Clinical Presentation and Laboratory Investigation in Malaria Diagnosis and Use of Prevention Methods in the Patient Attending Kumur ALgaaleen Health Center, Gezira State, Sudan (April 2013)

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MBBs., Omdurman Islamic University (2002)

A Dissertation

Submitted to the University of Gezira in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science in

Family Medicine

Department of Community and Family Medicine

Faculty of Medicine

August, 2013
Audit of the First Antenatal Care Visit in Banat Health Center, Wad Medani, Gezira State, Sudan (2012)

Eman Abdel Muniem Mohammed Abbas

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Date: August/ 2013
Audit of the First Antenatal Care Visit in *Banat Health Center, Wad Medani, Gezira State, Sudan* (2012)

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Date of Examination: August/ 2013
Dedication

To my family for their support

To the soul of my college Mardi Elamin
Acknowledgement

I express my deep sense of gratitude & heartfelt thanks to prof. Samirahamid for her inspiring guidance.

I’m also grateful to the staff in Kumur Algaaleen health centre.

I’m also grateful my family and my friends.
Clinical Presentation and Laboratory Investigation in Malaria Diagnosis and Use of Prevention Methods in the Patient Attending Kumur ALgaaleen Health Center, Gezira State, Sudan (April 2013)

Ehab Elagib Ibrahim Mohammed

Abstract

Malaria disease lethal transmitted to humans through mosquito bites, and spread in about 100 countries in the world and there are about 40% of the world's population are at risk of malaria, and is considered as one of the most important health problems in Sudan that were not the most important of all, causing many deaths mothers and children. The study aims to find out and disperse the cases of malaria diagnosis microscropy of all cases reported in Alkumur health center and identified the type of parasite during the month of April 2013, it is descriptive study, done on 100 patients present to the health center during that period, where the information was collected using a questionnaire containing demographic information, complaint of patients, clinical findings, the result of microroscopic examination, the uses of methods of prevention and behavior of patients towards similar illness within four weeks ago from the date of the study, results showed 39% males 61% females, 9% of pregnant women used anti malaria prophylaxis during pregnancy, 96% attending with fever, 44% attending with headache, laboratory examination showed appositive 33%. As a result of which 85% of the type of falciprum species, 79% ring stage and 21% gametocyte. Also there was 80% of patients used the methods of prevention and the majority were nets 85%, exposure to the similar illness within four weeks ago was 93% and the behavior of patients towards those 70% of them took the medical drug by themselves without refer to a doctor and fansidar is mostly 90%. Study recommended the need for education health and raise the quality of health services and continuity of this kind of studies.
الأعراض السريرية والفحص المعملي في تشخيص الملاريا واتباع أساليب الوقاية بين المترشدين على مركز صحي الكمر الجعليين، ولاية الجزيرة، السودان (أبريل 2013 م)

إيهاب العاقب إبراهيم محمد

ملخص الدراسة

الملاريا من الأمراض الفتاكة التي تنتقل إلى البشر من خلال لدغات البعوض ، وهي من الأمراض التي تم اكتشافها في أواخر القرن التاسع عشر الميلادي، وتنتشر في حوالي مائة دولة في العالم وننالك حوالي 40% من سكان العالم معرضون لخطر الملاريا، وتعتبر من أهم المشاكل الصحية في السودان إن لم تكون أمراً على الإطلاق، وخاصة في مناطق المشاريع الخروجية متصلة في عدد من ولايات الأمم والبنات والبشر وتقليلة عينة الإنتاج لها كان لابد لنا من دراسة مشكلة الملاريا كأحد مهمات الطبيب الأسرية للتأكد من المشاكل الصحية وصياح طرق المعالجة والوقاية منها. تهدف الدراسة إلى معرفة وتبديل حالات الملاريا بالتشخيص المجهري من كل حالات التبليغ الذاتي للملاريا من المترشدين على مركز صحي الكمر الجعليين وتحديد نوع الطفول خلال فترة شهر أبريل 2013م. تم دراسة وصفية على عدد 100 متردد على مركز صحي الكمر الجعليين خلال شهر أبريل 2013م. تم خلالها معرفة معلومات ديموغرافية عنهم وعلاقتهم السريرية والتشخيص المجهري، وكذلك تم سؤالهم عن أساليب الوقاية ضد الملاريا. أظهرت النتائج نسبة 39% من الذكور 61% من الإناث، 9% من الحوامل يستعملن مضادات الملاريا كوقاية إثناء الحمل، 96% من المرضى حضروا بشكرى حمي، 44% حضروا بشكرى صداع، الجسم المعتمي أظهر 33% نتائج موجبة، منها 85% من نوع القاسيم، و79% الطور الحلو 21% طور الجامبوت سايت. كذلك، وجد أن هناك 80% اتبعوا أساليب الوقاية والعلاجية كانت النمط الريه المتبادلة والعرض لرؤية مماثلة خلال أربعية أسابيع مضت كانت بنسبة 93%， وسلوك المرضى تجاها للفيروس 70% منهم تنزلوا عقار طبي دون اللجوء إلى استشارة طبي والفنلادار هو الأغلب بنسبة 90%.

أوصت الدراسة بضرورة التثقيف الصحي ورفع جودة الخدمات الصحية المقدمة واستمرارية مثل هذا النوع من الدراسات.

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Introduction

Historical Background: Malaria is one of the oldest diseases known to man. It is believed that it may have infected humans for 50,000 years, and to have been a human pathogen through this entire period (1). Historians and archaeologists have found evidence of the disease’s existence in the Xian Dynasty and Medieval Europe (2). The linguistic origin of the word “malaria” stems from medieval Italian “Mala aria” meaning “bad air”, since it was believed to be caused by putrid marsh air (3).

The parasite of malaria was first viewed inside red blood cells by a French doctor working in the army stationed in Algeria in 1880, his name was Charles Laveran. Laveran was also the first to propose the notion of protozoa as causes of disease. He later received the Nobel Prize for his discovery. In 1898, proof that malaria was transmitted by mosquitoes was finally established by Sir Ronald Ross, a physician in the British army in India. He was able to isolate the malaria parasite from the salivary glands of mosquitoes that bite malaria infected birds and then transmit the parasite to healthy birds. Sir Ross won the Nobel Prize in 1902 (4).

The process of control and prevention of malaria in the United States began in 1914, when the US Public Health Service (USPHS) petitioned the congress for funds for anti-malaria efforts. The funds granted to the service were used establish malaria control activities all over the US and even the military bases located in high risk regions in the southern US to ensure continuous training of soldiers in those areas (5).

Epidemiology: According to the World Health Organization (WHO), malaria causes 300 to 500 million illnesses and one million deaths worldwide every year. Most of these are among children less than 5 years old. This puts 40 percent of the world’s population at risk (6). Developing countries are hardest hit, especially sub-Saharan Africa, South and Southeastern Asia, Oceania and Haiti, where P.falciparum malaria prevails. P.vivax is prevalent in India, the middle east and Central America. Though much less frequent in the United States, malaria cases do occur. According to the Centers of disease Control and Prevention (CDC), 1337 malaria cases were diagnosed in 2002, almost all of which were linked to travel to endemic areas (7). Since 1986, only one outbreak of malaria occurred in the US. This was in west palm beach, Florida, in
2003, where seven cases of vivax malaria were diagnosed in unexposed individuals. (8) There is a rising trend in malaria infection in recent years, proposed reasons include:

Emergence of treatment resistant parasites

• Resistance of anopheles mosquitoes to common insecticides

• Global warming and associated climate changes

• Globalization and international tourism to malaria endemic areas.

The WHO estimated that by the end of 2004, 107 countries were at risk of malaria transmission. People living in these at risk areas are estimated around 3.2 billion. (9) Falciparum malaria is implicated in over one million fatalities annually. It also is a secondary cause of many deaths mostly in young children through a synergistic effect with other infections.

In malaria-endemic countries, transmission is highest in rural areas. Although seasonal variations exist, the highest rates of disease transmission are seen towards the end of the rainy season. However, higher altitudes are associated with less disease transmission. The highest rates of malaria transmission globally are found in Oceania and sub-Saharan Africa, followed by the Indian subcontinent, southeast Asia, south America and central America. (10)

Sub-Saharan Africa is burdened by the heaviest toll of malaria globally with 60 percent of cases, 75 percent of falciparum malaria cases, and 80 percent of deaths worldwide occurring in this region. Falciparum is the leading species of malaria infection in sub-Saharan Africa and causes 18 percent of deaths in children under five. (11) who Malaria is a leading etiology of anemia both in children and pregnant women, as well as low birth weight, premature babies and infant mortality.

Around 30000 people from developed countries contract malaria due to travel to endemic areas annually. The risk of transmission is affected by many factors, most importantly the amount of disease transmission in the region, and whether the individual received prophylactic drugs or not. The risk of acquiring malaria for exposed individuals by region is

• Oceania — 1:30 or higher

• Sub-Saharan Africa — 1:50
• Indian subcontinent — 1:250
• Southeast Asia — 1:1,000

Pathophysiology

*Further information: Plasmodium falciparum biology*

Micrograph of a placenta from a stillbirth due to maternal malaria. H&E stain. Red blood cells are a nuclear; blue/black staining in bright red structures (red blood cells) indicate foreign nuclei from the parasites.

Malaria infection develops via two phases: one that involves the liver (exoerythrocytic phase), and one that involves red blood cells, or erythrocytes (erythrocytic phase). When an infected mosquito pierces a person's skin to take a blood meal, sporozoites in the mosquito's saliva enter the bloodstream and migrate to the liver where they infect hepatocytes, multiplying asexually and asymptptomatically for a period of 8–30 days.[25]

After a potential dormant period in the liver, these organisms differentiate to yield thousands of merozoites, which, following rupture of their host cells, escape into the blood and infect red blood cells to begin the erythrocytic stage of the life cycle.[25] The parasite escapes from the liver undetected by wrapping itself in the cell membrane of the infected host liver cell.[26]

Within the red blood cells, the parasites multiply further, again asexually, periodically breaking out of their host cells to invade fresh red blood cells. Several such amplification cycles occur. Thus, classical descriptions of waves of fever arise from simultaneous waves of merozoites escaping and infecting red blood cells.[25]
Some *P. vivax* sporozoites do not immediately develop into exoerythrocytic-phase merozoites, but instead produce hypnozoites that remain dormant for periods ranging from several months (7–10 months is typical) to several years. After a period of dormancy, they reactivate and produce merozoites. Hypnozoites are responsible for long incubation and late relapses in *P. vivax* infections,[23] although their existence in *P. ovale* is uncertain.[27]

The parasite is relatively protected from attack by the body's immune system because for most of its human life cycle it resides within the liver and blood cells and is relatively invisible to immune surveillance. However, circulating infected blood cells are destroyed in the spleen. To avoid this fate, the *P. falciparum* parasite displays adhesive proteins on the surface of the infected blood cells, causing the blood cells to stick to the walls of small blood vessels, thereby sequestering the parasite from passage through the general circulation and the spleen.[28] The blockage of the microvasculature causes symptoms such as in placental malaria.[29] Sequestered red blood cells can breach the blood–brain barrier and cause cerebral malaria.[30]

Although the red blood cell surface adhesive proteins (called PfEMP1, for *P. falciparum* erythrocyte membrane protein 1) are exposed to the immune system, they do not serve as good immune targets because of their extreme diversity; there are at least 60 variations of the protein within a single parasite and even more variants within whole parasite populations. The parasite switches through a broad repertoire of PfEMP1 surface proteins, thereby avoiding detection by protective antibodies.[31]

**Genetic resistance**

*Main article: Genetic resistance to malaria*

Due to the high levels of mortality and morbidity caused by malaria—especially the *P. falciparum* species—it has placed the greatest selective pressure on the human genome in recent history. Several genetic factors provide some resistance to it including sickle cell trait, thalassaemia traits, glucose-6-phosphate dehydrogenase deficiency, and the absence of Duffy antigens on red blood cells.[32][33]

The impact of sickle cell trait on malaria immunity is of particular interest. Sickle cell trait causes a defect in the hemoglobin molecule in the blood. Instead of retaining the biconcave shape of a normal red blood cell, the modified hemoglobin S molecule causes the cell to sickle or
distort into a curved shape. Due to the sickle shape, the molecule is not as effective in taking or releasing oxygen. Infection causes red cells to sickle more, and so they are removed from circulation sooner. This reduces the frequency with which malaria parasites complete their life cycle in the cell. Individuals who are homozygous (with two copies of the abnormal hemoglobin beta allele) have sickle-cell anemia, while those who are heterozygous (with one abnormal allele and one normal allele) experience resistance to malaria. Although the shorter life expectancy for those with the homozygous condition seems to be unfavorable to the trait's survival, the trait is preserved because of the benefits provided by the heterozygous form.\[33]\[34]

**Liver dysfunction**

Liver dysfunction as a result of malaria is rare and is usually a result of a coexisting liver condition such as viral hepatitis or chronic liver disease. The syndrome is sometimes called malarial hepatitis, although inflammation of the liver (hepatitis) does not actually occur. While traditionally considered a rare occurrence, malarial hepatopathy has seen an increase, particularly in Southeast Asia and India. Liver compromise in people with malaria correlates with a greater likelihood of complications and death.\[35]\n
**Diagnosis**

*Main article: Diagnosis of malaria*

The blood film is the gold standard for malaria diagnosis.
Ring-forms and gametocytes of *Plasmodium falciparum* in human blood. Approximately 30% of people will no longer have a fever upon arriving to a health care facility. Owing to the non-specific nature of the presentation, diagnosis of malaria in non-endemic areas requires a high degree of suspicion, which might be elicited by any of the following: recent travel history, enlarged spleen, fever without localizing signs, low platelets, and hyperbilirubinemia combined with a normal peripheral blood leukocyte count. \[^3\]

Malaria is usually confirmed by the microscopic examination of blood films or by antigen-based rapid diagnostic tests (RDT).\[^{36,37}\] Microscopy is the most commonly used method to detect the malarial parasite—about 165 million blood films were examined for malaria in 2010.\[^{38}\] Despite its widespread usage, diagnosis by microscopy suffers from two main drawbacks: many settings (especially rural) are not equipped to perform the test, and the accuracy of the results depends on both the skill of the person examining the blood film and the levels of the parasite in the blood. The sensitivity of blood films ranges from 75–90% in optimum conditions, to as low as 50%. Commercially available RDTs are often more accurate than blood films at predicting the presence of malaria parasites, but they are widely variable in diagnostic sensitivity and specificity depending on manufacturer, and are unable to tell how many parasites are present.\[^{38}\] In regions where laboratory tests are readily available, malaria should be suspected, and tested for, in any unwell patient who has been in an area where malaria is endemic. In areas that cannot afford laboratory diagnostic tests, it has become routine to use only a history of subjective fever as the indication to treat for malaria—a presumptive approach exemplified by the common teaching "fever equals malaria unless proven otherwise". A drawback of this practice is overdiagnosis of malaria and mismanagement of non-malarial fever,
which wastes limited resources, erodes confidence in the health care system, and contributes to drug resistance.\textsuperscript{[39]} Although polymerase chain reaction-based tests have been developed, these are not widely implemented in malaria-endemic regions as of 2012, due to their complexity.\textsuperscript{[31]}

**Classification**

Malaria is classified into either "severe" or "uncomplicated" by the World Health Organization (WHO).\textsuperscript{[33]} It is deemed severe when *any* of the following criteria are present, otherwise it is considered uncomplicated.\textsuperscript{[40]}

- Decreased consciousness
- Significant weakness such that the person is unable to walk
- Inability to feed
- Two or more *convulsions*
- Low blood pressure (less than 70 mmHg in adults and 50 mmHg in children)
- Breathing problems
- Circulatory shock
- Kidney failure or hemoglobin in the urine
- Bleeding problems, or hemoglobin less than 50 g/L (5 g/dL)
- Pulmonary edema
- Blood glucose less than 2.2 mmol/L (40 mg/dL)
- Acidosis or lactate levels of greater than 5 mmol/L
- A parasite level in the blood of greater than 100,000 per microlitre (µL) in low-intensity transmission areas, or 250,000 per µL in high-intensity transmission areas

Cerebral malaria is defined as a severe *P. falciparum*-malaria presenting with neurological symptoms, including coma (with a Glasgow coma scale less than 11, or a Blantyre coma scale greater than 3), or with a coma that lasts longer than 30 minutes after a seizure.\textsuperscript{[41]}
Objectives

General objectives

To study Malaria cases presentation, diagnosis, used of prevention methods in attending patients to the health center.

Specific objectives

1- To determine the proportion of malaria cases (diagnosed by microscopy) from patients self reported as malaria.
2- To determine the proportion of different malaria species among diagnosed cases.
3- To determine the clinical presentations of diagnosed malaria cases.
4- To identify the magnitude of malaria utilization of self preventive measures.
5- To identify health seeking behaviors of patients who reported malaria like illness during the 4 weeks preceding the study.
Chapter (2)

Literature Review

Malaria remains one of the most widespread infectious diseases of humankind, threatening approximately half the world’s population and causing debilitating illness in more than 216 million people. Morbidity and mortality is particularly high in sub-Saharan Africa, with children below five years at the greatest risk [1]. Plasmodium falciparum, the deadliest of the malaria parasite species, kills a child every 30 seconds in Africa [2] and also wreaks significant economic havoc in highly endemic areas, substantially decreasing Gross Domestic Product (GDP) of affected countries relative to malaria-free regions [3].

In endemic areas, malaria accounts for 25–35% of all outpatients’ visits, 20–45% of hospital admissions and 15–35% of hospital deaths [4]. The clinical spectrum of pediatric P. falciparum infections range from asymptomatic parasite carriage to a febrile disease that may develop into severe, life-threatening illness [5]. Mortality from malaria is associated largely with the parasite’s ability to induce severe complications, presenting as severe anemia, cerebral malaria and metabolic acidosis, manifested clinically as respiratory distress. Other severe malaria manifestations at enrolment include multiple or prolonged convulsions, hyperlactataemia, hyperparasitaemia, hypoglycemia, hyperpyrexia and intravascular haemolysis [6,7].

The factors that determine malaria severity are not completely understood. Despite the scaling up of the provision of insecticide-treated nets and the increasing use of the most rapidly parasitical artemisinin derivatives [8,9], the risk of and mortality from malaria still remain significantly high [1,2]. Studies on factors associated with increased risk of developing severe malaria and death, may provide additional understanding of the course of severe malaria, and, eventually, lead to improved case management, and the development of drugs and vaccines for malaria.

Studies on paediatric malaria in Cameroon are limited [10] and although several studies, at various settings in Africa, have attempted to delineate the epidemiology of clinical malaria, the data have shown significant variability across various transmission zones [6,7,11-14]. Nevertheless, severe malaria features may change according to a number of factors including the genetic characteristics of the population, malaria epidemiology, health-seeking behavior, non-malaria co-morbidity, clinical assessment and local case management [14]. There is, therefore, a need for more site-specific data in order to appreciate the complete clinical and epidemiological
picture needed for efficient testing of candidate malaria vaccines and other control tools in different endemic sites. Furthermore, how the peripheral parasite density varies with transmission or influences the different types of manifestations of specific clinical features is poorly described [13].

A hospital-based study was, therefore, undertaken to determine the factors that account for different clinical outcomes of malaria as well as its relationship with ethnicity, transmission intensity and parasite density in young children from three regions with distinct ecological conditions across Cameroon. The prevalence of the clinical phenotypes in hospitals was used as a proxy measure, although malaria disease patterns related to transmission are best studied using incidence data [15]. To describe the clinical characteristics, laboratory parameters and prognostic factors in patients with falciparum malaria (FM) with jaundice. METHODS: A cross-sectional comparative study was conducted at the Department of Medicine, medical unit II, Jinnah Postgraduate Medical Centre, Karachi. Adult patients with jaundice and smear positive plasmodium falciparum infection, who fulfilled the inclusion criteria were selected for the study from amongst all cases of FM who presented during the study period. Patients were divided in to two groups on the basis of rising bilirubin and adverse outcome. The data was analyzed on SPSS ver 12. Results were expressed as, percentages, mean and standard deviations. P-value < 0.05 was taken as significant. RESULTS: Among 76 patients of FM, 35 (46.05%) developed jaundice. Fifteen (42.86%) patients had bilirubin 3-10 mg/dl while 20 (57.14%) had bilirubin > 10 mg/dl. Comparative analysis of the groups showed that elevation of ALT and AST was modest in comparison with conjugated hyperbilirubinaemia while prolonged duration of illness impaired consciousness, hepatomegaly, acute renal failure with deranged renal parameters, low platelet counts and high parasite density were significantly associated with rising bilirubin and adverse outcome. Twenty-one (60%) patients recovered completely while 14(40%) succumbed to the disease.

CONCLUSION: FM is one of the causes of severe jaundice in adults in this part of the world. This presentation of complicated FM needs to be recognized globally in order to institute prompt and specific therapy. Delayed diagnosis and inappropriate treatment is the leading cause of complications and increased mortality in FM.[1] A descriptive study on the clinical presentation of childhood malaria was conducted in Savannakhet Province, Lao People's Democratic Republic. It is aimed to describe the clinical features and to determine the association between the severity of malaria and the initiation or delay of treatment. A total number of 92 children 1-14 years of age with confirmed malaria diseases were enrolled in this study. Fifty-six cases
(60.9%) had illness for less than 3 days before hospitalized and 36 cases (39.1%) for more than 3 days. Twenty-nine cases (31.5%) had self antimalarial medication before admission (9 cases of chloroquine, 16 cases of quinine and 4 cases of artesunate). Ten cases (10.9%) had abnormal consciousness of which 7 cases (7.6%) had confusion but responded to verbal command and 3 cases (3.3%) were in coma not respond to painful stimuli but had reflex. Two cases (2.2%) had convulsions, 11 cases (12.0%) had dehydration, 47 cases (51.1%) had vomiting, 18 cases (19.6%) had hepatomegaly and 19 cases (20.7%) had splenomegaly. There was a statistically significant association between consciousness levels and the duration of illness before admission < or = 3 days and > 3 days (p = 0.01) while there is no significant difference between parasitemia density and the duration of illness before admission (p > 0.05).[2] The objectives of this retrospective study were to describe initial clinical profiles and subsequent outcome of adult patients in France who were diagnosed with severe imported malaria, as defined by the World Health Organization (WHO). Forty-two patients diagnosed from 1996 to 2002 were included (median age: 30 years, men: 78%, non-immune persons: 74%, return from Africa: 100%, inappropriate antimalarial chemoprophylaxis: 95%). At the time of hospital admission, jaundice (62%), hyperparasitemia (56%), and prostration (52%) were the most frequent findings, followed by acute renal failure (31%). Other findings, as described by the WHO criteria, were less common. Twenty-three patients presented only with jaundice, hyperparasitemia, or prostration in isolation, or in combination. Of these 23, five non-immune persons subsequently developed coma, shock, acute respiratory distress syndrome or acute renal failure; this led to death in 2 of these cases. This suggests that non-immune persons with imported malaria who present with jaundice, hyperparasitemia, or prostration should be admitted to the intensive care unit for close monitoring.[3]
Material and methods

Study Design:

This across sectional descriptive facility base study, conducted at KumurALgaaleen health centre in April 2013.

Study area

KumurALgaaleen area located in Gezira state, total number of population (5000) about (25kilo meter) west Wad medani city, different tribes living the area. Most houses are of old fashion, most of peoples work as farmers.

KumurALgaaleen health center:

The oldest health center build in that area, rebuild on 2002, consist of 11 rooms. The medical stuff consist family doctor, lab teq., nurse, medical assistant, lab assistant, pharmacist, midwife and others.

Sample Size:

100 cases attending KumurALgaaleen health center in April 2013.

Sample Technique:

Random sample from 100 case attend health center.

Data collection tools:

1/Questionnaire:

*Demographic data (sex – age – education level).

*Data about pregnant women, gestational age and number of parity.

*Data about used of chemical prevention methods in pregnancy period.

*Clinical presentations.

*Clinical findings.

*Laboratory results.
*Final diagnosis.

*Attitude of patients among used of prevention methods of malaria.

*Questionnaire done by direct interview with patients after permission was taken, interview took about 10 to 20 min.

2/ Interviews:

* Interviews with old peoples lives in the area to collect data about the area, health center.
Chapter (4)

Results

Results of studying 100 cases attending KumurALgaaleen health center:

Age:

Less than 5 years 30%, 5 – 14 was 12%, more than 14 years 58% (table 1)

Sex:

Males 39%, females 61% (figure 3)

Education level:

Literacy 15%, primary 55%, secondary 18%, university 12% (table 2)

Pregnant women:

All pregnant are 82%, 26% in 1st trimester, 35% in 2nd trimester, 21% in 3rd trimester (table 4)

Used of chemical malaria prevention during pregnancy:

Used 9%, not used 91% (table 5)

Clinical presentation:

Fever: present in 96%, not present in 4%.

Headache: present in 44%, not in 56%.

Jaundice: not present in patients.

Skin rash: in 4% present, not in 96%.

Sore throat: present in 12%, 88% not.

Convulsions: 1% present, 99% not.

Coma: not present.

Fatigue: 12% present, 88% not.

Anxiety: 3% present, 97% not.
Urinary symptoms: 13% suffer from it, 87% not.

GIT symptoms: 10% suffer, 90% not.

Cough: 18% suffer, 82% not (table 6)

Diagnosis made by patient:

90% of patients present thinking they have malaria (table 7).

Clinical examination:

Temp. less than 37 was 10%.

37 – less than 38 was 80%.

More than 38 was 10% (table 8).

Pallor: present in 2%.

Jaundice: present in 2%.

Alert: present in 92%.

Confused: 3% are confused.

Coma: only 1% are comatose (table 9).

Laboratory result:

1/ Malaria microscopic exam: 33% positive, 67% negative (table 10).

2/ Spices: falciparum 85%, vivax 15% (table 11).

3/ Stage: gametocyte 21%, ring stage 79% (figure 12).

Final diagnosis:

Malaria 33%.

Others 67% (table 13).

Used of prevention methods:

Yes 80%, No 20% (table 14).
Types:
Nets 85%, chemical drugs 0%, others 15% (figure 15)

Exposure to similar episodes in last 4 weeks:
Yes 93%, No 7% (table 16)

What action happened:
Visit health center 7%.
Visit private clinic 3%.
Visit local healer 20%.
Took medication with him/her self 70% (table 17)

Types of medication:
Fansidar 90%.
Artesunate 2%.
Artemether injections 3%.
Antibiotics 5% (table 18)

Table (1) Age

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<td>30</td>
<td>%30</td>
</tr>
<tr>
<td>5 – less than 14</td>
<td>12</td>
<td>%12</td>
</tr>
<tr>
<td>Above 14</td>
<td>58</td>
<td>%58</td>
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<td>Total</td>
<td>100</td>
<td>%100</td>
</tr>
</tbody>
</table>
Table (2) Education level

<table>
<thead>
<tr>
<th>Education level</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>literacy</td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td>primary</td>
<td>55</td>
<td>55%</td>
</tr>
<tr>
<td>secondary</td>
<td>18</td>
<td>18%</td>
</tr>
<tr>
<td>university</td>
<td>12</td>
<td>12%</td>
</tr>
<tr>
<td>total</td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure (3) sex
### Table (4) gestational age

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; trimester</td>
<td>15</td>
<td>26%</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; trimester</td>
<td>20</td>
<td>35%</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; trimester</td>
<td>12</td>
<td>21%</td>
</tr>
<tr>
<td>Parity</td>
<td>10</td>
<td>18%</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table (5) malaria prevention during pregnancy

<table>
<thead>
<tr>
<th></th>
<th>frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>%9</td>
</tr>
<tr>
<td>No</td>
<td>91</td>
<td>%91</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>%100</td>
</tr>
</tbody>
</table>
### Table (6) clinical presentation

<table>
<thead>
<tr>
<th>Symptom</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>96</td>
<td>4</td>
</tr>
<tr>
<td>Headache</td>
<td>44</td>
<td>56</td>
</tr>
<tr>
<td>Jaundice</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Skin rash</td>
<td>4</td>
<td>96</td>
</tr>
<tr>
<td>Sore throat</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Convulsion</td>
<td>1</td>
<td>99</td>
</tr>
<tr>
<td>Coma</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Fatigue</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Anxiety</td>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>Urinary symptom</td>
<td>13</td>
<td>87</td>
</tr>
<tr>
<td>GIT symptom</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>Cough</td>
<td>18</td>
<td>82</td>
</tr>
</tbody>
</table>

### Table (7) diagnosis by patient

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>90</td>
<td>%90</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>%10</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>%100</td>
</tr>
</tbody>
</table>
Table (9) clinical finding

<table>
<thead>
<tr>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallor</td>
<td>2</td>
</tr>
<tr>
<td>Jaundice</td>
<td>2</td>
</tr>
<tr>
<td>Alert</td>
<td>92</td>
</tr>
<tr>
<td>Confusion</td>
<td>3</td>
</tr>
<tr>
<td>Coma</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>
Table (10) malaria microscopic result

<table>
<thead>
<tr>
<th>Result</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Ve</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>_ Ve</td>
<td>67</td>
<td>67</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table (11) spices

<table>
<thead>
<tr>
<th>Spices</th>
<th>frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falciprum</td>
<td>28</td>
<td>85%</td>
</tr>
<tr>
<td>Vivax</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure (12) stage
Table (13) Final diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
</table>
| Malaria   | 33        | 33%
| Other     | 67        | 67%
| Total     | 100       | 100%

Table (14) Malaria prevention methods use

<table>
<thead>
<tr>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>80 %80</td>
</tr>
<tr>
<td>NO</td>
<td>20 %20</td>
</tr>
<tr>
<td>Total</td>
<td>100 %100</td>
</tr>
</tbody>
</table>
Figure (15) Methods type

Table (16) Exposure to similar episodes 4 weeks ago?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>93</td>
<td>93</td>
</tr>
<tr>
<td>NO</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
### Table (17) Action

<table>
<thead>
<tr>
<th>Action</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit health center</td>
<td>7</td>
<td>7%</td>
</tr>
<tr>
<td>Visit private clinic</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>Visit local healer</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>Home self medication</td>
<td>70</td>
<td>70%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table (18) Home self medication

<table>
<thead>
<tr>
<th>Medication</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fansidar</td>
<td>90</td>
<td>90%</td>
</tr>
<tr>
<td>Artesunate</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Artemether inj.</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>5</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>
chapter (5)

Discussion

*High patients attending in the sample was age group above 14 , then child group below 5 year , this group easy to get complicated malaria, malaria can contribute to death in young children:

1/An overwhelming acute infection , which frequently presents as seizures or coma (cerebral malaria), may kill a child directly and quickly.

2/ Repeated malaria infections contribute to the development of severe anaemia, which substantially increases the risk of death.

3/ Low birth weight- frequently the consequence of malaria infection in pregnant women- is the major risk factor for death in first month of life. In addition repeated malaria infections make young children more susceptible to other common child hood illnesses, such as diarrhea and respiratory infections, and thus contribute indirectly to mortality.

*Females was highly attending than males , pregnant women was high in females attending also children below 5 years, these tow groups are more exposure to severe malaria.

In the Sudan each year more than 1.2 million women become pregnant, of those 750,000 are in areas with high malaria transmission, intense perennial, high seasonal transmission or in areas of irrigation. about 10,000 maternal deaths/year and 35% of preventable low birth weight. Best practices of malaria control during pregnancy include:

1/ Effective management of malaria cases for women in the reproductive age.

2/Using of insecticide treated nets.

3/ Adoption of intermittent preventive treatment with fansidar (SP).

Malaria in pregnancy: (MIP)

*The mortality and morbidity of MIP is higher than in non pregnant women. The risk is even more increased in primigravidae.
*There is evidence of maternal immune-suppression in the second half of pregnancy which caused by many factors (hormonal, placental and lymphocytic) in addition to malaria infection itself.

*Reduced immunity to malaria in pregnancy leads to more relapses of malaria and more parasitaemia and so worsens clinical manifestations.

* Falciparum is the commonest malaria infection and can lead to acute renal failure, pulmonary edema or cerebral malaria with convulsions and coma.

*Transplacental infection to fetus can occur.

*The risks of MIP are high so prompt chemotherapy for malaria is mandatory.

Prophlactivechemotherapy byfansidar in pregnancy tow doses, the first after fetus started movement and second after one month.

*Most of attending patients suffer from fever associated with others symptoms like sore throat, headache, fatigue and this can manifested other disease rather than malaria.

*Health education to patient they think that all fever is malaria.

*Most malaria cases due to P.falcipram.

*Most of attending used nets we must prove that behavior.

*Most of attending had wrong believe that every fever is malaria and they treat themselves according that without seek medical advice.
chapter (6)

Conclusion

* Malaria disease is big problem in our area, that need more activities, participation of all to roll back malaria.

* Economic problems leads to presence of wrong community practices like taking medication without medical prescription.

* Improve our health services, continuity of services, quality, quantity and cheap services lead to healthy community.
Recommendations

*Community health education about malaria disease and other health problems.

*Improved health services.

*Health services audit.

*Increased health insurance services to decreased cost effectiveness.

*Medical staff training.

*Increased health prevention activities.

*Community participation to eradicate endemic diseases.

*Support family medicine programs to build good health strategy.

*Support like this studies to detection of our health problems.
Reference

*The national protocol for treatment of malaria (Sudan, June 2004).


*Bloland, Peter B., Drug Resistance in Malaria, (WHO: Geneva, 2001)


*Garnham, P.C.C., Malaria parasites and other haemosporidia, (Blackwell: Oxford, [c1966])

*Prothero, R. Mansell, Migrants and malaria in Africa (University of Pittsburgh: Pittsburgh, 1965)

Appendix

Questionnaire

**Age**: less than 5 year ( ) 5 to less than 14 ( ) more than 14 ( )

**Sex**: male( ) female ( )

**Education level**: literacy ( ) primary ( ) secondary ( ) university ( )

**IF PREGNANT**: gestational age: 1 st trimester( ) 2 nd ( ) 3 rd ( ) parity( )

**Used of chemoprophlactic during pregnancy**: Yes ( ) No ( )

**Clinical presentation**: fever ( ) headache( ) jaundice( ) skin rash ( ) sore throat ( )

Convulsion( ) coma ( ) fatigue ( ) anxiety ( ) GIT symptoms ( ) cough ( )

Urinary symptoms ( )

**Diagnosis by patient**: malaria ( ) other disease ( )

**Clinical finding**: Temp. less than 37 ( ) 37 – less than 38 ( ) more than 38 ( )

Pallor ( ) Jaundice ( ) Alert ( ) Confused ( ) Coma ( )

**LAB. results**: microscopic exam by gemsa stain: + Ve ( ) - Ve ( )

**Spices**: P. falciparum ( ) Vivax ( )

**Stages**: Ring stage ( ) gametocyte ( )

**Final diagnosis**: Malaria ( ) Other disease ( )

**Used of prevention methods**: Yes ( ) No ( )

**If yes type of methods**: Mosquito Nets ( ) Chemo therapy ( ) Others ( )

**Exposure to similar episodes in last 4 weeks**: Yes ( ) No ( )

**If yes what action done**: Visit health center ( ) Visit local healer ( ) Visit private clinic ( )

Taking home medication by him/ her self ( )

**Type of medication**: Fansidar ( ) Artesunate ( ) Artemether inj. ( ) Antibiotics ( )