# Analysis of malaria cases among United Nations troops in Sierra Leone

***Ghassan I. Kawar,*** *MD, JMCC,* ***Jawad F. Maayah,*** *MD, JMCC,* ***Basel T. Rawashdeh,*** *MD, JMCC.*

## ABSTRACT

**Objective:** To analyze malaria case presentation admitted to the United Nations hospital in Freetown, Sierra Leone named Choithram Memorial Hospital, a Jordanian Medical Level III Hospital.

**Methods:** All data from patients admitted to the Choithram Memorial Hospital, Freetown, Sierra Leone, over a 6-month period, 21st January through to 21st July 2002 were tabulated and later analyzed according to clinical presentation. Data such as age, sex, most common complaints, malaria smear and history of malaria prophylaxis together with other variables were recorded.

**Results:** A total of 101 cases were included in this study. Males accounted for the majority of cases n=90 (89.1%), females n=11 (11.9%). Mean age was 34.4±9 and mean stay in hospital was 4.5±2 days. Malaria thick smear was positive from the first time in 71.3%, n=72, while in 16.8%, n=17 from the second time, 4%, 5%, 3% were positive from the third, fourth and fifth time. Most common complaints were fever and headache (79.2%, n=80), chills (74.3%, n=75), sweating (72.3%, n=73), arthralgias (56.4%, n=57) and vomiting (43.6%, n=44). Those who were taking anti-malarial prophylaxis were 34.6% (n=35), while the rest were on no prophylaxis. Complicated cases were: 5 cases presented with cerebral malaria, one of them succumbed while the rest recovered completely; 4 presented with uremia and were referred for dialysis, one of them passed away after the first dialysis session. Other clinical presentations were seen such as: upper gastro-intestinal bleeding, diarrhea, pneumonia, pericarditis, angina pectoris, black water fever and abdominal pain. Four consultations were received from the dermatologist on cases of chicken pox not responding to treatment and turned out to be malaria falciparum.

**Conclusion:** In an endemic area, malaria falciparum may present in very bizarre and variable clinical pictures. Fever is not necessarily a cardinal sign. High suspicion index must be exerted in unusual presentations. Prophylaxis against malaria must not alter the clinical decision away from the diagnosis. Prompt treatment on presumptive diagnosis will save many patients from the complications of this killing disease.

**Saudi Med J 2003; Vol. 24 (8): 881-884**

The United Nations (UN) deployed around 17000 troops to keep peace in Sierra Leone after the civil war, which took place there. This country is located on the western coast of Africa where malaria, mainly plasmodium falciparum (PF) species, prevails. The UN recruited a Jordanian medical team to run its hospital, located in Freetown, called Choithram Memorial Hospital. It is classified as a level III hospital, namely, a tertiary referral hospital. It deals with patients referred from military units and the UN headquarters. The Jordanian specialist physicians were equipped with a good laboratory and a limited x-ray facility. They were faced with a high number of malaria cases besides other medical emergencies. However, the malaria presentation was very variable and in many cases was very atypical. In this paper, the different presentations of malaria are described. Clinical and laboratory data were analyzed. The clinical response to anti-malarial drugs was also noted.

Methods. The medical files of the patients admitted to the above-mentioned hospital in the period between

From the Department of Internal Medicine (Kawar, Maayah), Department of Dermatology (Rawashdeh), Royal Medical Services, Amman, *Jordan*.

Received 29th January 2003. Accepted for publication in final form 13th May 2003.

Address correspondence and reprint request to: Dr. Ghassan I. Kawar, PO Box 961847, Amman 11196, *Jordan*. Tel. +962 77309173. Fax. +962 (6) 5927134. E-mail: gikawar@hotmail.com

Table 1 - Most frequent complaints and clinical presentations.

| Complaints | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Fever n (%)** | **Headache n (%)** | **Chills n (%)** | **Sweating n (%)** | **Arthralgia n (%)** | **Vomiting n (%)** | **Abd. pain n (%)** | **Diarrhea n (%)** | **Jaundice n (%)** |
| 93 (92.2) | 80 (79.2) | 75 (74.3) | 73 (72.3) | 57 (56.4) | 44 (43.6) | 27 (26.7) | 23 (22.8) | 17 (16.8) |
| **Clinical presentation** | | | | | | | | |
| | **Cerebral malaria** | **Renal failure** | **Lobar pneumonia** | **Chicken pox** | **GIT bleeding** | **Angina pectoris** | **Black water** | **Pericarditis** |
| **Number** | 5 | 4 | 5 | 4 | 2 | 1 | 1 | 1 |
| **Deaths** | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

Abd. - abdominal, GIT - gastrointestinal bleeding

Table 2 - Malaria falciparum treatment and prophylaxis.

| **Treatment** | **Frequency (%)** | **Cumulative (%)** |
|---|---|---|
| Artesunate total 1200mg | 70 (69.3) | 69.3 |
| Fansidar ( 3 tablets) (Pyrimethamine ± Sulfadoxine) | 8 (7.9) | 77.2 |
| Lariam (Mefloquine) total 1500mg | 3 (3) | 80.2 |
| Quinine sulfate (600mg x 3 for 7 days) followed by Doxycycline (100 mg x 2 for 7 days) | 20 (19.8) | 100 |
| **Prophylaxis** | | |
| Doxycycline 100mg daily | 1 (1) | 1 |
| Fansimef (weekly) (Fansidar+Mefloquine) | 10 (9.9) | 10.9 |
| Lariam 250mg weekly | 24 (23.8) | 34.7 |
| No prophylaxis | 66 (65.3) | 100 |
| **Total** | **101 100** | |

21st January 2002 and 21st July 2002 were reviewed thoroughly. As a policy full history was taken concerning malaria prophylaxis, country of origin, previous history of malaria infection as well as other diseases. These patients were admitted to the hospital so all available and needed investigations were carried out. A peripheral thick smear was adopted as our diagnostic tool for malaria besides the clinical presentation. Parasitemia was not measured. This test was repeated many times when clinical suspicion was strong to confirm the diagnosis. These patients were followed up after discharge until they were declared free from malaria. We filled tables for all malaria patients including age and sex, besides the complaints and clinical findings. Laboratory data, clinical response to treatment and history of malaria prophylaxis was also tabulated. These tables were analyzed after the mission was over. All the cases treated during this period did not have a previous medical record in this hospital because these troops changed every 6 or 12 months.

Results. Our records revealed 101 cases of PF malaria admitted to this hospital during the above-mentioned period. We were consulted on 4 cases admitted to the dermatology section as chicken pox cases not responding to treatment that turned out to be PF malaria infection. They responded promptly to anti-malarial drugs. **Table 1** shows the most frequent complaints with which patients presented. As it is obvious, some complaints are trivial and well known (fever, chills, and headache), however, other complaints were not related and may mislead the clinical decision (dry cough, diarrhea). One case was brought early by his colleagues as alcoholic intoxication that turned out to be cerebral malaria. Fortunately, due to our high index of suspicion and prompt diagnosis and management he was treated early and successfully made a full recovery. On the other hand, a case was delayed in his unit for one week and succumbed after 12 hours of admission to our hospital. His autopsy revealed cerebral malaria and severe hepatitis. Five patients presented with a picture of lobar pneumonia on chest x-ray and clinically, they responded when anti-malarial treatment was added to the regimen. One patient was referred as a case of fever. The clinical evaluation revealed a feverish patient with faint heart sounds, pericardial rub and cardiomegaly on chest x-ray. A thick smear was positive for PF malaria. Cardiac ultrasound showed a considerable pericardial effusion. He responded dramatically to anti-malarial and indomethacin treatment. Another patient with no risk factors for coronary artery disease presented with angina pectoris and ischemic electrocardiographic changes. During his hospital stay, he developed sweating for which malaria smear was found to be positive for PF. He responded well to anti-malaria treatment. Later, his cardiac catheterization and treadmill stress testing were negative for ischemia.

The 4 cases, which presented with acute renal failure were managed immediately and evacuated for hemodialysis when needed, one of them presented very

late with anuria and was evacuated outside the country where hemodialysis were carried out, but unfortunately he passed away after the first hemodialysis session; his autopsy showed adult respiratory distress syndrome along with acute tubular necrosis. Twenty-three patients presented with diarrhea, they were positive for PF, *Entameba histolytica* was isolated in 5 cases while 4 cases were infested with *Giardia lamblia*, they promptly responded when anti-malaria treatment was added to the regimen. Two cases presented with upper gastrointestinal bleeding and fever, and they were found to have PF malaria positive smear. They received blood transfusion and anti-malarial treatment with full recovery. One case presented with black water fever and severe anemia, responded to treatment and blood transfusion.

The frequency of positive thick smear for malaria was variable as 71.3% of patients showed positive results from the first test, while 16.8% were positive from the second, 4% from the third, 5% from the fourth and 3% were positive from the fifth test. The liver function tests were checked routinely and repeated if abnormal. In 17 patients the results were abnormal, 13 of which were jaundiced. Four patients were jaundiced as well, but showing normal liver function tests. Urine was checked by dipstick method for transient albuminuria. Thirty-six out 93 febrile patients showed positive test, while the remaining were negative.

Packed cell volume (PCV, mean = 40.7%) and white blood count (WBC, mean 8050 per $mm^3$) were checked routinely. A considerable number of patients had anemia (n=12, 11.9%) and leukocytosis (n=5, 5%). All patients with complications had marked anemia (minimum PCV 23%) and high WBC (maximum 20.000 per $mm^3$), while the mild uncomplicated cases showed almost normal results.

The policy of treatment was tailored according to patients' condition and tolerance to drugs. However, Artesunate (Artemisia derivative) was used frequently for treatment due to its good tolerability, efficacy and prompt clinical response. Patients treated with drugs other than Artesunate had a similar stay at hospital as those with Artesunate but with less satisfactory clinical response and more side effects (4.5 days for non-Artesunate treated patients versus 4.3 days for Artesunate treated patients, $p<0.005$).

**Table 2** shows the details of drugs given for treatment and prophylaxis. Most patients were supposed to receive prophylaxis against malaria. However, most of these cases failed to take this prophylaxis possibly due to the side effects or negligence. We observed that, patients who contracted malaria while on whatever prophylaxis had a milder clinical course and shorter stay at hospital compared with those who were on no prophylaxis (3.5 days versus 4.3 days).

Discussion. Malaria can mimic many diseases, and there are no absolute diagnostic clinical features. A high index of suspicion is a clue for clinical diagnosis. Severe malaria remains a major cause of mortality in endemic areas, and its management needs potent anti-malarial drugs and intensive care. Morbidity and mortality will be reduced in severe malaria patients with early diagnosis and prompt treatment. Plasmodium falciparum accounts for nearly all malarial mortality and kills an estimated 1-2 million persons yearly. A wide range in clinical response to malaria is based on the degree of immunity, age, and duration of infection. Plasmodium falciparum malaria can progress rapidly. If major organ systemic dysfunction such as cerebral malaria develops, the risk of death is 20% even with proper treatment. Mortality rate encountered in this study is also 20% for cerebral malaria, however, the case presented late and succumbed after 12 hours of admission. This rapid progression to complicated malaria is most common in those without immunity, such as children in the tropics or travelers from temperate zones.

This paper discusses the different presentations, early diagnosis, complications and response to treatment in a UN hospital in an endemic area with malaria PF, namely, Sierra Leone. This hospital had the duty of treating UN troops coming from different countries, considered non-immune to malaria. Although one of the worlds' most devastating diseases, PF malaria is treatable and attention to detail will reduce morbidity and mortality. In our study, the mortality rate was 2%. Plasmodium falciparum malaria has the capacity for amplification because blood cells of any age can be invaded. Niazi[1] observed in a study carried out in Saudi Arabia, that anemia is a significant finding in patients with PF malaria, along with normal white cell blood count and moderate to severe thrombocytopenia, the latter finding mainly in patients with FP malaria and splenomegaly. Pre-existing helminth infections may increase the severity of malarial anemia.[2] Most insidious is the parasite's ability to sequester in the capillaries of vital organs such as the brain and kidneys. In a retrospective study carried out by Desai et al,[3] PF malaria was detected at autopsy, and a very high incidence of cerebral malaria was seen. Plugging of cerebral vasculature by parasitized red blood cells (p RBC's) was seen. Multiple organ sequestration with p RBC's was seen in all cases. A positive peripheral smear was obtained ante-mortem in only 20 out of 55 cases. The paroxysms of fever and chills that characterize the classic malaria attack are related to red blood cells rupture. The tumor necrosis factor and interleukins are elevated and mediate fever, chills, rigors, headaches and anorexia, cause short-term hyperglycemia followed by inhibition of gluconeogenesis leading to hypoglycemia and hypotension. Nicolas et al[4] emphasized the importance of indirect laboratory findings for early diagnosis of malaria in foreigners living in Africa. Alfandari et al[5] suggests that normal platelet count and C-reactive protein value probably exclude the diagnosis of malaria in febrile travelers.

Any change in mental status should raise the suspicion of hypoglycemia, some times induced by

quinines. Faiz et al[6] diagnosed cerebral malaria taking into consideration unarousable coma or any neurological manifestation in a febrile patient with asexual PF in blood film. Despite advances in the management, mortality and morbidity have not changed much.[7]

Renal failure in severe malaria is often due to acute tubular necrosis and will often resolve if the patient is supported by dialysis. Pulmonary dysfunction is similar to adult respiratory distress syndrome. Rajput et al[8] concludes that malarial atypical respiratory presentations are far higher in incidence than reported in literature and peripheral blood smear in feverish patients with respiratory manifestations in endemic areas unmask malarial infection and warrant early anti-malarial treatment resulting in decreased mortality and morbidity. Oster et al[9] found that signs and symptoms of respiratory tract infection were negatively associated with malaria parasitemia. The main recommendations for malaria management in adults were to improve the quality of blood slide examinations.

Gastrointestinal complaints are common. Nausea, vomiting and abdominal pain may be due to parasite sequestration in intestinal capillaries. In this study we had 27 cases (26.7%) of PF malaria where they presented only with abdominal pain, which promptly responded to anti-malaria treatment. Hepatic dysfunction is usually mild so any jaundice is first attributed to hemolysis. Leman et al[10] admitted patients only when they showed high bilirubin level along with thrombocytopenia. The spleen is often enlarged and rupture may occur leading to shock. In non-immune patients, malaria may stabilize or it may progress rapidly to organ dysfunction and death. Castelli et al[11] found that clinical presentation is milder in migrants from endemic areas with malaria compared with non-immune subjects. Ronning et al[12] suggests that complications in imported PF malaria may largely be prevented by a high rate of chemoprophylaxis compliance in non-immune travelers and a high index of suspicion among physicians evaluating travelers from endemic areas. Owusu-Agyei et al[13] suggests that naturally acquired immunity does not provide adult migrants with significant defense against re-infection.

Plasmodium falciparum malaria in the non-immune is a medical emergency. Delay in initiating therapy, failure to absorb drugs due to vomiting or resistance to the anti-malarial drugs used may lead to rapid progression to coma and death. For these reasons, non-immune patients with PF malaria should generally be admitted to hospital and followed until the parasitemia has cleared regardless of the initial clinical appearance. World's[14] experience with military population suggests that there are a number of persisting problems affecting it in relation to malaria. Only publication of reliable statistics will define their magnitude. Our sample size may not have enough power to detect a small increase in case fatality rate. Conditions favoring a good outcome in our setting included a clinic that was open 24 hours a day; specialist supervision and easy accessibility because of short distances to travel. The physicians had their residence in hospital premises so they had frequent visits to their patients with frequent review of medical history and management. Referral to more advanced medical levels was secured by a very vigilant system in the UN headquarters.

In conclusion, malaria may present in very different clinical pictures such as dry cough or diarrhea. A high index of suspicion must be exerted while treating non-immune patients in endemic areas presenting with any symptom. Laboratory tests are valuable for assessment of complications, but clinical evaluation is indispensable. Prompt and early treatment may save patients from complications of malaria or even death. Prophylaxis against malaria does not confer full protection against infection with malaria, but it may lessen the severity and complications of the disease. Admission of patients with suspicion of malaria infection is safer as malaria thick and thin smears may become positive when repeated while the patient is under observation. Artesunate is a well-tolerated drug against malaria with good results but quinine therapy is still a cornerstone in the treatment policy, with the cost of longer course of treatment.

## References


1. Niazi GA. Hematological aspect of malaria in a population based hospital, Saudi Arabia. ***J Egypt Soc Parasitol*** 1995; 25: 787-793.
2. Nacher M, Singhasivanon P, Silachamroon U, Treeprasertsu S, Krudsood S, Gay F, et al. Association of helminth infections with increased gametocyte carriage during mild falciparum malaria in Thailand. ***Am J Trop Med Hyg*** 2001; 65: 644-647.
3. Desai SP, Vora IM, Bhalero M. Plasmodium falciparum malaria - a diagnostic dilemma. ***Indian J Pathol Microbiol*** 1996; 39: 477-479.
4. Nicolas X, Nicolas F, Gorge O, Perret JL, Touze JE. Malaria in expatriates in Africa. 154 cases. Clinical problems and therapeutic difficulties. ***Presse Med*** 1997; 26: 158-160.
5. Alfandari S, Santre C, Chidiac C, Senneville E, Leroy O, Beuscart C et al. Imported malaria: presentation and outcome of 111 cases. ***Clin Microbiol Infect*** 1996; 2: 186-190.
6. Faiz MA, Rahman MR, Hossain MA, Rashid HA. Cerebral malaria - a study of 104 cases. ***Bangladesh Med Res Counc Bull*** 1998; 24: 35-42.
7. Garg RK. Cerebral malaria. ***J Assoc Physicians India*** 2001; 49: 1046.
8. Rajput R, Singh H, Singh S, Meena, Tiwari UC. Pulmonary manifestations in malaria. ***J Indian Med Assoc*** 2000; 98: 612-614.
9. Oster N, Krause E, Hatz C. Towards a rational malaria management at district hospital level: exploratory case series of febrile adult patients in a holoendemic area of Tanzania. ***Trop Doct*** 2000; 30: 203.
10. Leman P, Mir N. Malaria in inner London. ***Eur J Emerg Med*** 1999; 6: 31-35.
11. Castelli F, Matteelli A, Caligaris S, Gulletta M, el-Hamad I, Scolari C et al. Malaria in migrants. ***Parassitologia*** 1999; 41: 261-265.
12. Ronning EJ, Myrvang B, Jensenius M. Falciparum malaria in Oslo and Akerhus. ***Tidsskr Nor Laegeforen*** 2000; 120: 1658-1660.
13. Owusu-Agyei S, Koram KA, Baird JK, Utz GC, Binka FN, Nkrumah FK et al. Incidence of symptomatic and asymptomatic Plasmodium falciparum infection following curative therapy in adult residents of northern Ghana. ***Am J Trop Med Hyg*** 2001; 65: 197-203.
14. World MJ. Malaria remains a military medical problem. ***J R Army Med Corps*** 2001; 147: 274-280.