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Study of Some Biochemical Abnormalities in Patients Undergoing HIV/ARV Treatment in Bamako (Mali)

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ABSTRACT

In 2017, an estimated 21.7 million people living with HIV had access to antiretroviral treatment. Many biochemical variations are related to diet but also to the side effects of ARVs. The objective of this work is to describe variations in some biochemical parameters (transaminases, creatinemia and blood sugar) in patients living with HIV (PLWHIV) on antiretroviral therapy (ART). This was a retrospective study of 201 PLWHIV over the period October 2018 to January 2019. Only PLWHIV on ART who were at least 18 years old and had a biological check-up at one of the following periods: at treatment initiation (M0), at 6, 12, 18, 24 and 30 months were considered. Patients' transaminases, creatinemia and blood sugar levels were measured by the spectrophotometric method. The results showed that out of 201 patients, women represented 70.15% of the study population compared to 29.85% of men. The study showed that 6.48% of patients had higher than normal blood glucose levels. 14, 28% of men and 17.41% of women had high creatinemia. Aspartate amino-transferase (ASAT) was high in 40.91% of cases in men and 35.82% in women. Alanine amino-transferase (ALAT) was high in 11.42% of cases in men compared to 21.92% in women. It appears from this study that the use of ARVs in PLWHAs seems to have had a negative impact on the biochemical parameters measured, especially ASAT, hence the importance of regular and constant follow-up in these patients.

Keywords

ARVs, Biochemical parameters, HIV.

Introduction

HIV infection remains a major public health problem worldwide with 37.9 million people living with HIV in 2018. Sub-Saharan Africa remains the most affected continent with 25 million people. 62% of these people living with HIV (PLWHIV) have access to antiretroviral treatment (ART) [1,2]. Taking ARV is mandatory and strict. Consequently, patients would be exposed to the aggression of viruses and the side effects of these ARV, including induced abnormalities in biochemical parameters (creatinemia, blood sugar, transaminases, etc.) [3,4]. Assessing the efficacy of the treatment regimen of antiretroviral HIV treatment always requires virological, immunological and biochemical tests [5]. In recent years, the determination of biochemical parameters has been part of the follow-up strategies for patients on ARVs [6-8]. Studies have shown that abnormalities in biochemical parameters are generally related to diet [9] but also to HIV infections [7-11]. Therefore, the evaluation of these biochemical parameters remains crucial in the monitoring of PLWHA. Despite the high frequency of PLWHIV in Bamako, data on the evolution of biochemical factors are uncommon and old. For all these reasons, we have proposed to conduct a study on the variations of some biochemical parameters in PLWHIV. Thus, the objective of this work is to study three biochemical parameters (creatinemia, transaminases, blood sugar) in patients undergoing HIV ARV treatment followed at the Reference Health Centre of Commune V of the Bamako District in Mali.

Material and Methods

Material

The biological material consisted of the blood of patients living with HIV and on antiretroviral therapy.

Methods

Study population

Type and period of study: This is a retrospective study of 201 PLWHA conducted during the period October 2018 to January 2019.

Exclusion inclusion criteria: Only PLWHA under ART who were at least 18 years old and who had carried out a biological check-up at the Reference Health Centre of Commune V of Bamako at one of the following periods: at the initiation of treatment (M0), at the 6th, 12th, 18th, 24th and 30th months were taken into account. All persons under 18 years of age were excluded.

Sample size: 201 PLWHA on ART.

Ethical considerations: This study was conducted with the consent of the patients and the agreement of the ethics committee of the said health centre. An anonymous database has been created from patients' medical and social records.

HIV Testing

Preparation of samples

Blood samples were taken as recommended by Maiga et al. [12]. The samples were centrifuged at 3000 rpm for 10 minutes to recover the serum using a TDZ5.WS 0050-05 centrifuge with 18EMA control.

HIV testing was conducted according to a standard procedure recommended by the national HIV testing guidelines that used two rapid diagnostic tests (RDTs) and one confirmatory test. The samples were tested using a first TDR (Determine Alere ® HIV1/2). Samples that tested positive with this first test were confirmed by a second enzyme-linked immunosorbent assay (Immunocomb II) that specified the type of HIV (HIV1, HIV2, HIV1 and 2) [8,11].

Determination of biochemical parameters

Glucose was measured using the colorimetric enzyme method described by Dieusaert (2015) [13]. 1000µl of reagent were added to 10ul of serum. After a 10-minute incubation at 37°C, the absorbances were determined at 505 nm using a visible UV spectrophotometer.

The colorimetric kinetic method was used for the determination of creatinine [7,13]. 500 µL of R1+ 500 µL of R2 was the working solution. Thus, at 1000µl of this solution were 100µl of serum and the reading was immediate between 30 seconds and 90 seconds on the spectrophotometer at 492 nm.

Transaminases (GPT/ ALAT, GOT/ ASAT) were determined by the colorimetric kinetic method [7,8]. For this purpose, 1000 µl of reagent and 100 µl of serum were mixed, after an incubation of one minute and then reading with a 340nm spectrophotometer. The data obtained were compared with reference values [14,15].

Data analysis

The data were processed by the Epi Info software version 6.04c and Excel® version 2013.

Results

Demographic social characteristics

In this study, 201 patients, both male and female, were followed.

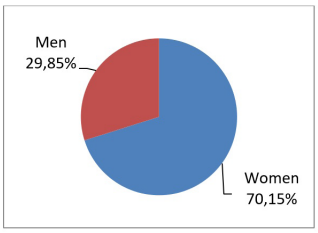


Figure 1: Distribution of HIV 1 patients by gender

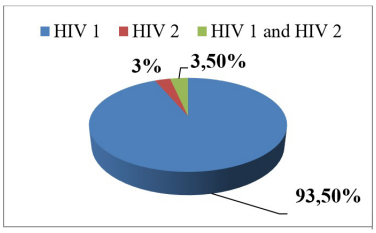


Figure 2: Distribution of patients by type of HIV

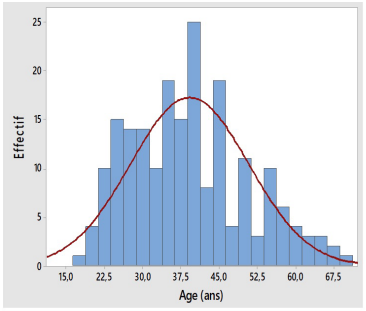


Figure 3: Age histogram

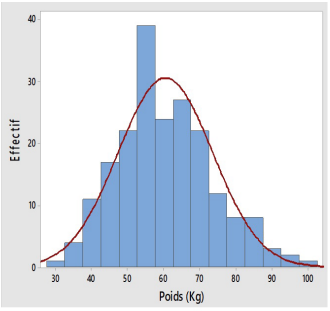


Figure 4: Weight histogram

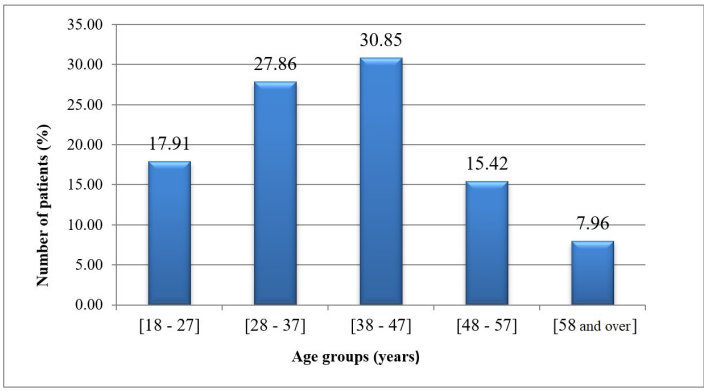


Figure 5: Distribution of HIV 1 patients by age groups.

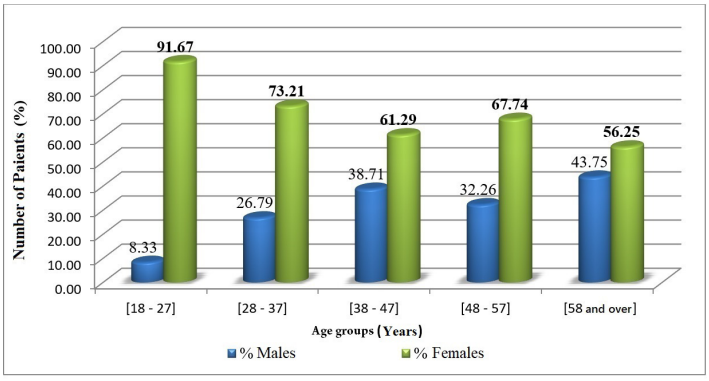


Figure 6: Distribution of HIV 1 patients by age groups and by sex.

Measured biochemical parameters

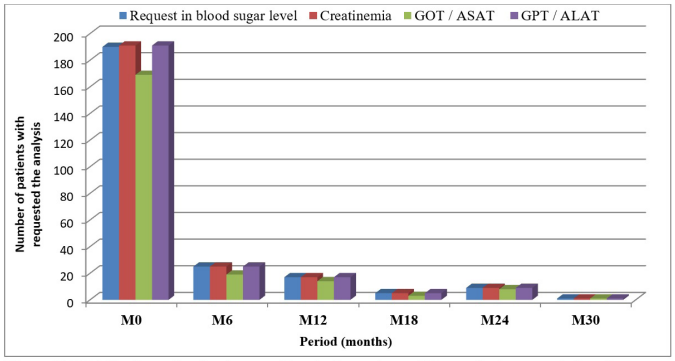
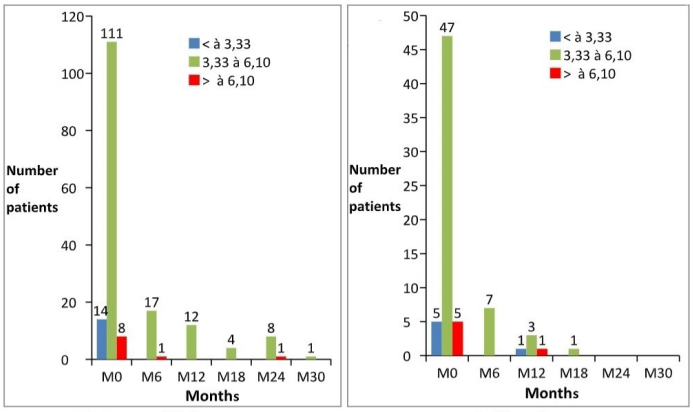


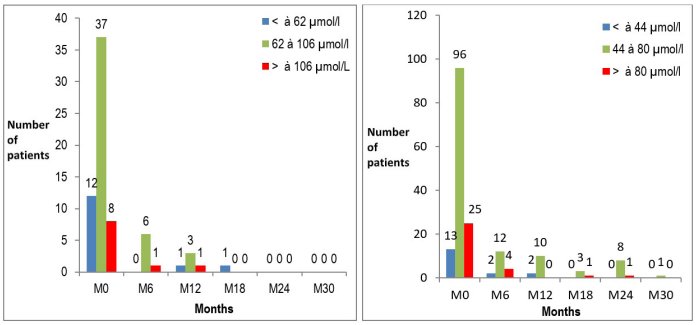
Figure 7: Distribution of patients according to the nature of the analysis requested and the period.



a. Male **b. Female**

Figure 8: Distribution of Blood sugar level of patients by sex

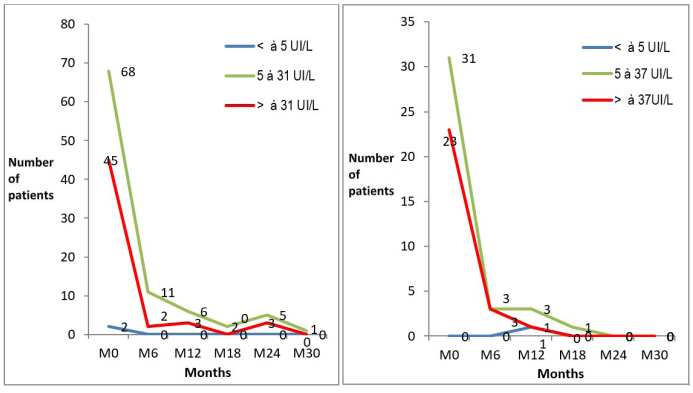
Standards: 3,33 mmol- 6,10mmol.



a. Male **b. Female**

Figure 9: Distribution of creatinemia by sex.

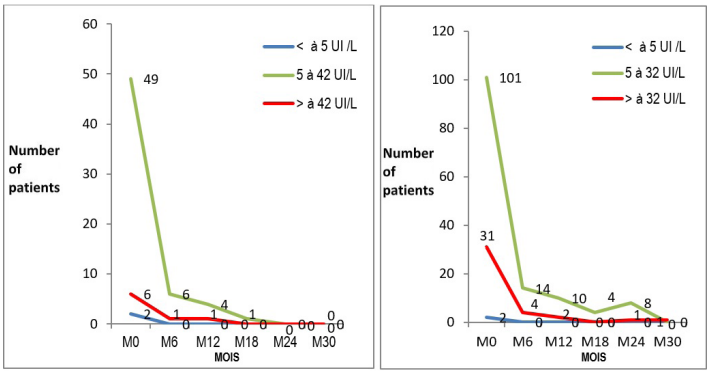
Standards: Male (62 to 106μmol/l); Female (44 to 80 μmol/l)



a. Male **b. Female**

Figure 10: Distribution of aspartate amino-transferase of patients by sex

Standards: Male (5 to 37UI/L); Female (5 to 31 UI/L).



a. Masculin **b. Féminin**

Figure 11: Distribution of alanine amino-transferase of patients by sex.

Standards: Male (5 to 42UI/L); Female (5 to 32 UI/L).

Discussion

Socio-demographic characteristics

The data in Figure 1 shows that out of the 201 patients, 70.15% were women compared to 29.85% who were men, representing a sex ration of 0.42. This high prevalence among women had already been reported in Haidara's (2006) work [16], which could perhaps be due to the large surface area of genital contact and recurrent infections, making women more vulnerable to this infection. In our study, type 1 HIV was the most widely encountered with a frequency of 93.5% of cases (Figure 2). A study in Burkina Faso showed an 80.9% incidence of HIV 1 cases [11]. An even more pronounced result than ours was reported by Edith Déné et al. (2010) [17] in Mali with 95.10% of cases. The works of Cissé et al. (2013) [18] showed a large prevalence of type 1 HIV with 97.07%. This predominance reported by various authors is explained by the fact that HIV 1 is more widespread, more virulent and more transmissible than HIV 2 [10].

The average age is close to that obtained about 39 ± 11 years with extremes of 18 and 69 years (Figure 3) compared to an average weight of 60 ± 12 kg (Figure 4). This average age is near to that obtained by Traoré et al. (2015) [19] with 37.8 years and Fortes Déguénonvo et al. (2011) [20] with 41 years. The age group between 38-47 years was the most representative with 30.85% followed by the age group 28-37 years with 27.86% and the least infected age group was 58 years and over with 7.96%. At the level of all age groups, women represent more than half, 91.67% for the youngest age group 18-27 years against 61.29% for the most affected 38-47 years. These data confirm the findings of the UNAIDS report [2] which showed that young women aged 15-24 are twice as likely to be living with HIV as men. They corroborate those of several authors. Karfo et al. (2018) [11] obtained an age group between 45-54 years as the most representative with 39.4%. They also recorded high rates for the 25-34 and 35-44 age groups. We obtained 82.09% of patients for the 28-69 age groups. On the other hand, the results of Karfo et al. [11] postponed an age range between 25-54 years (77.64%). In Mali, the work of Coulibaly (2010) [10] reported a majority age group of 22-44 years. Studies have shown that this age group corresponds to the age of maximum sexual activity, exposing subjects to the risk of transmission of

sexually transmitted infections [21,22].

Biochemical parameters

The analysis in Figure 7 shows a sharp decrease in the number of patients followed at the Reference Health Centre in Commune V of Bamako. After six months of follow-up, the active line had increased from 191 in M0 to 25 in M6 and only one patient remained in M30. These results are consistent with those of Fortes Déguénonvo et al. [20] who obtained a loss of sight rate of 29% and those of Mongo-Delis et al. [23] with a rate of 33.5%. According to the same authors, these people were lost to follow-up for several reasons, including abandonment for financial reasons, death, transfer to other health centres, etc. [20,23].

The evolution of our biochemical parameters shows that in M0, 10% of our patients had blood glucose levels below 3.33 mmol/l (Figure 8). This hypoglycemia, which would lead to asthenia, is in agreement with the results of Bouaré (2016) [24]. At the same time 6.84% of our patients had high blood sugar, therefore at risk of diabetes. These results are contrary to those of Bouaré [24] who reported no hyperglycemic patients. This difference could be due to the sample size of 19 patients for Bouaré compared to 190 in our study. During this M0 phase, high creatinemia levels were observed in 18% of female patients (Figure 9b) compared to 14% of male patients (Figure 9b). The Bouaré study did not show any anomalies in this parameter. These creatinemia related abnormalities would expose these patients to renal function disorders [7].

The transaminase rate shows in our case, in M0 42.59% of men had a high ASAT, compared to 39% for women (Figure 10). The high ALAT percentage was 23.13% for women compared to 10.52% for men (Figure 11). Bouaré's work [24] showed that 26.31% of patients had high ALAT. This increase in these parameters would be an indicator of the hepato toxicity of some ARVs. Studies have shown that ARV significantly influence the catalytic activity of the liver in the human body of patients living with HIV/AIDS [7].

In M6, 50% of men had a high ASAT and 15% of women had a high ASAT (Figure 10). At the same time, 22% of women had high ALT compared to 14% of men (Figure 11). In 2016, Bouaré's work [24] showed that 15.78% of PLWHA had a high ASAT compared to 10.52% with a high ALAT. Follow-up of our M12 patients showed that ASAT values were 20% in men and 33% in women (Figure 10). 20% of men had high ALAT compared to 16% of women (Figure 11).

Our results show in M6 that 4% had abnormal blood sugar levels (Figure 8). This result is lower than that obtained by Hama (2010) [6] who showed that 7.79% of patients had abnormal blood sugar levels; this could be due to the regularity of patient follow-up or the number of patients in his study, which is 77 patients compared to 25 in our case; at the same time, the creatinemia level was abnormal at 14.28% in men and 33.33% in women (Figure 9). The work of Hama (2010) [6] showed that 6.49% of patients had high creatinemia. The high creatinemia level would probably be due to the renal toxicity of ARVs, probably induced by ARVs [7].

11.76% of M12 patients had abnormal blood glucose levels. This result is close to that obtained by Hama (2010) [6] which was 9.83%. At the same time, the creatinemia rate was 40% abnormal in men compared to 16.66% in women. The ALT rate was 20% abnormal for men compared to 16.66% for women. These results are significantly higher than those of Hama [6] who reported 8.82% of cases.

Conclusion

This study showed that the therapeutic response was generally in good agreement with biochemical parameters. Women are the greatest victims of HIV infection and biochemical parameter abnormalities. The data show abnormalities in blood sugar, creatinemia and transaminases. The number of regular people on the balance sheet decreased during treatment. Although the frequency of disturbances of biochemical parameters is relatively low, regular and constant monitoring of PLWHA should be carried out through better involvement of social workers in the management of patients, especially at the time of inclusion, in order to reduce the number of people lost to follow-up. in order to avoid chronic toxicity in certain organs such as the liver. It would be necessary to extend the investigations to other biochemical parameters in PLWHAs, including cholesterol levels, triglycerides and bilirubin.

Acknowledgments

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