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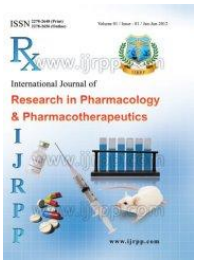

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Prevalence and treatment of malaria during the AIDS infection in hospital area of Bamako, Mali

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ABSTRACT

Malaria and HIV are a major public health problem in developing countries. Our study was a prospective study to find the incidence of malaria during HIV infection in Bamako at the national referral and teaching hospital "Point G" from May 1st, 2006 to February 28th, 2007. Among 212 patients hospitalized or followed as patients with HIV positive by rapid tests: Immuno Comb II HIV 1/2 (Organics, Strasbourg, France) and genie II HIV 1/2 (Sanofi Diagnostics Pasteur, France); 46 patients had a positive malaria test (21.6%). Theses coinfected patients (*Plasmodium*/ HIV) have been enrolled in the study. The age average was 34.4 ± 9.4 years. The sex ratio was 0.7. The patient majority had a CD4 rate less than 200 cells/mm^3. The HIV 1 infection was predominant in 45 patients (97.6%). The risk of exposure to the complicated malaria during HIV infection was higher in patients with the AIDS stage than seropositive patients (p = 0.04 fisher). The risk of exposure to moderate anemia during HIV infection was higher in patients with the AIDS stage than seropositive patients (p = 0.01 fisher). The majority of patients did not use preventive measures which are 71.7%. The hospital case lethality was 34%. We can confirm that Malaria has been relatively frequently during the HIV infection in Mali. Malaria chemoprophylaxy combined to bed nets use by HIV/AIDS patient should improve the morbidity and mortality due to this disease.

Keywords: Malaria, HIV/AIDS, Mali.

INTRODUCTION

Malaria and HIV infection are the two main problems of public health in Sub-Saharan Africa [1,2]. In cities, it has been proved that a serious form of malaria is not the matter of children, but concern also adults [3,4]. While HIV infection in those parts of Africa affects mainly young people [5], in Mali the prevalence of that infection is 1.1% [EDS MIV, 2012] [6]. What is about the causes of malaria's expansion in adults in cities? It has been evoked the weak prevention and the transmission as the causes [7,8]. The association HIV and *Plasmodium falciparum* has been studied in the

African continent and the relation between the case and effect bin those two infections evoke contradictions [9-12]. In Mali, to our knowledge, no study has been done in that co-infection and none has been done on the incidence of malaria during HIV infection. That's why we have initiated this work to study the correlation between HIV infection and malaria in the same goal to describe clinical and biological aspect of malaria during HIV infection in adults in the teaching hospital of Bamako.

PATIENTS AND METHODS

We made a prospective and descriptive study during 10 months, from May 1st, 2006 to February 28th, 2007 at the infectious diseases service in the nation and referring the "Point G" hospital in Bamako, Mali. That is the main hospital which is located 7 km from the center of the town. The population of Bamako, the capital of Mali is about 1,100,000 peoples. *Plasmodium falciparum* is the cause of 95% of cases and the vector of transmission is *Anopheles gambiae* [13]. Alone was considered the first malaria occurred after the patient is included. A return to the files was carried out systematically by using a questionnaire to validate the case and complete all the data on malaria (parasitemia, malaria treatment and the type of monitoring and the clinical form of malaria). The sample of the study is constituted by the patient having at least 15 years old and seropositive hospitalized or controlled by one service of infectious diseases.

By that way, we include in our sample every patient satisfying the WHO definition of malaria [1] whom the HIV serology in known has been excluded pregnant women and other patients having other infections pathology. Eligible patients in our study have been informed of the objectives of the study and they have been lightened conscientiously. Blood samples has been taken from patient with HIV positive confirmed by two quick tests (ImmunoComb II HIV 1/2 (Organics, Strasbourg, France and genie II HIV 1/2 (Sanofi Diagnostics Pasteur, France) for malaria test. Definition of malaria cases: all malaria occurring during the study period and authenticated by the identification of the *Plasmodium* during a parasitological examination. Definition of severe malaria: Classification of the WHO in 2000 the severity of malaria was used [14].

BIOLOGICAL

At the admission, every patient included in the sample for the study has been suggested for the biological checkup: TCD4 rate, blood cell configuration before and after malaria treatment.

Other biological examinations like: transaminase, creatinemia, glycemia and viral load were made according to the stave of the patient in view of the restoration of antiretroviral treatment. The case was anti-malaria with quinine or other Artemisinin-based combination therapy (ACT) with Artemisinin and the treatment of other opportunistic infections. Antiretroviral treatment is only given after the treatment of opportunistic infections.

Treatment

Our patients have been treated in Simple malaria by Artemisinin-based combination therapy (Artemether-Lumefantrine or Artesunate-Amodia-Quine) per OS by 3 days and in Severe and complicated malaria with quinine in the doses of 25mg/kg/24 hours divided in 3 slow drips of 4 hours each during 72 hours then from the 4 days Artemisinin-based combination therapy per OS 3 days. We didn't give them quinine per OS because the frequent auto-medication in the adult population. The symptomatic treatment was variable according to the clinical board (antipyretics, anticonvulsive, transfusion, diuretics). The care was clinical and biological during hospitalization. Clinical, biological and therapeutic data of each patient are noticed in an individual sheet which is analyzed in the software EPi info 6.04 CDC Atlanta/WHO. Khi^2 test and fisher test have been used for the comparables of our proportions which can be significant with $p \leq 0.05$.

Ethical considerations

The data recorded were obtained as part of a routine clinical examination and routine blood tests. No interventions were done and no additional testing was initialized on behalf of the study. The Ethical Committee at the Faculty of Medicine in Mali, Bamako approved the study and granted permission that the study could be performed without asking for the consent from the patient.

RESULTS

Globally, during those 10 months, we have registered 242 patients hospitalized for different

reasons. The 212 patients were HIV seropositive confirmed. We have selected 46 patients with 41 at the AIDS stage associated with malaria and 5 HIV-infected associated also with malaria which is 21.6% of the sample. Female gender was predominant with 58.7% of the case and the sex ratio was 0.7. The majority of the patients (65.2%) were aged between 30 and 49 years old. The age average is 34.4 years and the extremes: 17 and 55. We have noticed the predominance of married women in patients with HIV: 69.6%. The majority of the patients 71.7% did not use the preventive medications. We have found 52% of the patients were at stage IV of WHO classification. They were a difference statistically signification between the Karnofsky's score observed in seropositive patients and the one in patients at the AIDS stage at the moment of diagnostic p = 0.002 (table 1). After an anti-malaria treatment, the general stave was quite better in patient at the AIDS stage. All seropositive patients have been classified in B category, while 78% of patients at AIDS stage were in the C category. The exposure risk for severe and complicated malaria was more important in more patient at the AIDS stage than seropositive patients. The difference was significant with the test of fisher p = 0.04 (Table 2). Hyperthermia was more frequent in seropositive patients than in patients at the AIDS stage. Anorexia and asthenia were frequently observed in both patients. It is a difference statistically between anemia observed in seropositive patients and those of patients at the AIDS stage at the admission (Table 3). HIV-1 was the most frequent in any stage of the sickness. In our study, 80% of seropositive patients have been treated with Artemisinin-based combination therapy, ACT (Artemether-Lumefantrine or Artesunate-Amodiaquine) while patients at the AIDS stage were treated with Quinine in 48.8%. Death has been observed only in patient at the AIDS stage (Table 2). Severe malaria was dominated by neurological forms (Table 4).

Table1: Patients according to Karnofsky Score at the moment of diagnosis.

Karnofsky Score	**Seropositive**		**AIDS Stage**	
	No	**%**	**No**	**%**
40%	1	20	25	**61**
50%	1	20	14	34
60%	3	**60**	2	05
Total	**5**	**100**	**41**	**100**

χ^2= 14.20 p= 0.002 ddl = 3

Table 2: Demographic, clinical and biological characteristics of all 46 patients.

Characteristics	**Patients (n=46)**	
	No	**%**
Demography		
Sex		
Male	19	41
Female	27	59
Age		
Mean years (range)	34	[17-55]
<30	13	28
30-49	30	65
≥50	03	7
Preventive medication		
Yes	13	28
No	33	71

Clinical monitoring		
Ambulatory	05	11
Hospitalization	41	89
Duration of hospitalization/days		
Median	06	5-14
CD4 Count stage		
>350	06	13
200-349	06	13
<200	34	74
WHO HIV/AIDS stage		
I-II	05	11
III	17	37
IV	24	52
Malaria's forms		
Severe	23	50
Simple	23	50
Malaria treatment		
Quinine	23	50
Artesunate Amodiaquine	12	26
Arthémeter-lumefantrine	11	24
Patient's outcome		
Died	14	30
Survived	32	70

Table 3: Patients according to the rate of hemoglobin at the beginning.

Rate of Hg (g/dl)	Seropositive		AIDS Stage	
	No	**%**	**No**	**%**
< 5	1	20	4	10
5- 9.9	1	20	34	**83**
10- 13.8	3	60	3	07
Total	**5**	**100**	**41**	**100**

$\chi^2 = 12.23$ p = 0.002 ddl = 2

Table 4: WHO's Score of severity of the 23 patients.

	Patients (n=23)	
	No	**%**
Score of severity		
Cerebral	**3**	**13**
Convulsions	**5**	**22**
Anemia	5	22
Hyper parasitaemia	2	08
Jaundice	3	13
Prostration	**5**	**22**

DISCUSSION

Our sample can have a scientific value concerning clinical studies in teaching hospital even with the smallest of the sample. That study allowed us to describe epidemical, and clinical profiles and evolution of malaria during HIV infection. The population of the study concerned both HIV-infected and those at the AIDS stage. Among 242 patients, hospitalized 212 patients were

HIV-infected between who 46 had malaria. These results were similar to found by Onyenekwe and al in Nigeria [15]. At the end of our study, we have notified the predominance of married in HIV infection by 69.6%. That predominance can be explained by polygamy. Our results are closer to those observed in the global population of patients with HIV infection. The same notice has been done by Diallo et *al.* in Burkina Faso [16]. Oumar et *al.* had found a high frequency with 84.5% of married [17]. In our study, women represented 58.7% (27/46) with sex ratio 0.7. Seropositive patients represented 10.87% (5/46). Patients at the AIDS stage represented 89.1% (41/46). In our study the majority of the patients 65.2% were aged between 30-40 years in Mali [18]. Seventy three point nine percent (73.9%) of our patients didn't have knowledge of blood transmission, none the notion of endemic area of malaria. During our study, all the HIV-infected had simple malaria while 56.1% of patients at the AIDS stage had complicated malaria. Leaver et *al.* [19] in Zambia had found 8 serious cases after 40 seropositive patients. The conclusion was that serious and complicated malaria is independent to serological stave. Moderate anemia was frequently observed in patients at the AIDS stage compared to HIV-infected. Approximately the majority of the patients had the satisfaction biologically after treatment what is 60% of HIV-infected and 46.3% of those on the AIDS stage. Our results are nearer of those of Kayo in 2000 who found 70% cases of biological anemia in HIV infected in Mali and Diallo et *al.* in Burkina Faso [16,20]. We have received during our study, cases with HIV-1 infected with 97.6%. All those results are comparable to those obtained by Kayo in Mali and Diallo et *al.* in Burkina Faso [16,20]. Our patients had satisfied standard treatment instituted by the following protocol:

Simple malaria: treatment of the Artemisinin-based combination therapy per os by 3 days

Severe and complicated malaria: treatment by quinine in drips at dose 25mg/kg/days during 3 days from the clinical amelioration, the treatment is continued by ACT for 4 till 7 days. The same conclusion ended with Greenberg et *al.* during longitudinal study in 1986 at "Mama Yemo" hospital in Kinshasa in patients seropositive infected of serious malaria and children born from mother HIV-infected and from seronegatives mothers [21]. With those results, we can conclude that the response of the treatment was similar in both groups of patients. In HIV-infected patients, we mentioned a total clinical satisfaction comparable to those at the AIDS stage were only 26 cases of satisfaction has been observed. The control test of malaria has been done after 3rd days of treatment and it was negative for 44 cases, only 2 cases were positives. These results were similar to found by Diallo et *al.* in Burkina Faso [16]. At the end of our study, all the seropositive patients were healthy and in life while we registered 14 cases of death in patients at the AIDS stage. Kayo has found during his study a lethality of 23.3% [20]. That rate was inferior to the results of Diallo et *al.* in Burkina Faso [16]. The death cases can be by associating pathology.

The research on the co-infection of malaria and HIV infection is at the beginning and some methodological problems are making the difficult access and comparison of the results. The prevalence of Malaria in infected patients by HIV during our period of study was 21.6%. The clinical results show that exist a significant difference in patients suffering of severe and complicated malaria must pass through a correct and quick diagnosis and appropriate treatment to all both types of patients. Otherwise the anti-malaria treatment (Quinine and ACT) proved its efficacy in the treatment of the both types of patients in Mali.

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DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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