [Cited 2004 Nov 29]. Available from URL: http://www.wpro.who.int/themes/focuses/theme_1/focus2/tlf2malaysia.asp
- Rahman WA, Che' Rus A, Ahmad AH. Malaria and *Anopheles* mosquitoes in Malaysia. *Southeast Asian J Trop Med Public Health* 1997;28:599-605.
- Sidhu PS, Ng SC. A retrospective study on malaria cases admitted to the University Hospital, Kuala Lumpur, 1984-1988. *Med J Malaysia* 1991;46:177-82.
- White NJ, Breman JG. Malaria and other diseases caused by red blood cell parasites. In: Harrison's principles of internal medicine. Vol 1. 14th ed. McGraw-Hill, 1998:1180-8.
- Warrell DA. The 1996 Runme Shaw Memorial lecture: malaria-past, present and future. *Ann Acad Med Singapore* 1997;26:380-7.