

Clinical and Demographic Profile and Outcome of Adult Patients with Malaria Including Complicated Cases with Focusing on Cerebral Malaria, Hepatic and Renal Impairment Admitted in Al Gamhouria Teaching Hospital and Attending a Private Clinic in Aden City - Southwest Yemen

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Abstract

Background: Malaria is a major health threat in Yemen, and it is the most common and widely prevalent life-threatening infectious disease in tropical and subtropical regions where it causes high rates of morbidity and mortality.

Aim of Study: This study aimed to describe the clinical and demographic profile, and outcome of patients with malaria including complicated Cases with focusing on cerebral malaria, hepatic and renal impairment admitting in Al-Gamhouria Teaching Hospital and attending a private clinic Aden City in Southwest Yemen.

Patients and Methods: It was a prospective study, a total of 30 malaria patients >15 years of age who presented in Al Gamhouria Teaching Hospital and a private clinic in Aden City Southwest of Yemen, over a period of one year, Between (June 2022 to June 2023), rapid diagnostic test used for malaria diagnosis, clinical examination and other laboratory tests to identify severe malaria complications with focusing on cerebral malaria, hepatic and renal impairment were performed at the hospital and the clinic.

Results: During the study period, 30 patients were enrolled, (83%) of cases were male while (17%) being female, mean age was (30±15.2) years, (50%) of patients belonging to the age group of (26-35) years, (80%) came from rural area while (20%) came from urban area, Fever was the most common symptoms of malaria (93%) cerebral malaria was the most common complication (30%), recovered patients was (83%) while dead patients (17%).

Conclusion: This study concluded that the majority of patients were male and came from rural area, fever was the most common symptoms while cerebral malaria was the most common complication.

Key Words: Cerebral malaria – Fever – Rural area.

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Introduction

THERE is a scarcity of new studies about clinical and demographic data of malaria including complicated cases in Yemen especially among adults.

Malaria is transmitted through the bite of Plasmodium infected female Anopheles mosquitoes. It remains one of the most common vector-transmitted diseases, leading to a high disease morbidity and mortality [1].

Most human infections occur by *P. falciparum* and *P. vivax*, and limited degree to *P. ovale*, *P. malariae*, and *P. knowlesi* additionally infect human (2). The causative agent of the acute form of malaria is *P. falciparum*, which is responsible for the highest morbimortality rates [3].

Malaria is separated for convenience into two main disease presentations: Uncomplicated malaria and severe malaria. Plasmodium falciparum is responsible for the most severe malaria cases while *P. vivax* usually produces milder disease symptoms. However, the effects of *P. vivax* can still be severe, and recurrent episodes bring about significant increased risk of associated morbidity [4,5]. The clinical symptoms of uncomplicated malaria are usually nonspecific and include headache, exhaustion, fatigue, abdominal discomfort and body aches, which are usually followed by the classical signs of the disease, i.e., fever, chills, sweating, anorexia, vomiting and worsening malaise [6]. If diagnosis and treatment are delayed, especially for falciparum malaria, the patient may develop potentially life-threatening severe malaria within a few hours to a few days [7]. Severe malaria typically presents

with one or more of the following complications: cerebral malaria (coma), hypoglycaemia, metabolic acidosis, acute kidney failure, severe anaemia, or acute lung injury that can develop into acute respiratory distress syndrome in about 25% of cases [8]. If left untreated, severe malaria is mostly fatal. For example, the case fatality rate of treated cerebral malaria is usually 10-20% and can be as high as 50% in pregnant women [9].

Rainfall is an environment suitable for breeding and gathering mosquitoes [10].

The collection of water on the ground, and living close to a stream and/or a water pump were identified as significant risk factors for malarial infection in Yemen. People who lives in rural and some urban cities in Yemen using uncovered tanks, cement cisterns and smaller containers to store water which adds substantial risk and facilitates the breeding of mosquitoes and transmission of malaria [11].

Patients and Methods

This was a prospective study carried out in Al Gamhouria Teaching Hospital and a private clinic in Aden City Southwest of Yemen, 30 patients with malaria enrolled in this study some of them admitted to Department of Internal Medicine and Intensive Care Unit due to complications with emphasis on cerebral malaria, hepatic and renal impairment others being regularly followed-up through the private clinic over a period of one year, Between (June 2022 to June 2023).

Data gathered from patients and their relatives through questionnaire filled by medical residents in the hospital and by author in his private clinic, these data composed of the following sex, age, residency either urban or rural area, the symptoms and complicated presentation of the patient with emphasis on cerebral malaria, hepatic and renal impairment, and final outcome either recovered or died.

Symptoms and complications focused in this study were the following:

- 1- Fever.
- 2- Chills rigors.
- 3- Nausea and vomiting.
- 4- Cerebral malaria.
- 5- Hepatic impairment.
- 6- Renal impairment.

Fever which was defined as temperatures $>37.50^{\circ}\text{C}$ [12].

Cerebral malaria defined as Impaired consciousness (GCS <11 in adults), coma, seizures, while hepatic impairment defined as Bilirubin [$>3\text{mg/dl}$], aminotransferases $>40\text{U/L}$ and Renal impairment defined as creatinine [$>3.0\text{mg/dl}$] or urea $>20\text{mmol/l}$ [13].

The result was calculated manually, and presented as means, percentages and tables as appropriate.

Ethical consideration: Verbal informed consent was obtained from participating subjects or their relatives; the research and ethics committee in the Faculty of Medicine University of Aden approved the study design.

Results

A total of 30 patients enrolled in this study diagnose with malaria included complicated cases with emphasis on cerebral malaria, hepatic and renal impairment, their age ranged from 15 to 45 years, with a mean \pm SD age of 30 ± 15.2 years.

The sex distribution in Table (1) showed a prominence of male gender (83%) versus (17%) being female.

Table (2) showed maximum of patients belonging to the age group of (26-35) years (50%).

Table (3) revealed that (80 %) of subjects came from rural area, while (20 %) from urban area.

Table (4) demonstrated symptoms and complications, where fever (93%), and cerebral malaria (30%).

Table (5) revealed the outcome of subjects enrolled in this study (83%) of the subjects discharged alive and (17%) died.

Table (1): Distribution of patients according sex.

Sex	No. (%)
Male	25 (83%)
Female	5 (17%)

Table (2): Distribution of patients according age.

Age group (years)	No. (%)
15-25	10 (33%)
26-35	15 (50%)
36-45	5 (17%)

Table (3): Distribution of patients according residency.

Residency	No. (%)
Rural area	24 (80%)
Urban area	6 (20%)

Table (4): Distribution of patients according symptoms and complications.

Symptoms and complications	No. (%)
Fever	28 (93%)
Chills rigors	15 (50%)
Nausea and vomiting	11 (37%)
Cerebral malaria	9 (30%)
Hepatic impairment	5 (17%)
Renal impairment	4 (13%)

Patients had more than one symptoms and complication.

Table (5): Distribution of patients according outcome.

Outcome	No. (%)
Alive	25 (83%)
Dead	5 (17%)

Discussion

The study participants were predominantly male (83%), nearly close to the result found in Chery et al., study done in tertiary care centre in south western India in 2016 where male was (91.0%) [14] and Ngum et al., in Cameroon in 2023 where males also recorded a higher prevalence of malaria [15].

The study result was not in agreement with a cross-sectional study was conducted in 2017 at Port Sudan Ahlia College, included Forty-eight malaria patients, females were (56.2%) and males were (43.8%) [16].

The majority of malaria cases in this study were male, more likely because males spent most of the day outdoor for work so they are more exposed. While the Yemeni traditional dress used by female, which covers the whole body, makes them less exposed for mosquitos.

The Patients age enrolled in this study ranged from 15 to 45 years, with a mean \pm SD age of 30 ± 15.2 years. Close to the figure reached by Darraj study executed in jazan Region, Saudi Arabia in 2020 with a mean \pm SD, age of 29.2 ± 15.2 years [17].

The majority of malaria cases were related to 26-35 age group; close to result of the study,

included 439 patients visited Mizan Tepi University Teaching Hospital Southwest Ethiopia 2022.

Where, infection rate was highest in the 25-34 age group [18].

Malaria cases came from rural areas predominate over those came from urban areas (80% vs. 20%) respectively, approximated to result Reached by Adugna et al., study [19] in (2022) carried in Lake Tana and surrounding areas, northwest Ethiopia where urban area 19 (15%) Rural area 112 (85%) and to Abdul Salam et al., study carried in Yemen in 2010 where malaria cases came from rural area was (83%), and urban area (17%) [20].

Due to the high temperature and humidity in rural area, which make patients especially men and boys wearing light cloths, leaving arms and legs uncovered so exposed for mosquitos.

In addition, in rural area most of homes are built by mud, straw or woods and gaps within allows mosquito to get through inside the home.

Fever was the most common clinical features of malaria, this result was in agreement with Abosalif et al., study executed in Jazan Area, Kingdom of Saudi Arabia and published in 2019 [10].

The most common form of complicated malaria among the studied 30 patients was cerebral malaria composed (30%) close to the result reached by Sawsan Bakhubaira where among 77 patients recruited in her study executed in Aden in 2013 cerebral malaria composed (25.9%) [21].

Chaparro-Narváez et al., study performed in Colombia between 2007-2013 and published in malaria journal in 2016 [22] shown that hepatic and renal complications were the most common severe manifestations (63.6%), while in Darraj study in jazan Region, Saudi Arabia in 2020, Hepatic impairment constitutes (36%) of the complications [17].

(83%) of the cases enrolled in this study was alive during discharge while (17%) died similar to the results obtained Newton et al., study carried in 2003 western Thailand where 17% of malaria patients died (19 of 113 patients) [23].

This study result is greater than the result obtained by Chery et al., in southwestern India where there were six deaths among the 182 hospitalised malaria positive patients (3%) [14].

Recommendation: Due to the small size of the sample and the focused complications screened in this study, further studies with larger sample and other complications should be included which not covered in this study should be encouraged by health system in Yemen.

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الصورة السريرية والديموغرافية وحصيلة المخرجات لمرضى الملاريا البالغين بما فيها الحالات المعقدة مع التركيز على الملاريا الدماغية والتلف الكبدى والكلى المودعين مستشفى الجمهورية التعليمى والزائرين إحدى العيادات الخاصة فى مدينة عدن جنوب غرب اليمن

المقدمة : تشكل الملاريا تهديد بازر للصحة فى اليمن، وتعتبر من أكثر الأمراض المعدية المهددة للحياة شيوعاً وانتشار فى المناطق الاستوائية والمجاورة لها حيث تسبب معدلات وفاة وأمراض عالية.

الأهداف : قصدت الدراسة لوصف الصورة السريرية والديموغرافية وحصيلة المخرجات لمرضى الملاريا البالغين بما فيها الحالات المعقدة مع التركيز على الملاريا الدماغية والتلف الكبدى والكلى المودعين مستشفى الجمهورية التعليمى والزائرين إحدى العيادات الخاصة فى مدينة عدن جنوب غرب اليمن.

الأساليب : دراسة مستقبلية شملت ٣٠ مريض تجاوزت أعمارهم ١٥ عام أودعوا مستشفى الجمهورية التعليمى وزاروا إحدى العيادات الخاصة فى مدينة عدن جنوب غرب اليمن خلال فترة سنة من شهر مايو ٢٠٢٢ - مايو ٢٠٢٣، أستعمل اختبار التشخيص السريع لتشخيص الملاريا، أجرى الفحص السريرى وفحوصات مخبرية أخرى فى مستشفى الجمهورية والعيادة لإكتشاف مضاعفات الملاريا الوخيمة مع التركيز على الملاريا الدماغية والتلف الكبدى والكلى.

النتائج : ٣٠ مريض تم أدرجهم خلال فترة الدراسة، شكل الذكور نسبة (٨٣٪) بينما الأناث (١٧٪)، متوسط العمر (١٥.٢±٣٠) سنة ، انتمى (٥٠٪) من المرضى إلى الفئة العمرية (٢٦-٣٥) سنة، شكل القادمون من الريف (٨٠٪) والقادمون من المدينة (٢٠٪)، شكلت الحمى أكثر الأعراض شيوعاً بنسبة (٩٣٪)، والملاريا الدماغية الأكثر شيوعاً من المضاعفات (٣٠٪)، الحالات التى شفيت (٨٣٪) والحالات المتوفاة (١٧٪).

الخلاصة : خلصت الدراسة أن أغلبية المرضى كانوا من الذكور القادمين من الريف، شكلت الحمى أكثر الأعراض شيوعاً، بينما الملاريا الدماغية أكثر مضاعفة شيوعاً.