



# Epidemiology, symptoms and chemotherapy of imported malaria at Mohammed V Military Teaching Hospital in Rabat, Morocco



CPC-046

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## OBJECTIVES

In Morocco, since the neutralization of the last outbreak of *Plasmodium vivax* in 2004, only imported malaria cases have been recorded, the majority from sub-Saharan Africa. At Mohammed V Military Teaching Hospital in Rabat, patients are mostly military, often called to perform missions in malaria endemic areas.

The purpose of our study is to report the incidence, origins, symptoms and treatment of malaria at Mohammed V Military Teaching Hospital.

## METHODS

A prospective study was performed from 1 January 2000 to 15 November 2009. All patients who had travelled to a country where malaria is endemic and diagnosed positive for *Plasmodium spp* in our hospital were included. The data collected concerned the epidemiology, symptoms, diagnosis and treatment of malaria.

## RESULTS

145 patients had a thick blood smear positive for malaria parasites. the sex ratio Male/Female is 19.71 and the age varies from 6 to 60 years with a median of 34 years. Countries at the origin of the infection are classified in zone 3 in 92% of cases. All malaria patients were symptomatic at admission. 19 patients contaminated by *Plasmodium falciparum* had at least 1 of severity criteria adopted by World Health Organization (all adults, 18 men and one woman). Among these 19 cases of severe malaria, 12 have been hospitalized in an intensive care unit.

3 patients among the 145 imported malaria cases presented a probable evolutive visceral malaria with an irregular low grade fever (37.9 ° C on average), alteration of general state, splenomegaly, anemia with a hemoglobin less than 10g/dl and a low parasitaemia not exceeding 0.5%. However, these three cases have not benefited from serology. Among the 03 patients, 02 also had jaundice, and one had an hepatomegaly. *P. vivax* was behind one case, while the two others were due to *P. falciparum*.

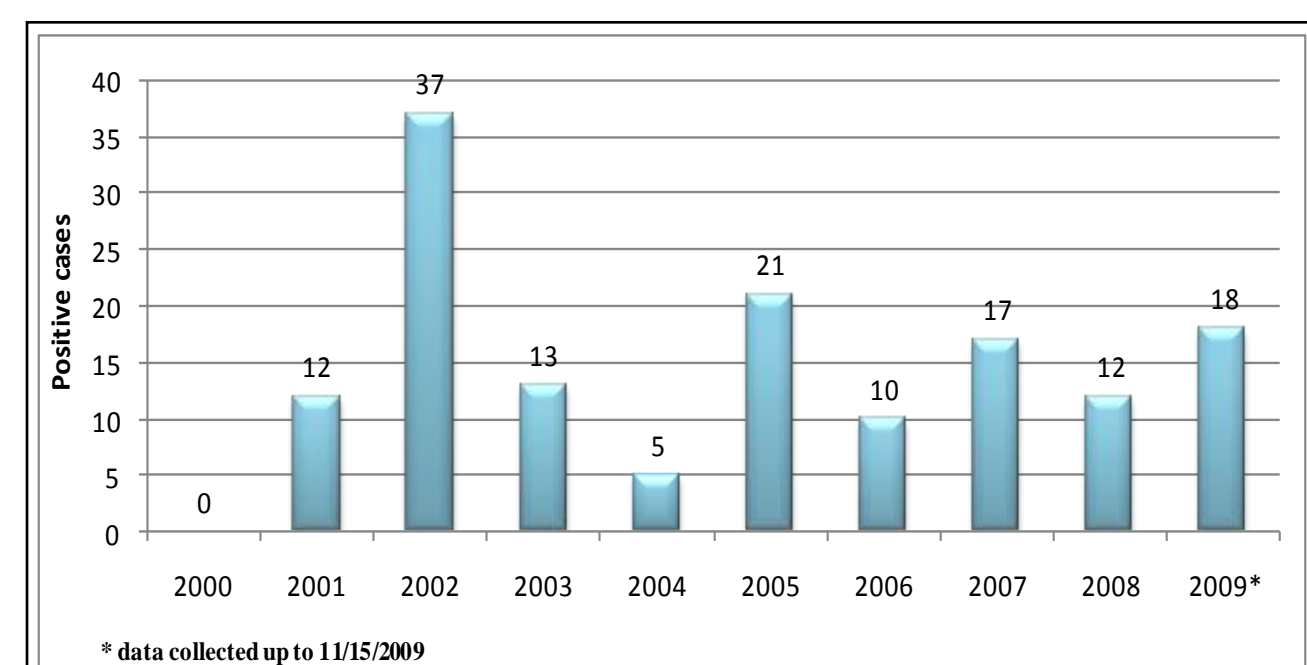


Figure 1 : Annual distribution of imported cases (n=145)

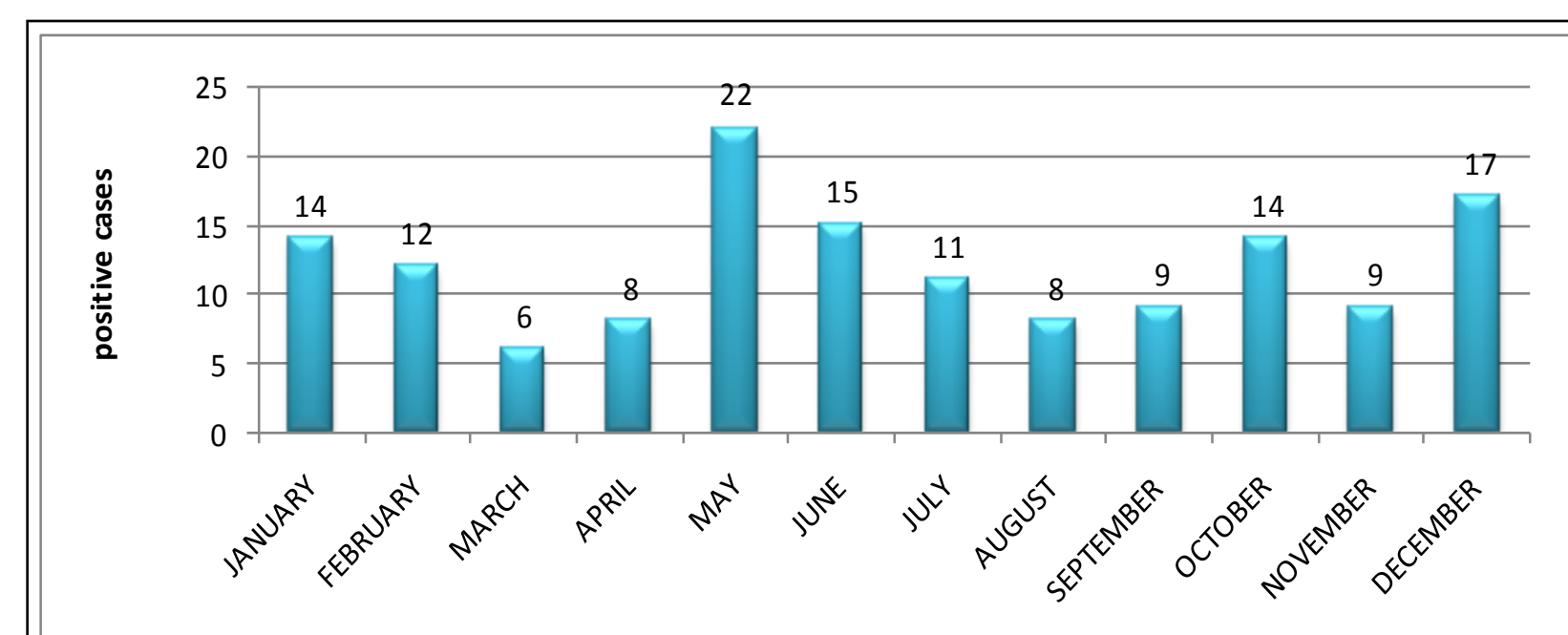


Figure 2 : Monthly distribution of imported cases (n=145)

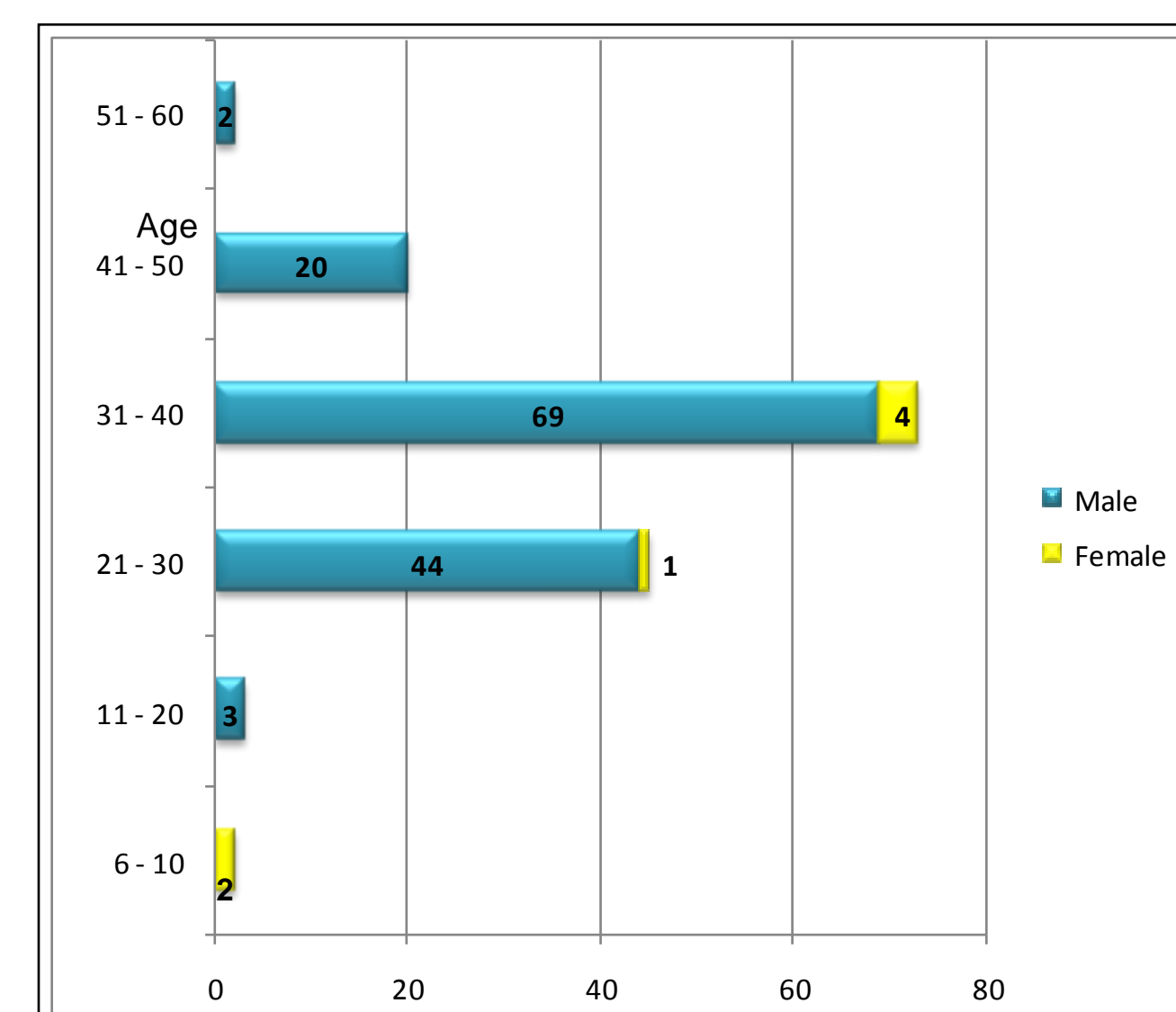


Figure 3 : Malarious population distribution by age and sex (n=145)

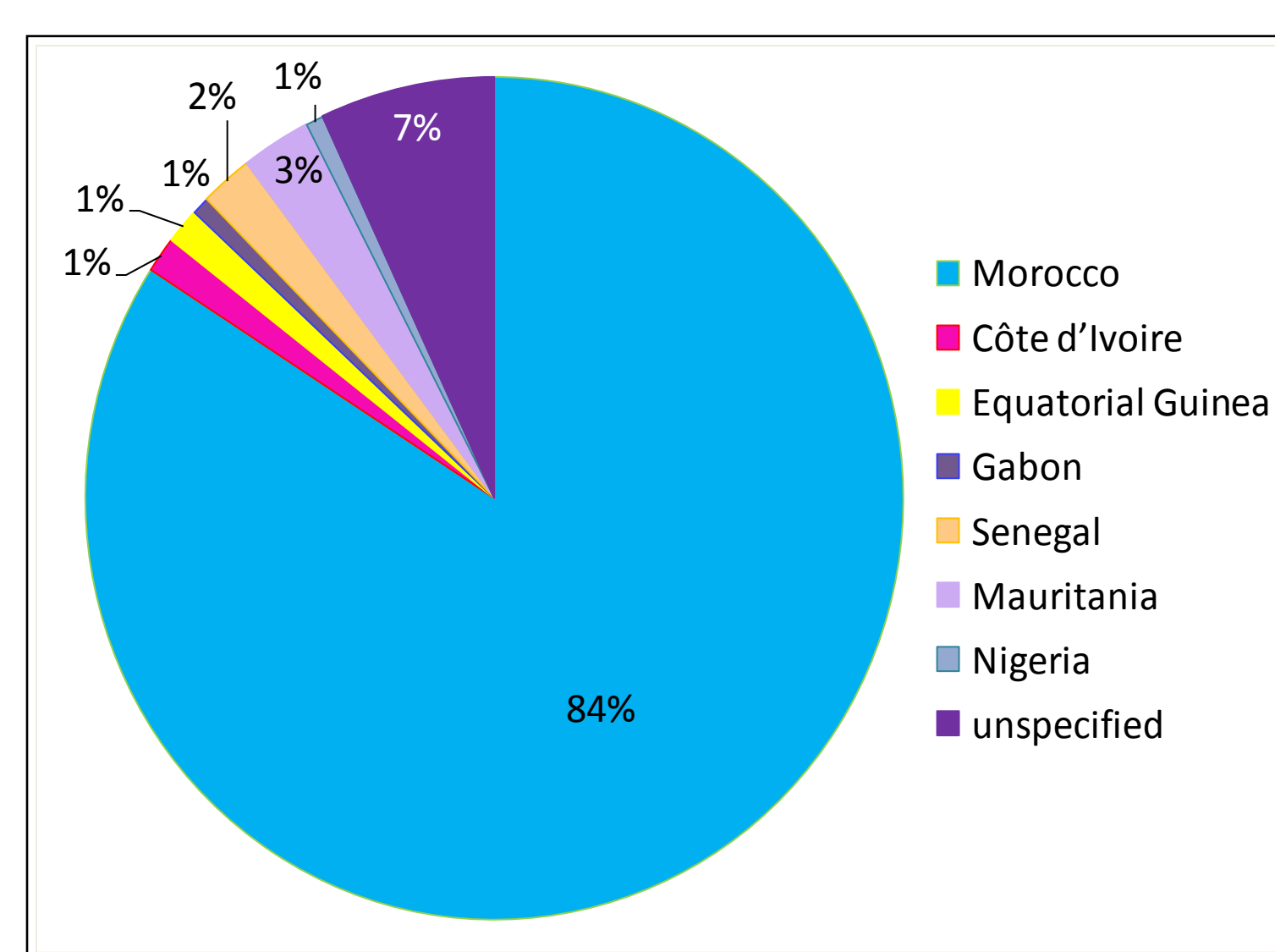


Figure 4 : Malaria patients nationalities (n=145)

Table 2 : Clinical details of the malarious population (n=145)

CLINICAL SYMPTOMS	PERCENTAGE AMONG MALARIOUS POPULATION
Fever	99 %
Algis	80 %
> Diffus	19 %
> headache	72 %
> Body aches / Myalgia	37 %
> Arthralgias	32 %
> abdominal pains	29 %
Vomiting	67 %
Chills	57 %
Nausea	44 %
sweats	41 %
diarrhea	33 %
Icterus	13 %
neurological disorders	11 %
urinary disorders	11 %
splenomegaly	8 %
asthenia	31 %
Anorexia	21 %
weight loss	13 %
hepatomegaly	3 %
respiratory disorders	3 %
hemorrhagic syndrome	1 %

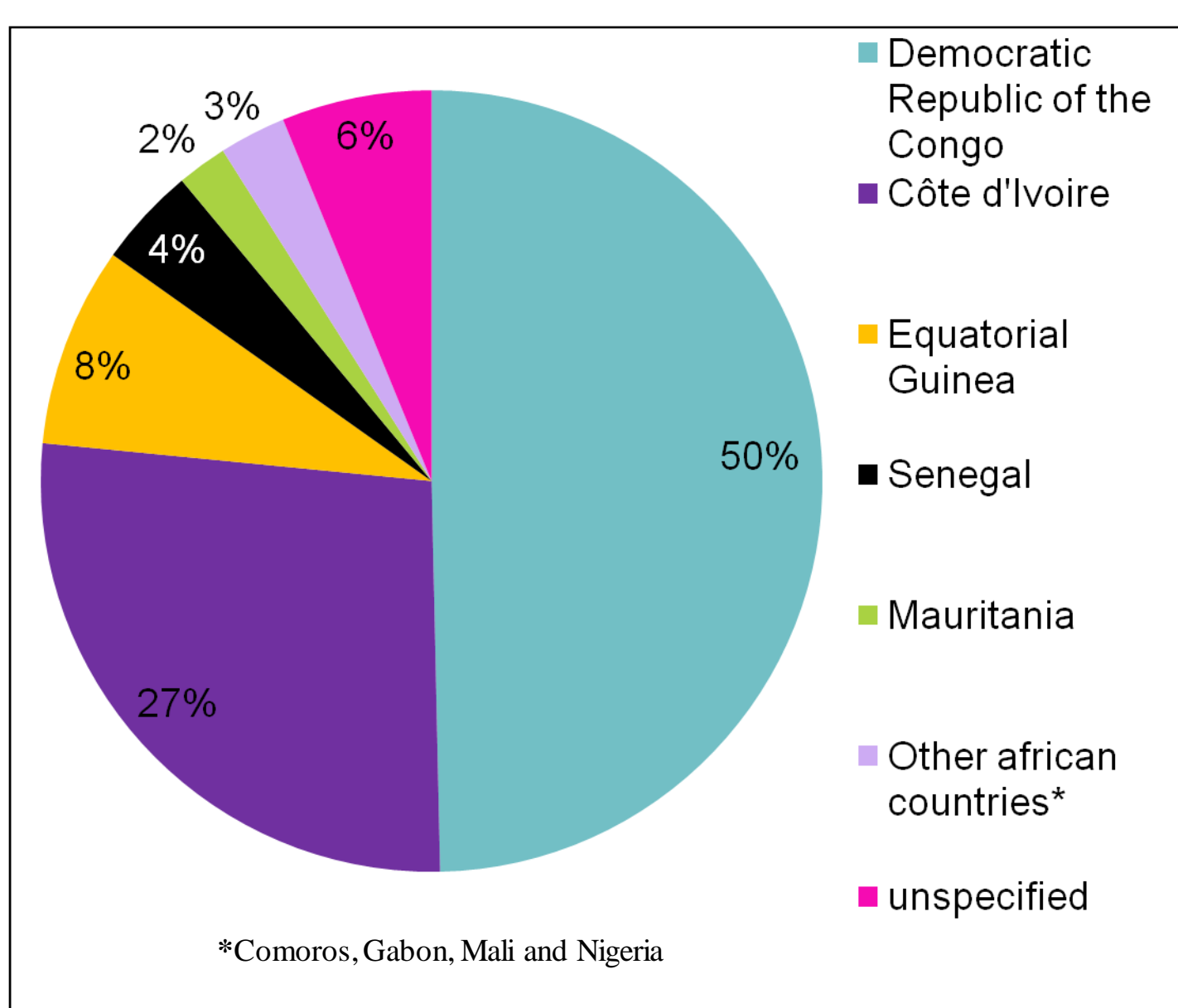


Figure 5 : Countries of stay (n=145)

Table 1 : Synthesis of biological exploration of the malarious population

BIOLOGICAL CRITERIA	PERCENTAGE AMONG MALARIOUS POPULATION
Anemia	44 %
Thrombopenia	73 %
Hypoglycemia	5 %
Hyperglycemia	32 %
Uraemia	16 %
Hypercreatininemia	2 %
Uraemia+hypercreatininemia	1 %

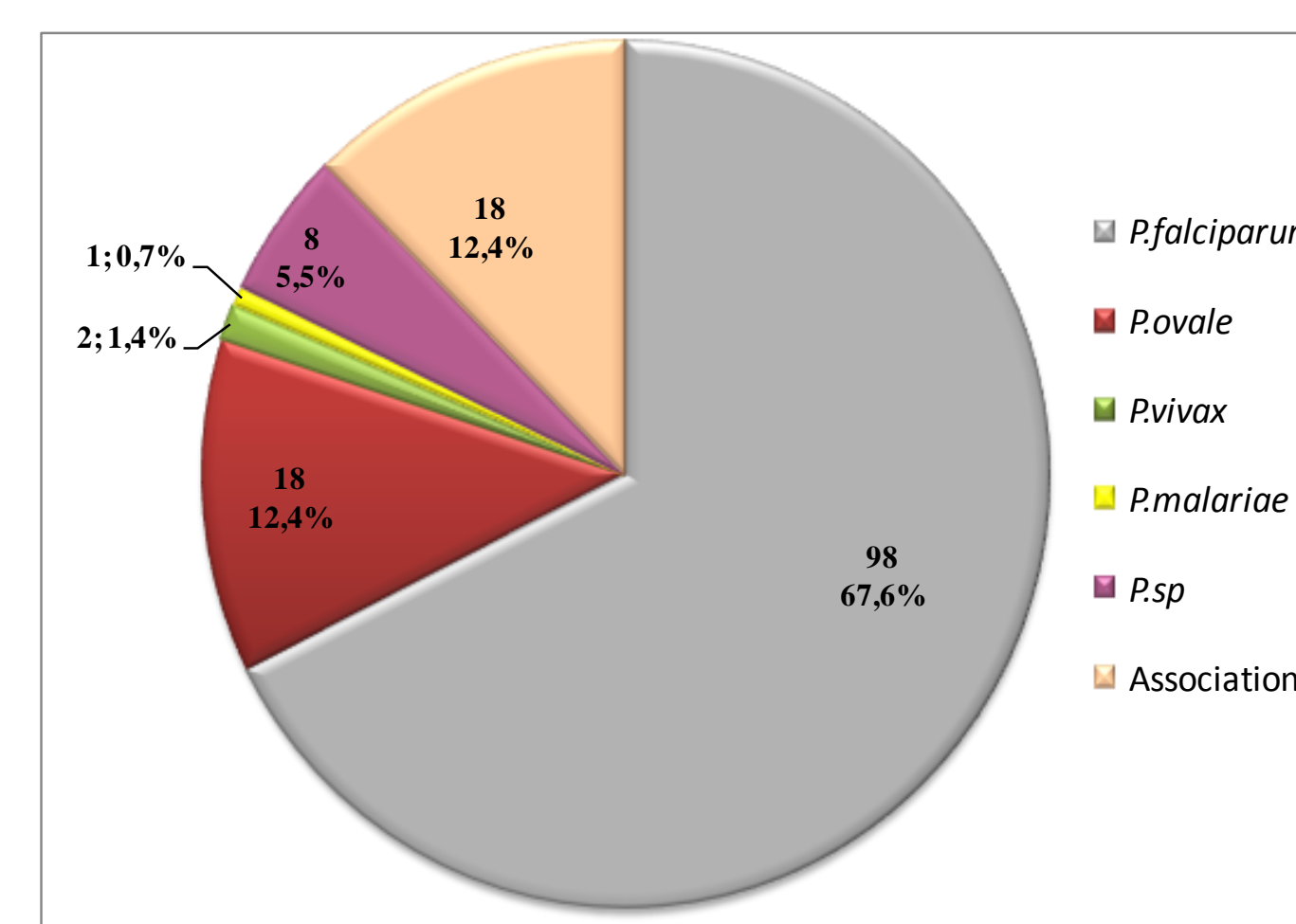


Figure 6 : Plasmodium species (N = 145)

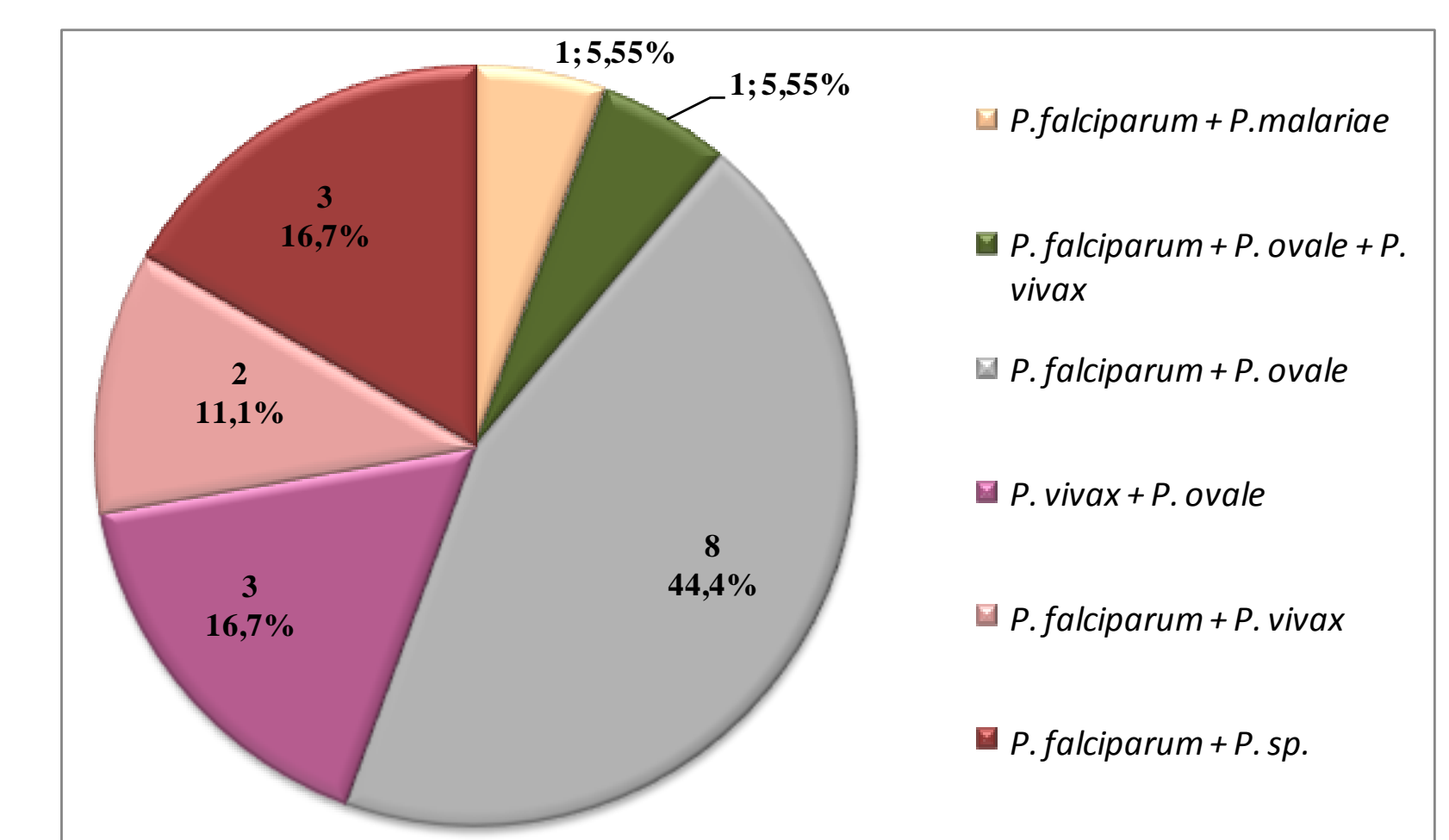


Figure 7 : Plasmodium associations (N = 18)

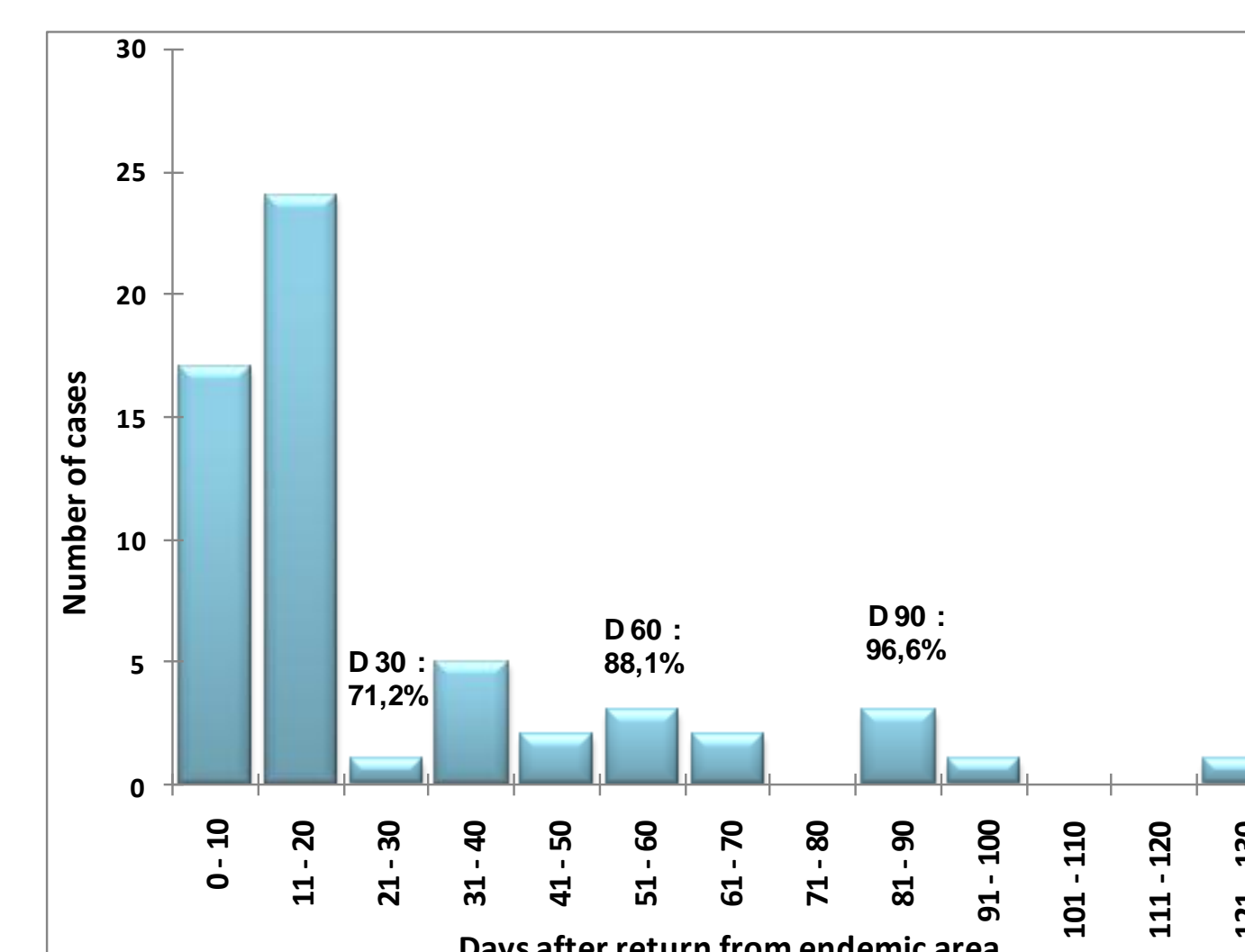


Figure 8 : Diagnosis time for Plasmodium falciparum cases

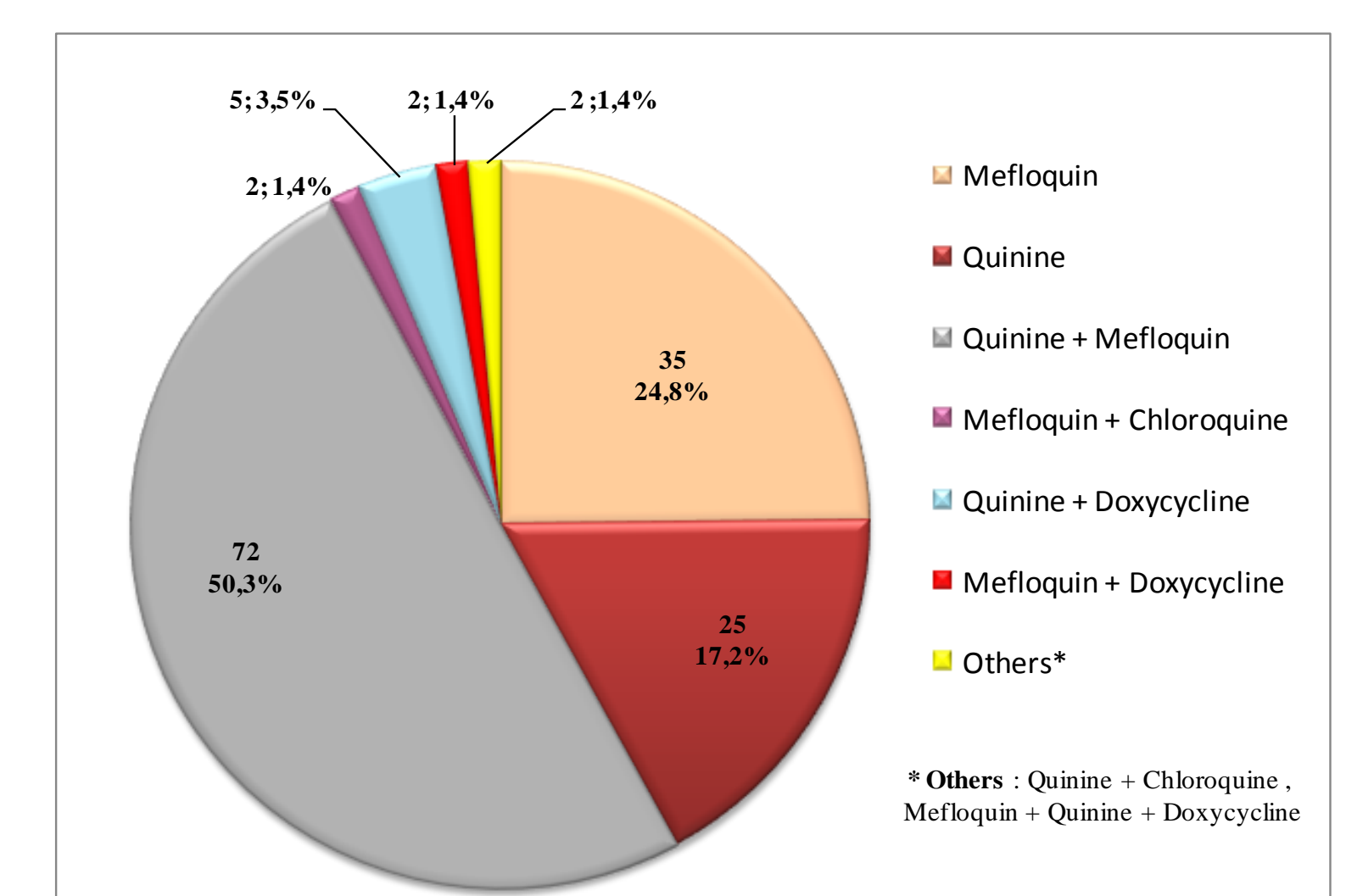


Figure 9 : Treatments (N=145)

## DISCUSSION

The examined population is heterogeneous, it is mainly composed of Moroccan military presenting fever after returning from an endemic area.

No case was registered in 2000. This can be explained by the definitive return of our troops from Somalia and Equatorial Guinea. The increase in the number of cases since that time is explained by the massive sending of our troops to the Congo after the installation of the Moroccan contingent in 2001. The second peak observed in 2005 can be explained by the deployment of the first contingent of the Moroccan Royal Armed Forces in Ivory Coast in April 2004, within the framework of the United Nations Operation in Ivory Coast (UNOIC). These data also provide information on the country of origin of infection.

Cases are recorded throughout the year, with two small peaks in December and May, marking the changing of our military every six months as part of missions in malaria-endemic areas.

The sex ratio male / female shows a highly expressed dominance of men, which can be explained by the nature of the studied population (male soldiers serving in malaria-endemic area).

The age of malarious population is around 30 years. In fact, a young population is more dynamic and therefore more exposed to travel, either for study, for work or for military service.

Despite the irregularity of malaria symptoms, most of the studies (including ours) report some frequent symptoms, namely fever, chills and sweats, headaches and various pains, stomach upsets, fatigue and anorexia, splenomegaly, anemia and thrombocytopenia. Other signs are also found in most of the series, but at frequencies less important, namely jaundice, hepatomegaly, urinary disorders and neurological disorders.

Fever in malaria is intermittent, as the clinical examination on admission doesn't show sometimes the episode of fever reported by patients during the interrogation. However, it remains the most common symptom during malaria. Its frequency may vary depending on involved parasite species.

In the absence of statistical data on the prevalence of severe imported malaria nationwide, our study shows a rate of 13% of the total malaria cases during the study period. 90% of these cases had at least two criteria of severity according to the WHO, with a delay of symptom onset of 14 days, and 63% required hospitalization in intensive care unit. These cases were all due to *P. falciparum*, the only species potentially fatal.

For evolutive visceral malaria, the presumed frequency in our study is 2%. However, the three suspected cases could not be confirmed by serology, due to the unavailability of reagents necessary for the technique in question. In this type of malaria, clinical signs have nothing in common with what is expected of malaria since there is no access. They are slightly evocative and cause diagnostic difficulties, if we do not take into account the epidemiological context.

For Plasmodium species frequency, we note the dominance of Plasmodium falciparum compared to the other Plasmodium species. This dominance is also confirmed by the WHO which estimates that 91% of worldwide cases are due to Plasmodium falciparum (2006).

Our diagnostic time is in standards. For Plasmodium falciparum, 71% of cases are diagnosed within 1 month from the date of return of the malaria-endemic area and 17% of cases were delayed malaria, defined as any malaria detected more than 59 days after returning from the malaria-endemic area, which is often a source of misdiagnosis, because of the nonspecific malaria symptoms.

The choice between the five most widely used malaria treatments (atovaquone-proguanil, artemether-lumefantrine, mefloquin, quinine and halofantrine) depends on the existence of any contraindications, the frequency and severity of side effects (especially those potentially serious), the route of administration and the cost of treatment. In our study and the most used treatments are mefloquin and quinine. These two molecules are most commonly associated (intravenous quinine first for two to five days and then oral mefloquin tablets. These two molecules are privileged by our doctors. For combinations based on artemisinin, they are highly demanded because they are known for their efficacy against Plasmodium. However the only obstacle for their use is their high price.

## CONCLUSION

This study allowed us to better understand the profile of our malaria patients whose vital prognosis is often at stake, in order to improve their management in our hospital.