



Epidemiological, Diagnostic, and Therapeutic Facies of Malaria in Outpatient Medicine at NTHC-HKM

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Abstract: Malaria is an endemic parasitosis caused by plasmodium. The objective was to evaluate the epidemiological, diagnostic, and therapeutic profile of malaria in outpatient medicine at the NTHC-HKM of Cotonou. This is a cross-sectional and descriptive study, having covered a period of 11 years and 3 months (1/01/2010 to 31/03/2021). Patients who consulted the outpatient clinic of the NTHC-HKM of Cotonou during the study period were included. The diagnosis of malaria was made on the basis of a positive parasite density thick drop. Over 41,960 patients consulted during the period, 95 had malaria, a hospital incidence of 0.2%. Forty-seven patients (49.5%) were male. The mean age was 36.8 ± 14.3 years. The main symptoms were fever in 81 patients (85.2%), asthenia in 45 patients (47.3%) and arthromyalgia in 42 patients (44.2%). Clinically, the general condition was preserved in 61 patients (64.2%), pallor was noted in 4 patients (4.2%) and icterus in 2 patients (2.1%). Hepatomegaly was found in 2 patients (2.1%) and splenomegaly in 1 (1.0%). Biologically, anemia was found in 11 patients (11.6%). CRP was elevated in 10 patients (10.5%). Parasite density varied between 1,200-75,000 red blood cells per microliter. Therapeutically, 45 patients (47.3%) had taken self-medication before diagnosis. All diagnosed patients had been treated. Simple malaria is a pathology rarely encountered in adults in outpatient clinics.

Keywords: NTHC-HKM, Malaria, Outpatient Medicine

1. Introduction

Malaria is the most common parasitic disease in the world. Known since ancient times, it was 140 years ago that hematozoan parasites of the genus *Plasmodium* were identified as the causative agents [1]. Five species have been implicated in human pathology: *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi* [2]. *P. falciparum* is by far the most common

and is responsible for the majority of cases, including the most serious ones [2]. This parasite is transmitted by the female mosquito of the genus *Anopheles*, which is the definitive host. Malaria is thus characterized by epidemiological, clinical and biological variability, influenced by the characteristics of the parasites and the mosquito. Malaria is most prevalent in tropical environments where conditions are favorable for the development of mosquito vectors [3]. Transmission varies from

one environment to another. A distinction is made between areas of intense transmission and areas of low transmission, depending on whether the disease occurs with a more or less constant incidence during the year [4]. Malaria is a mild disease in most cases, but can be potentially fatal, especially in at-risk individuals. During simple attacks, malaria is characterized by a periodic fever associated with unspecific functional symptoms [5]. Hepatomegaly and splenomegaly may be present in some patients, particularly children. Positive diagnosis is based on the detection of Plasmodium on a smear or thick drop, which is the reference technique, but requires access to a laboratory. Rapid diagnostic tests have therefore been developed to facilitate access to diagnosis [6]. Biologically, hematological abnormalities such as anemia and thrombocytopenia may be present. Neurological and anemic forms are the main severe forms of the disease. In 2019, 229 million cases including 409,000 deaths were recorded [7]. Benin is a country in the intertropical zone of Africa located between the 6th and 12th parallels north. The humid climate, especially in the south of the country, is conducive to hyperendemic transmission of the disease. Although the prevalence of malaria has gradually decreased in recent years, it remains the primary reason for consultation and hospitalization in the periphery, particularly among children under 5 years of age. In 2015, there were an estimated 3 million cases with nearly 1500 deaths [5, 7]. Although still high, these figures reflect the effectiveness of numerous control strategies: land-use planning, distribution of long-acting insecticide-treated nets, accessibility to diagnosis, and treatment [6]. In the hospital setting, particularly in the country's referral centers, malaria cases have become exceptional in adult consultations. The objective was to evaluate the epidemiological, diagnostic, and therapeutic profile of malaria in outpatient medical consultations at the CNHU-HKM of Cotonou during the last decade.

2. Data and Methods

2.1. Study Population

This was a descriptive cross-sectional study conducted from 1 January 2010 to 31 March 2021 in an outpatient clinic. The study population consisted of patients seen in outpatient medical consultations in the specialized medical services of the NTHC -HKM of Cotonou during the study period, selected through their files. All patients were included, regardless of their age, sex or reason for consultation, in whom the diagnosis of malaria had been retained. The diagnosis of malaria was based on the presence of Plasmodium on the blood smear and thick drops. Patients with incomplete records and who did not have a blood smear or a thick blood smear were excluded.

2.2. Methods

The variables studied were sociodemographic, clinical, biological, and therapeutic. The data collection consisted first of a screening of all the patients' files seen in consultation during the study period. The files corresponding to our

criteria were selected and the data were collected with data processing forms designed for this purpose. The data were analyzed with the R software version 4.1.0 to output the estimates of the descriptive analysis.

3. Results

3.1. Globale Socio-demographic Data and Overall Hospital Frequency

Over 41,960 patients consulted during the study period, 95 had malaria, representing a hospital incidence of 0.2%. The mean age was 36.8 ± 14.3 years. Men accounted for 49.5% and women for 50.5%. The sex ratio was 0.98. Females represented 73.7%. The socio-economic level was average for 50.5% and 80.2% of the patients lived in urban areas (Table 1).

Table 1. Socio-demographic characteristics of malaria patients, outpatient department of the NTHC -HKM from 2010 to 2021.

	N=95
Age	
Average	36,8±14,3 ans
Extremes	15 – 96 ans
Sex <i>n</i> (%)	
Male	47 (49.5)
Female	48 (50.5)
Nationality <i>n</i> (%)	
Beninese	91 (95.8)
Foreign	4 (4.2)
Ethnicity <i>n</i> (%)	
Fon	70 (73.7)
Nago	11 (11.6)
Bariba and Dendi	8 (8.4)
Other	6 (6.3)
Profession <i>n</i> (%)	
Trader	35 (36.8)
Civil servant	34 (35.8)
Student	22 (23.2)
Housewife	4 (4.2%)
Socio-economic level <i>n</i> (%)	
Low	46 (48.4)
Medium	48 (50.5)
High	1 (1.1)
Place of residence <i>n</i> (%)	
Urban	80 (84.2)
Rural	15 (15.8)

3.2. Reasons for Consultation

The patients had consulted for follow-up appointments for a chronic condition in 45.3% of cases, for fever in 27.7% of cases, and for asthenia in 12.7% of cases (Table 2).

Table 2. Reasons for consultation of patients suffering from malaria, outpatient department of the NTHC-HKM from 2010 to 2021.

	n (%) N=95
Follow-up consultation for a chronic condition	43 (45.3)
Fever	26 (27.7)
Asthenia	12 (12.7)
Headache	8 (8.5)
Chills	4 (4.2)
Vomiting	1 (1.3)

3.3. Clinical Data

3.3.1. Health History

The main antecedents found were: chronic renal failure (20%), diabetes (25.3%), arterial hypertension (8.5%), and alcoholism (8.5%) (Table 3).

Table 3. History of malaria patients, outpatient department of the NTHC-HKM from 2010 to 2021.

	n (%) N=95
Chronic renal failure	19 (20.0)
Diabetes	24 (25.3)
Hypertension	7 (8.5)
Ethylism	7 (8.5)
Rheumatoid arthritis	8 (8.4)
Allergy to quinine	3 (3.7)
Ulcer	2 (2.6)
Sulfonamide allergy	1 (1.3)
Smoking	1 (1.3)
Depranocytosis	1 (1.3)

3.3.2. General Signs

Fever was found in 62.6% of headache patients, while asthenia and anorexia were found in 49.5% and 23.5%, respectively (Table 4).

3.3.3. Functional Signs

Headache (62.6%) and arthromyalgia (46.2%) were the main functional signs, followed by nausea and vomiting (25.3%) and diarrhea (10.0%) (Table 4).

3.3.4. Physical Signs

The general condition of the patients was preserved (69.5%). The physical examination was poor overall. Six patients had mucosal pallor and 2 had jaundice. However, hepatomegaly was found in 2 patients and splenomegaly in 1 patient (Table 4).

Table 4. Clinical signs of malaria patients, outpatient department of the NTHC-HKM from 2010 to 2021.

	n (%) N=95
General signs	
Fever	59 (62.1)
Asthenia	45 (49.5)
Chills	23 (27.4)
Anorexia	20 (23.5)
Functional signs	
Headache	57 (62.6)
Arthro-myalgia	42 (46.2)
Nausea / Vomiting	23 (25.3)
Diarrhea	9 (10.0)
Cough	8 (8.4)
Other	12 (12.6)
Physical signs	
WHO PI	
0	66 (69.5)
1	19 (20.0)
2	4 (4.2)
3	6 (6.3)
Mucosal pallor	4 (4.2)
Jaundice	2 (2.6)
Hepatomegaly	2 (2.6)
Splenomegaly	1 (1.3)

3.4. Biological Data

Biologically, *Plasmodium falciparum* was present in all cases. The parasite density varied between 120 and 75,000 parasites/ μ L with an average of 5638 parasites/ μ L. Anaemia was found in 11.6% of patients and CRP was elevated in 10.5% (Table 5).

Table 5. Biological signs of malaria patients, outpatient department of the NTHC-HKM from 2010 to 2021.

	N=95
Parasite density	
Average	5638 \pm 1532
Extreme	120 - 75000
Tx Hb n (%)	
8 - 10	11 (11.6)
≥ 10	73 (76.8)
Not available	11 (11.6)
Platelets n (%)	
Normal	84 (88.4)
Not available	11 (11.6)
White blood cells n (%)	
Normal	67 (70.5)
Neutrophilia	8 (8.4)
Lymphopenia	9 (9.5)
Not available	11 (11.6)
CRP	
High	10 (10.5)
Negative	47 (49.5)
Not available	38 (40)

3.5. Therapeutic Data

All patients had received treatment with CTA and the evolution was clinically favorable in 100% of patients. Some patients had self-medicated or received treatment before the consultation. Paracetamol, Artemisinin-based Combination Therapy (ACT), or quinine were used in 31.6%, 15.8%, and 6.3% of cases, respectively (Table 6).

Table 6. Treatment received by malaria patients by self-medication before admission, outpatient department of the NTHC-HKM from 2010 to 2021.

	n (%) N=95
Paracetamol tablets	30 (31.6%)
Antibiotics tablets	24 (25.3%)
CTA	15 (15.8%)
Anti-inflammatory	2 (2.6%)
Quinine tablets	6 (6.3%)
Quinine IV infusion	1 (1.3%)
Artesunate IV	1 (1.3%)

4. Discussion

4.1. Epidemiologic Profile

The annual incidence of malaria is constantly decreasing and is estimated at more than 480 per 1000 inhabitants in the country [7]. In this study, the incidence of malaria was much lower than in the general population at 0.2%. It should be noted that this study focused on patients who came to the Benin referral center for specialized medical consultations, whereas most of the cases are managed in the periphery in

general medical consultations.

The study population was made up of young adults (mean age 37 years) and the disease affected both men and women (sex ratio about 1). The socio-economic level was average in half of the cases. Almost all patients were from urban areas. The prevalence of malaria is an index that makes it possible to assess the evolution of urbanization, the effectiveness of the means of control, and reflects the socio-economic health of the population [5, 6, 8-15].

4.2. Diagnostic Aspects

Clinically

All cases were simple malaria. This can be explained by the fact that severe malaria is more frequent in children under 5 years of age, and that potentially severe cases were seen earlier in the periphery and in emergency departments.

Malaria is characterized by febrile, non-specific symptoms with poor physical examination in simple forms [2, 4, 13]. Splenomegaly was only found in one patient, which confirms the low splenic index found in Benin [7].

Biologically

Plasmodium falciparum was found in all patients. Indeed, this species is endemic and almost the only one found under our skies [16].

The average parasite density was 5638 p/μL. Benin is located in a hyperendemic transmission zone with a high plasmodium index [6]. Therefore, there is usually no correlation between parasitemia and clinical signs, although severe forms are associated with high parasitemia [8, 13, 17, 18]. In any case, the question of the imputability of fever to parasitemia requires the systematic exclusion of differential diagnoses.

The rest of the biological work-up was not very disturbed and showed essentially only moderate anemia. Malaria is an intra-erythrocytic parasitosis, and the release of shizonts necessarily implies a destruction of parasitized red blood cells but also of healthy ones [19]. However, the origin of anemia in malaria is multifactorial. It involves immune reactions, bone marrow dysfunction, hypersplenism, and disorders of iron metabolism [20-23]. During simple attacks, these different mechanisms are involved to a lesser extent, which explains the lack of severity of anemia.

4.3. Therapeutic Aspects

Self-medication

One third of the patients had used self-medication before admission. In addition to the paracetamol that had been used, about 15% had received CTAs, and 6% had taken quinine. Yameogo *et al.* in Burkina Faso, explored the therapeutic course of presumptive cases [24]. They concluded that, given the frequency of malaria in countries, people systematically resorted to presumptive treatment at home before medical consultation. This observation had already been made earlier by other authors [25-30]. Moreover, ACTs were used more than second-line drugs such as quinine. This could be due to their improved cost and to awareness campaigns [6]. For

some, this attitude would contribute to prevent the evolution towards severe forms [31-33]. However, this practice poses the problem of unjustified recourse to CTA without recourse to a previous diagnostic test, as well as that of the abusive use of antibiotics systematically in febrile contexts. All patients were managed with ACTs, which are the gold standard of current malaria treatment [6].

5. Conclusion

The frequency of malaria is 2 cases per 1000 consultations in outpatient medicine. The exploration of functional symptoms, mainly fever, during the follow-up of a chronic condition, was the main mode of discovery. Indeed, patients seem to preferentially turn to their usual practitioner when faced with various health problems. The average age was in the young adult age group and there was no sexual predominance. The attacks were simple in all cases. The parasitemia, which was higher or lower in most cases, reflects the level of immunity of the populations of southern Benin. In addition, systematic self-medication with antimalarials is still widely practiced. With the democratization of ACTs, we are therefore faced with what could soon lead to the emergence of new resistant strains.

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