

## Original Article

## Status of Imported Malaria in Kuwait: Experience from Al-Jahra Hospital

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### ABSTRACT

**Objectives:** To illustrate the incidence of malaria positive cases reported at Al-Jahra hospital, compared to the total number of patients whose blood was examined for malaria parasites over a period of four years from 1996-1999 in the same hospital.

**Subjects and method:** The present study involved 1446 in- and out-patients who suffered from fever of unknown origin. The method applied involved examination of Giemsa-stained thick and thin blood films.

**Results:** Over a period of four years, blood samples from 1446 Kuwaiti and non-Kuwaiti patients were examined for malaria, and only 202 (14%) were positive. Of the positive cases, 183 patients (90.6%) showed *P. vivax* parasites in their peripheral blood, 15 patients (7.4%) showed *P. falciparum* and four patients (2%) showed mixed infections. In 1996, 60/432 (14%) of examined patients were positive and in succeeding years 1997, 76/431 (17.6%); 1998, 32/317 (10.1%) and in 1999, 34/266

(12.8%) of examined patients were positive. The male:female ratio of positive patients was 83.7%:16.3%, and 42% and 54% of positive patients were of age groups 21-30 years and 31-40 years, respectively.

**Conclusion:** The massive economical development achieved in Kuwait and other Arabian gulf countries, following oil production, necessitated the importation of skilled workers of productive age. A significant number of these workers originated from malaria-endemic countries, and some of them were found to be positive for malaria. From the results of this study, it is clear that the problem of imported malaria still exists, although the number of positive cases has decreased in the last few years. This decrease can be traced to many reasons including prior examination of blood samples of imported workers in their countries, a step of great help in the process of controlling the disease in Kuwait.

KEY WORDS: Arabian gulf, imported malaria, Kuwait.

### INTRODUCTION

Kuwait is considered as a non-endemic country for malaria<sup>[1]</sup> since mosquito-borne transmission of the parasite has not been recorded<sup>[2]</sup>. Malaria transmission has, however, been reported in some neighboring countries of the Arabian gulf such as Saudi Arabia<sup>[3]</sup>, United Arab Emirates<sup>[4]</sup> and Iran<sup>[5]</sup>. Imported malaria in Kuwait originated from several endemic countries<sup>[6]</sup>, from which large numbers of workers immigrated to Kuwait. These workers came to Kuwait seeking jobs following the massive development of the local economy, which necessitated a large number of skilled workers in different aspects<sup>[6]</sup>. However, the number of imported malaria cases is decreasing because the immigrant workers are now screened for the disease in their home countries before coming to Kuwait (Ministry of Health, Kuwait

report, 2000)<sup>[7]</sup>. A large number of the expatriate workers settled in Al-Jahra province, an area served by a 419-bed general hospital, supported by several clinics scattered in different areas of the province. In this study, the incidence of malaria in the last four years has been summarized in relation to age, sex and species of the parasite detected.

### PATIENTS AND METHOD

#### Patients:

This study comprised 1446 Kuwaiti and non-Kuwait patients who presented with fever. The non-Kuwaiti patients (1374 imported workers) were from several countries some of which are endemic for malaria (India, Sri-Lanka, Afganistan, Pakistan, Bangladesh and Sudan). When such workers came to Kuwait, their malarial status was unknown. From interviewing the patients it

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was clear that most of them were newly arrived workers, whereas a number of them had been living in Kuwait and returned home where they acquired the infection upon their return they relapsed as no primaquine was given to them. Blood specimens from the patients were sent to the parasitology laboratory at Al-Jahra hospital, either within the hospital itself or from the outlying clinics, for examination.

#### Method:

Venous blood, collected in EDTA tubes, was sent to the parasitology laboratory. The laboratory provides a 24-hour service for the diagnosis of malaria. Blood was processed as thick and thin blood films<sup>[6]</sup> and two slides per patient were prepared. The thick blood films were made on one third of 70% alcohol-clean slides and the thin blood films were made on the same slides. As soon as the thick blood films were visibly dry, usually within 20 minutes, they were dipped twice in acetone to lyse the red blood cells and the thin films were fixed in methanol. The slides were then stained, for 30 minutes, in Giemsa stain (diluted 7.5ml stain to 92.5ml phosphate buffer 0.15M at pH 7.2 and filtered). After staining, the slides were dipped twice in the buffer to remove excess stain and allowed to air dry in an upright position. Slides were examined, under oil immersion, by a technician and by the first author. For each slide, 100 fields of the thick film and 200 fields of the thin film were examined before results were reported. If a specimen was positive, the species and stage of the *plasmodium* parasite were recorded. Examination of the positive and negative blood films by other specialists ensured that no positive case had been overlooked, whilst confirming that the species identity was as accurate as possible.

#### RESULTS

The number of suspected patients for malaria who were examined at Al-Jahra hospital as well as the number of positive patients in 1996, 1997, 1998 and 1999 are shown in Table 1. There was a decrease in the total number of examined patients from 432 in 1996 to 266 in 1999, as well as the number of positive cases from 60 and 76 in 1996 and 1997 to 32 and 34 in 1998 and 1999, respectively. Upon examining the blood of 1446 patients who had fever, only 202 patients showed malaria parasites in their blood and of these positive patients 169 (83.7%) were males and 33 (16.3%) were females.

All the positive patients were non-Kuwaitis who had come from different countries which are endemic for malaria, mainly from the Indian subcontinent. An overwhelming majority, 95%,

were between 20-40 years which is considered as the productive age for imported workers.

In this study, most of the positive cases were due to *P. vivax* (90.6%) and to *P. falciparum* (7.4%), with fever cases due to mixed infections with the two species (2%). *Plasmodium vivax* positive blood films were seen throughout the year with an infection peak between May and August, while *P. falciparum* positive blood films were seen in January and March and in the period between July and November with no cases identified in other months (Fig. 1).

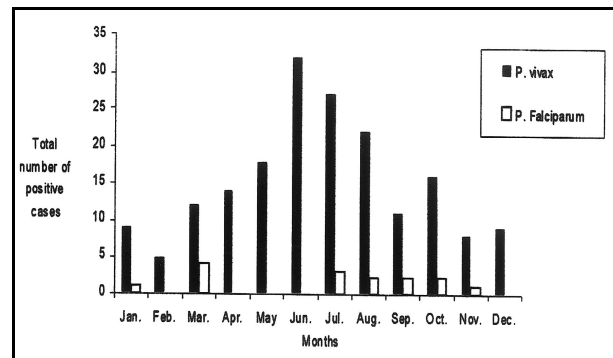


Fig. 1. Monthly distribution of *P. vivax* and *P. falciparum* over a four year period

#### DISCUSSION

In Kuwait as in other gulf countries, the development of the economy, generated by the oil revenues, has attracted a large labor force from many Asian countries with higher malaria endemicity such as India, Pakistan, Bangladesh, Afganistan, Sri-Lanka, Philippines and from some African countries<sup>[4]</sup>. The importation of these workers is the only identified source of malaria in Kuwait, as well as a source in the other gulf countries, in which indigenous malaria has also been reported<sup>[3,4,6]</sup>.

The main factor which has contributed to the recognition of the imported cases in this study, is the application of routine methods for the diagnosis, i.e. this is the examination of acetone-fixed thick blood films and methanol-fixed thin blood films<sup>[6]</sup>, which is employed in all hospitals in Kuwait. Other techniques tried by other investigators include OptiMAL test, PCR<sup>[11]</sup> and quantitative buffy coat capillary tube test<sup>[12]</sup> could have been applied in this study but due to lack of facilities we limited ourselves to the examination of fixed blood films. However, it would be of practical and resource relevance to undertake a comparative controlled study with these alternative methods.

In this study, there was a gradual decrease in the number of suspected patients from 432 in 1996 to 266 in 1999, while 14%, 17.6%, 10.1% and 12.8% were positive in each year from 1996 to 1999

inclusive. Thus, the percentages of positive cases are closely related (Table 1). The decrease in the number of patients examined could be due to several reasons such as the strict policy of the Ministry of Health that all immigrants be checked in their home countries for infectious diseases before coming to Kuwait, a decrease in the number of people screened, and fewer people coming from malaria-endemic countries and fewer people reporting to the clinics. Over the period of four years (1996-1999), a total of 1446 patients, Kuwaiti and non-Kuwaiti, males and females of different ages, were examined for malaria. Only 202 non-Kuwait patients were positive (Table 1). None of the Kuwaiti patients were found to be positive during the the four-year period since there has been no evidence of any mosquito-borne transmission of the disease in Kuwait, unlike other neighboring gulf countries such as United Arab Emirates<sup>[4]</sup>, Saudi Arabia<sup>[3]</sup> and Iran<sup>[5]</sup> where indigenous malaria was reported. This observation supports previous reported findings<sup>[13]</sup>.

The majority (83.7%) of imported malaria detected at Al-Jahra hospital over the four-year period was found in male patients. One contribution factor to this finding may be because more males than females are recruited into the labor force. About 95% of the positive patients were between 20-40 years of age, which coincides with the productive age for an imported worker. These results support previous reports which have indicated about 77% of the imported malaria was in workers in similar age ranges<sup>[2]</sup>.

In this study, most of the positive cases were due to *Plasmodium vivax* (90.6%) and to a lesser extent due to *Plasmodium falciparum* (7.4%). Only

2% were due to mixed infections with both species, which supports previous findings<sup>[8]</sup>. This reflects the prevalent species in the endemic zones where the infections were acquired<sup>[14]</sup>. *Plasmodium vivax* was seen more in patients from India, Bangladesh and Sri-Lanka from which the largest number of immigrants usually come to Kuwait.

The seasonal distribution of the positive cases is illustrated in Fig 1. It has been noticed that *Plasmodium vivax* (the major species) shows a seasonal peak between May and August, and *Plasmodium falciparum* shows its seasonal peak between July and November. This could be attributed to the heat stress and humidity between May and November, which may be partly responsible for precipitating clinical attacks amongst those harboring latent infections<sup>[2]</sup>.

Finally, this problem will continue to exist as long as expatriate workers are needed for economical development and residents in Kuwait need to be forewarned about simple protective measures necessary to prevent malaria while in endemic zones<sup>[15]</sup>.

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**Table 1:**

Total number of patients examined for malaria and number of positive cases in a four-year period (1996-1999) at Al-Jahra Hospital

	Year				Total Number (%)
	1996	1997	1998	1999	
No. of Patients examined	432	431	317	266	1446
Positive for malaria (%)	60 (13.9)	76 (17.6)	32 (10.1)	34 (12.8)	202 (14)
Male	50	58	30	31	169 (83.7)
Female	10	18	2	3	33 (16.3)
Species:					
<i>P. vivax</i>	52	71	29	31	183 (90.6)
<i>P. falciparum</i>	8	3	1	3	15 (7.4)
<i>Pf + P. vivax</i>	0	2	2	0	4 (2)

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