Prevalence and Outcome of Imported Adult Malaria Cases Admitted to a Tertiary Hospital in Sharjah, United Arab Emirates: A Five Year Study

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Abstract: *Background:* Malaria is a major public challenge. It's estimated 247 million malaria cases worldwide in 2021, with death of almost 619000 cases. WHO data shows incidence of malaria in UAE over last 10 years as 0 per 1000 population at risk. Since UAE is a global country will have a risk of having cases of malaria from malaria-endemic countries and will have similar mortality and morbidity risks. *Aim:* This study aims to review prevalence and outcome of imported adult malaria cases admitted to tertiary hospital in UAE during last five years (2018-2022). *Methods:* It's a retrospective review of imported adult malaria cases admitted to tertiary hospital in UAE during five years, the participants were a total of 83 cases. *Result:* 93.9% participants were between 18-60 years, with 6.1% older than 60 years. Majority were male (82.9%) and most common ethnicities Asian (56.1%) and African (41.5%). 61 % Participants underwent blood film while 39% underwent both malaria detection test and blood film. *Plasmodium vivax* was most common species (56.1%) and *Plasmodium falciparum* was found in 31.5%. Screening for HIV (15.9%) and G6PD (18.3%) which are representing small percentage of participants. During admission, 37.8% had Procalcitonin checked with 90.3% having a cut-off $\geq$ 0.5. Majority had non-severe malaria (93.1%), while 6.1% had severe malaria.4 out of 82 participants required ICU admission (4.9%), while (95.1%) did not. 53.7% of participants received antibiotics while 46.3% did not. 74.4% stayed in hospital for 0-5 days, 19.5% stayed for 6-10 days, while 6.1% only stayed for more than 10 days. Majority of participants were discharged from hospital 97.6% and 2.4% transferred to another facility. *Conclusions:* Majority of malaria cases in UAE are imported and predominantly affect adult males of Asian and African ethnicities. Although incidence of malaria in UAE is low, patients coming from malaria-endemic regions with similar morbidity and mortality risks can still be encountered. The prevalence of important adult malaria cases admitted to a tertiary hospital in Sharjah was not high in last 5 years, but mainly affect male travellers hailing from endemic countries. *Plasmodium vivax* was most common species although *Plasmodium falciparum* percentage was also significant. Outcome of cases was generally favourable, but some patient required ICU admission due to severe complication. This study highlighted importance of raising awareness, promoting preventive measures & strengthening surveillance and control measures including appropriate chemoprophylaxis to reduce burden of imported malaria in non-endemic areas.

Keywords: Malaria, Death, Risk, Morbidity, Mortality, Epidemiological, Diagnosis, SPSS, ICU

1. Introduction

Background

The United Arab Emirates (UAE), which are located on the northernmost tip of the southern Arabian Peninsula, are primarily a subtropical dry region with little to no native flora or water flow. Unending sand dunes surrounds the region. Seasonal streams, wells, man-made reservoirs are used for recreation and agriculture, and rainwater pools are also potential anopheles hatching grounds [3].

Although it only affects a tiny portion of the area, malaria has been endemic there for a while. Ten years ago, indigenous people accounted for over half of all malaria cases documented in the nation [1]. Similar to Kuwait [4] and other Arabian Gulf nations, the development boom brought about by the oil riches drew a sizable labour force from a number of nations with high malaria endemicity. This not only altered the country's demographic profile but also posed a danger to the effectiveness of the already-in place malaria control initiatives.

Despite extensive eradication and control measures over 20th century, malaria remain the most significant parasite illness known to humans. It was eradicated from over half of the word's nations over the past century [5]. In 1980s and 1990s United Arab Emirates and other Gulf countries were able to successfully stop the regional malaria transmission.

In 2007 WHO declared the UAE malaria free as the last locally transmitted case was documented in 1973 [10, 14]. However, the UAE continues to have a sizable number of imported malaria patients and a capable mosquito vector population. Local transmission is still dangerous in light of these conditions. The nearby Saudi Arabia, Yemen, and Iran are only a few significant mentions among the estimated 99 nations that were still deemed malaria endemic in 2010 [6].

Although the worldwide malaria map has shrunk as a result of the eradication of malaria, a more intricate global pattern of malaria epidemiology has emerged. Malaria imported cases into areas where the disease is not prevalent are now being recognized as a new public health problem. Imported malaria is defined as an infection that a person (either a tourist or an indigenous local) contracted in an endemic location but that was only discovered in a non-endemic industrialized nation after the onset of the clinical sickness [9].

Worldwide, there are about 10,000 imported cases of malaria each year. The vast majority of imported malaria cases are linked to immigrants from endemic regions [11]. In order to prevent the importation of malaria and to remove existing foci, a coordinated effort was launched [8], the relative prevalence of indigenous malaria decreased from 20.7% in 1983 to 7.1% in 1987 and to 2.8% in 1988 [2].

The malaria slide positive rates within the Eastern Mediterranean (UAE, Qatar, Palestine, Sudan, Oman, Morocco, etc.) decreased by 26% (7 million to 5 million) reported cases from 2000 to 2019. [7]. Since there hasn't been any local malaria transmission for the previous ten years, Al-Qassimi Hospital has been designated as a consolidation area. This research is set to review the prevalence and the outcome of the imported adult malaria cases admitted to a tertiary hospital in Sharjah, United Arab Emirates.

2. Method

A. Study Design

This study was retrospective medical file review, also known as retrospective chart review (RCR). This approach utilized pre-recorded patient-centered data to answer various research questions. The study focused on 83 laboratory-confirmed malaria cases admitted to one of the largest tertiary hospitals in the United Arab Emirates over a period of five years.

B. Data collection

Patients data were collected from Hospital's Electronic Medical Record (EMR) system. Data included the patient's demographics, age, gender and labs (RDT – Rapid Diagnostic Testing) and microscopy (Thick & thin blood smear.). In addition, malaria treatment, ICU admission, and length of stay also.

C. Ethical approval

The study was approved by Ministry of Health and Prevention Research Ethics Committee. No potential risk to the patients was anticipated.

D. Statistical analysis

Data analyses were performed using IBM SPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp.

3. Result

Demographics:

Table 1 presents the characteristics of the study participants and their investigations, which included 82 cases. Its representing multiple variables included age, gender, ethnicity, investigation type, malaria type, screening for G6PD (Glucose-6-dehydrogenase and HIV (human immunodeficiency virus), PCT level on admission and its clinical cut-off.

93.9% of the participants were aged between 18-60-year-old, with only 6.1% older than 60-year-old. the majority were male (82.9%) and the most common ethnicities Asian (56.1%) and African (41.5%).

Participant who underwent a blood film were 61% while 39% underwent both malaria detection test and a blood film test.

Vivax malaria was the most common type of malaria in the participant (56.1%) and (31.5%) had falciparum malaria.

Screening for HIV (15.9%) and G6PD (18.3%) which are representing small percentage of the participants. During the admission, 37.8% had their PCT value checked with 90.3% having a clinical cut-off ≥ 0.5.

The table summarizes the characteristics of the study participants and the investigation conducted, which is useful

in analysing the study result and drawing conclusions.

***Table 1.** Characteristics of the study participants and investigations, n = 82.*

Variables	Frequency (%)
Age, years	
18-60	77 (93.9)
> 60	5 (6.1)
Gender	
Female	14 (17.1)
Male	68 (82.9)
Ethnicity	
African	34 (41.5)
Asian	46 (56.1)
Middle Eastern	2 (2.4)
Investigation type	
Blood film	50 (61)
Malaria detection test & blood film	32 (39)
Malaria type	
Falciparum	34 (31.5)
Vivax	46 (56.1)
Other	2 (2.4)
Screening for G6PD	
Yes	15 (18.3)
No	67 (81.7)
Screening for HIV	
Yes	13 (15.9)
No	69 (84.1)
PCT level on admission	
Yes	31 (37.8)
No	51 (62.2)
Clinical cut-off of PCT, ng/ml	
< 0.5	3 (9.7)
≥ 0.5	28 (90.3)
G6PD= Glucose-6-phosphate dehydrogenase; HIV= human immunodeficiency virus; PCT= procalcitonin	

***Table 2.** Distribution of Malaria cases by county.*

Country	Cases, n (%)
Pakistan	22 (26.8)
India	18 (22)
Sudan	13 (15.9)
Ethiopia	5 (6.1)
Nigeria	4 (4.9)
Uganda	4 (4.9)
Bangladesh	3 (3.7)
Afghanistan	3 (3.7)
Egypt	2 (2.4)
Cameron	2 (2.4)
Gambia	1 (1.2)
Togo	1 (1.2)
Congo	1 (1.2)
Ghana	1 (1.2)
Mali	1 (1.2)
Burkina Faso	1 (1.2)

Table 2 showed that Pakistan is the most common country reported malaria cases at AL Qassimi hospital with (22) 26.8% of the cases followed by India (18) 22% cases, and Sudan with (13) 15.9%.

The other countries listed in the table showed smaller percentage of presenting cases ranging from 1.2%-6.1%.

Overall, the table showed the distribution of malaria cases by county.

Severity and the Clinical outcomes

The table 3 presents the outcomes and treatment of malaria among the 82 study participants. The variables presented in the table include severity of malaria, ICU admission, antibiotic use, length of stay, outcome, and clinic follow-up.

The majority of participants had non-severe malaria (93.1%), while 6.1% had severe malaria.

4 out of 82 participants required ICU admission (4.9%), while (95.1%) did not. in terms of antibiotics use 53.7% of the participants received antibiotics in the other hand 46.3% did not.

About the length of stay 74.4% stayed in the hospital for 0-5 days, 19.5% stayed for 6-10 days, while 6.1% only stayed for more than 10 days.

The majority of the participant discharged from the hospital 97.6% and 2.4% transferred to another facility.

Table overall, gave a useful understanding on the severity and the outcome of the malaria cases which is will give better understanding for overall impact of malaria infection on the participants health.

***Table 3.** Severity and the outcomes of malaria, n = 82.*

Variables	Frequency (%)
Severity	
Not severe	77 (93.1)
Severe	5 (6.1)
ICU admission	
Yes	4 (4.9)
No	78 (95.1)
Antibiotic use	
Yes	44 (53.7)
No	38 (46.3)
Length of stay, days	
0-5	61 (74.4)
6-10	16 (19.5)
> 10	5 (6.1)
Outcome	
Discharged	80 (97.6)
Transferred	2 (2.4)
Clinic follow-up	
Yes	32 (39)
No	50 (61)
ICU = intensive care unit	

4. Discussion

This study describes the prevalence and outcome of imported adult malarial cases admitted to a tertiary care hospital in Sharjah over a five-year study period. Our patients age results indicate that most are in middle age and are males from Asia and Africa; this can be justified since most workers are Asian and African males.

Our study confirms, in line with other studies, that the most common Plasmodium species identified was *Plasmodium vivax*. [1, 5, 7]

The most common country-reported malaria cases at AL Qassimi Hospital are Pakistan. In such a country, there is a need for more awareness and malaria control programs, as well as more attention on anti-relapse management and advice since most cases are *Plasmodiun vivax*.

While the UAE has been declared Malaria free by the WHO, with increasing travel to and immigration from

malaria-endemic countries, imported malaria has become common. Malaria importation has been attributed to the large population of immigrant workers primarily from Asian and African nations.

Our study will highlight the importance of screening and recommend more studies on HIV patients based on the few gabs we found concerning screening of HIV status in malaria cases. [12]

The use of antibiotics is very limited in cases of malaria. Empiric antibiotics, such as ceftriaxone (Third Generation), are warranted in cases of severe complications in malaria. Once no evidence of bacteria is found, it can be stopped.

ASP (Anti-microbial stewardship) programs are key in directing proper antibiotic use in such cases, and high PCT is not an indication of starting antibiotics [15]. This highlights the importance of ASP programs in directing antibiotic usage in such cases. [13]

The outcome of the case is was generally favourable, with no death reported. Hospital stay was generally short, ranging from 0 to 5 days. However, some patients (4%) required intensive care unit admission.

5. Study Limitation

This study has several limitations. First, the retrospective data collection design did not allow the capture of more detailed information. Second, the follow-up was limited. Third, selection bias since the data included a certain group of patients with low income, usually from the labour category, where the majority are males. Finally, the small sample size could have affected the statistical significance of important data.

6. Conclusion

Even though the UAE has been declared malaria-free by WHO, it faces many challenges relating to imported malaria cases because of the high number of immigrants from malaria-endemic areas. Over five years, this retrospective study examined the prevalence and outcomes of 83 laboratory-confirmed imported adult malaria cases admitted to a tertiary hospital in Sharjah, UAE. Most of the participants were males between the ages of 18-60. It emphasizes the need for continued vigilance in preventing imported cases and managing malaria in a country where the disease is no longer endemic. As a result of this study, future public health policies and strategies can be developed to control malaria in the UAE.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Approval

The study was approved by Ministry of Health and Prevention Research Ethics Committee. No potential risk to the patients was anticipated.

Data Availability Statement

Data used and/or analysed during this study was extracted from a patient data system in a tertiary care hospital in Sharjah.

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