

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

Angèle Azon Kouanou<sup>1,\*</sup>, Yolande Sissinto Savi De Tovè<sup>2</sup>, Kouessi Anthelme Agbodande<sup>1</sup>, Mahoutin Semassa Ghislain Missiho<sup>1</sup>, Yves Morel Sokadjo<sup>1</sup>, Adélakoun Ange Geoffroy Falade<sup>1</sup>, Olamidé Gloria Marlene Marie Dénise Kouanou<sup>1</sup>, Delphin Murhula Katabana<sup>1,3</sup>, Houénoudé Mickaël Arnaud Assogba<sup>1</sup>, Richard Oba<sup>1</sup>, Djimon Marcel Zannou<sup>1</sup>

<sup>1</sup>Internal Medicine-Medical Oncology, National Teaching Hospital Center (NTHC)-Hubert Koutougou Maga (HKM), Cotonou, Republic of Benin

<sup>2</sup>Parasitology-Mycology Laboratory, National Teaching Hospital Center (NTHC)-Hubert Koutougou Maga (HKM), Cotonou, Republic of Benin

<sup>3</sup>Department of Internal Medicine of University Clinics of Bukavu, Official University of Bukavu, Bukavu, Democratic Republic of Congo

## Email address:

[angele.azonkouanou@gmail.com](mailto:angele.azonkouanou@gmail.com) (A. A. Kouanou)

\*Corresponding author

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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  $36.8 \pm 14.3$  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  $36.8 \pm 14.3$  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/ $\mu$ L with an average of 5638 parasites/ $\mu$ 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)
$\geq 10$	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.

## References

- [1] Laveran A. Un nouveau parasite trouvé dans le sang de malades atteints de fièvre palustre. Origine parasitaire des accidents de l'impaludisme. Bull Mém Soc Méd Hôpitaux Paris. 1880; 17: 158-64.
- [2] Basu S, Sahi PK. Malaria: An Update. Indian J Pediatr. 2017; 84 (7): 521-8.
- [3] Rogier C. Paludisme de l'enfant en zone d'endémie: épidémiologie, acquisition d'une immunité et stratégies de lutte. Med Trop. 2003; 6: 449-64.
- [4] Varo R, Chaccour C, Bassat Q. Update on malaria. Medicina Clínica. 2020; 155 (9): 395-402.
- [5] Robert V, Macintyre K, Keating J, Trape J-F, Duchemin J-B, Warren M., Malaria transmission in urban sub-Saharan Africa. Am J Trop Med Hyg. 2003; 68: 169-76.
- [6] ACTwatch Group, Zinsou C, Cherifath AB. The malaria testing and treatment landscape in Benin. Malar J. 2017; 16 (1): 174.
- [7] WHO | By category | Incidence - Data by country [Internet]. WHO. World Health Organization; [cité 16 oct 2021]. Disponible sur: <https://apps.who.int/gho/data/node.main.MALARIAINCIDENCE?lang=en>.
- [8] Hay SI, Guerra CA, Tatem AJ, Atkinson PM, Snow RW. Urbanization, malaria transmission and disease burden in Africa. Nat Rev Microbiol. 2005; 3: 81-90.
- [9] Nasir SMI, Amarasekara S, Wickremasinghe R, Fernando D, Udagama P. Prevention of re-establishment of malaria: historical perspective and future prospects. Malar J. 2020; 19 (1): 452.

- [10] Sulistyawati S, Rokhmawati R, Fatmawati F. Malaria Risk Factors in Banjarnegara, Indonesia: A Matched Case-Control Study. *J UOEH*. 2020; 42 (2): 161-6.
- [11] Masango TT, Nyadzayo TK, Gombe NT, Juru TP, Shambira G, Chiwanda S, et al. Factors associated with malaria infection in Mudzi District, Mashonaland East Zimbabwe, 2019: a case-control study. *BMC Public Health*. 2020; 20 (1): 1745.
- [12] Mbohoun CN, Foko LPK, Nyabeyeu HN, Tonga C, Nono LK, Kangam L, et al. Malaria screening at the workplace in Cameroon. *Schallig HDFH, éditeur. PLoS ONE*. 2019; 14 (12): e0225219.
- [13] Doumbe-Belisse P, Kopya E, Ngadjieu CS, Sonhafouo-Chiana N, Talipouo A, Djamouko-Djonkam L, et al. Urban malaria in sub-Saharan Africa: dynamic of the vectorial system and the entomological inoculation rate. *Malar J*. 2021; 20 (1): 364.
- [14] Lechthaler F, Matthys B, Lechthaler-Felber G, Likwela JL, Mavoko HM, Rika JM, et al. Trends in reported malaria cases and the effects of malaria control in the Democratic Republic of the Congo. *Carvalho LH, éditeur. PLoS ONE*. 2019; 14 (7): e0219853.
- [15] Macarayan E, Papanicolas I, Jha A. The quality of malaria care in 25 low-income and middle-income countries. *BMJ Glob Health*. 2020; 5 (2): e002023.
- [16] Mobegi VA, Loua KM, Ahouidi AD, Satoguina J, Nwakanma DC, Amambua-Ngwa A, et al. Population genetic structure of *Plasmodium falciparum* across a region of diverse endemicity in West Africa. *Malar J*. 2012; 11 (1): 223.
- [17] Ndounga M, Casimiro PN, Miakassissa-Mpassi V, Loumouamou D, Ntouni T et Basco LK. Le paludisme dans deux centres de santé au sud de Brazzaville, Congo. *Bull Soc Pathol Exot*. 2008; 101 (4).
- [18] Plucinski MM, Candrinho B, Dimene M, Smith T, Thwing J, Colborn J, et al. Estimation of Malaria-Attributable Fever in Malaria Test-Positive Febrile Outpatients in Three Provinces of Mozambique, 2018. *The American Journal of Tropical Medicine and Hygiene*. 2020; 102 (1): 151-5.
- [19] Price RN, Simpson J, Nosten F, Luxemburger C, Hkirkjaroen L, ter Kuile F et al. Factors contributing to anemia in uncomplicated *falciparum* malaria. *Am J Trop Med Hyg*. 2001; 65: 614-22.
- [20] Jakeman GN, Saul A, Hogarth WL, Collins WE. Anaemia of acute malaria infections in non-immune patients primarily results from destruction of uninfected erythrocytes. *Parasitology*. 1999; 119: 127-33.
- [21] Lamikanra AA, Theron M, Kooij TW, Roberts DJ. Hemozoin (malarial pigment) directly promotes apoptosis of erythroid precursors. *PLoS ONE*. 2009; 4: e8446.
- [22] Aguilar R, Moraleta C, Achtman AH, Mayor A, Quintó L, Cisteró P, et al. Severity of anaemia is associated with bone marrow haemozoin in children exposed to *Plasmodium falciparum*. *Br J Haematol*. 2014; 164: 877-87.
- [23] Casals-Pascual C, Kai O, Cheung JO, Williams S, Lowe B, Nyanoti M, et al. Suppression of erythropoiesis in malarial anemia is associated with hemozoin in vitro and in vivo. *Blood*. 2006; 108: 2569-77.
- [24] Yameogo TM, Kyelem CG, Bamba S, Savadogo LB, Sombie I, Traore A-Z, Sanon D, Ouedraogo SM, Guiguemde TG. Chemin de soin des cas présumptifs de paludisme admis dans un hôpital de district au Burkina Faso. *Medecine et Sante Tropicales*. 2014; 34: 301-6.
- [25] Ye Y, Traore C, Meissner P, Coulibaly B, Becher H, Muller O. Ability of mothers to diagnose fever and anemia in their young children, in a malaria endemic region of West Africa. *Ann Trop Med Parasitol*. 2007; 101: 297-303.
- [26] Müller O, Traore C, Becher H, Kouyate B. Malaria morbidity, treatment-seeking behaviour, and mortality in a cohort of young children in rural Burkina Faso. *Trop Med Int Health*. 2003; 8: 290-6.
- [27] Diallo AH, Guiguemde TR, Ki-Zerbo G. Aspects cliniques et parasitologiques du paludisme grave de l'adulte en milieu urbain de Bobo Dioulasso (Burkina Faso). *Bull Soc Pathol Exot*. 2003; 96: 99-100.
- [28] Dossou-Yovo J, Amalaman K, Carnevale P. Itinéraire et pratiques thérapeutiques antipaludiques chez les citoyens de Bouaké, Côte D'Ivoire. *Med Trop*. 2001; 61: 495-9.
- [29] Pagnoni F. Malaria treatment: no place like home. *Trends Parasitol*. 2009; 25: 115-9.
- [30] Ouedraogo LT, Some IT, Diarra M, Guissou IP. Self-medication in the treatment of acute malaria: study based on users of private health drug stores in Ouagadougou, Burkina Faso. *Bull Soc Pathol Exot*. 2008; 101: 124-7.
- [31] Ndiaye P, Tal-DIA A, Diedhiou A, Uergens-B Ehr AJ, Lemort JP. Automédication de la fièvre dans le district nord de Dakar au Sénégal. *Med Trop*. 2006; 66: 74-8.
- [32] Dugas M, Dubé E, Kouyaté B, Bideau G. Enquête sur le transfert de connaissances concernant le paludisme par les professionnels de la santé aux consultants dans la région de Nouna au Burkina Faso. *Santé*. 2008; 18: 149-54.
- [33] Déti EKJF, Zohoun T, Maurice-Tison S, Salamon R et Atakouma YD. Prise en charge du paludisme chez l'enfant : proposition d'actions à partir des résultats d'une enquête CAP mené auprès des mères d'enfants de moins de 5 ans à Notse (Togo). *Santé*. 2008; 18.