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Full Length Research Paper

Transaminase reference values in a Senegalese adult population

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ABSTRACT

This work aims atestablishing the normal values of transaminases (aspartate aminotransferase and alanine aminotransferase) in a Senegalese adult population. Individuals in our cohort were selected, on a posteriori basis,among workers in a Senegalese company. Transaminases (ALT and AST) were assayed using enzymatic methods (at 37 °), without pyridoxal phosphate, BIOLABO, Maizy, France) adapted to the A15 chemistry automaton (Biosystems, Barcelona, Spain).We found ALT and AST normal values,which were respectively (12-40 IU / l) and (8-46 IU / l). The distribution of normal values based on age and sex shows an increase in transaminases with age in women and a significantly higher ratewas found in men compared to women. Normal values of transaminases in the study population were higher than those of the manufacturer. This shows the interest of determining normal values which are specific to the population. Our results also showed that sex is a factor of transaminases variation. It is therefore necessary to take this factor into account while representing them.

Key words: normal values, transaminases, Senegal

INTRODUCTION

Nowadays, biological analyses are crucial in the diagnosis of diseases. Their interpretation is valued only when they are compared to a series of so-called "reference values" obtained from individuals selected according to well-defined criteria (reference population). The concept of reference values was conceived by a Scandinavian group in the 1970s and later developed by national and international societies (Bergmeyer et al, 1989; Siest et al, 1981). Thus, GBEA (1999) and ISO 15189 (2007) standard prescribe reference values on analysis reports. Reference values available in most of our laboratories are provided by Western manufacturers.

Yet, the use of reference values from a given population by another creates diagnostic risks. Indeed, reference values represent a biological characteristic of the study population and require special attention in the choice of subjects (Cerriotti and Henny, 2008). Therefore, it is important for any biologist to determine the values which are specific to the targeted population. This is certainly a long, difficult and costly task that requires: establishing the metrological characteristics of the measurement technique used, determining all the pre-analytical and biological factors of variation and finally establishing the inclusion and exclusion criteria (Solberg and Stamm, 1991; Klein and Junge, 2004).Nonetheless, when these conditions are not met, it is possible to determine the "normal values" which are specific to their population (Henny, 2011).This work aims at establishing the normal values of transaminases (aspartate aminotransferase and alanine aminotransferase) in a Senegalese adult population. The choice of these two enzymes is motivated by the frequency of their

Table 1. Characteristics of the Study Population

N	1628
Age (M± ET)	40,5±10
Males (n)	1059
Femelles (n)	569

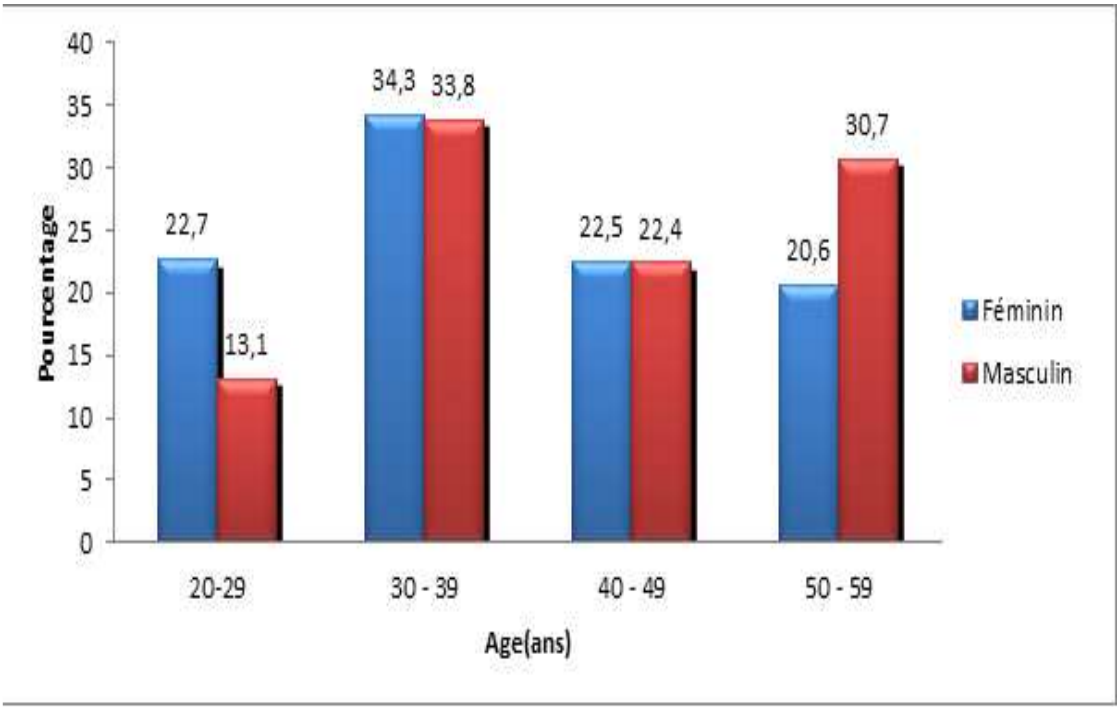

Figure 1. Distribution of study population by age and sex.

prescription in the diagnosis of liver, heart and muscular disorders. They are also key parameters in the treatment and follow-up of patients.

MATERIALS AND METHODS

We conducted a retrospective, transversal, analytical study. Individuals in our cohort study were selected on a posteriori basis among workers in a Senegalese company. They were received at Laboratory of Medical Biochemistry of the Faculty of Medicine (UCAD) for an annual medical check-up. Non-Senegalese subjects with a pathology likely to disturb transaminases or undergoing drug treatment were excluded from the study. All subjects included in thestudy underwent blood sample collection in dry tube. The tubes were centrifuged at 3000 rpm for 5 min and the serum was used for the assay of ALT and AST. The assay was performed using enzymatic methods (at 37 °, without pyridoxal phosphate, BIOLABO) adapted to the Chemistry A15 automaton (Biosystems, Barcelona, Spain). Data were managed using Excel 2010 and processed by SPSS software (version). We used the Dixon method to highlight and eliminate outliers. To determine the normal transaminase values in our population, we used a non - parametric method following the Kolmogorov-Smirnov test according to IFCC recommendations (2009): study population> 120, non-Gaussian distribution. The Pearson correlation test and the chi-square test were used for the comparison of the variables and the value of $p < 0.05$ was used as a significance threshold.

RESULTS

We selected a total of 1628 individuals including 1059 men and 569 women, which represents a sex ratio of 1.86. The average age of the population was 40.5 ± 10 years (Table 1). Subjects aged between 30 and 39 represented the majority (Figure 1). Reference values for ASAT and ALT in our study population were respectively (12-40 IU / l) and (8-46 IU / l) (Table 2). The distribution of normal values according to age and sex shows an

Table 2. Normal values of transaminases in the study population

Transaminases (UI/L)	ASAT	ALAT
N	1628	1628
médiane	21	18
percentile 2,5-97,5	12 à 40	8 à 46

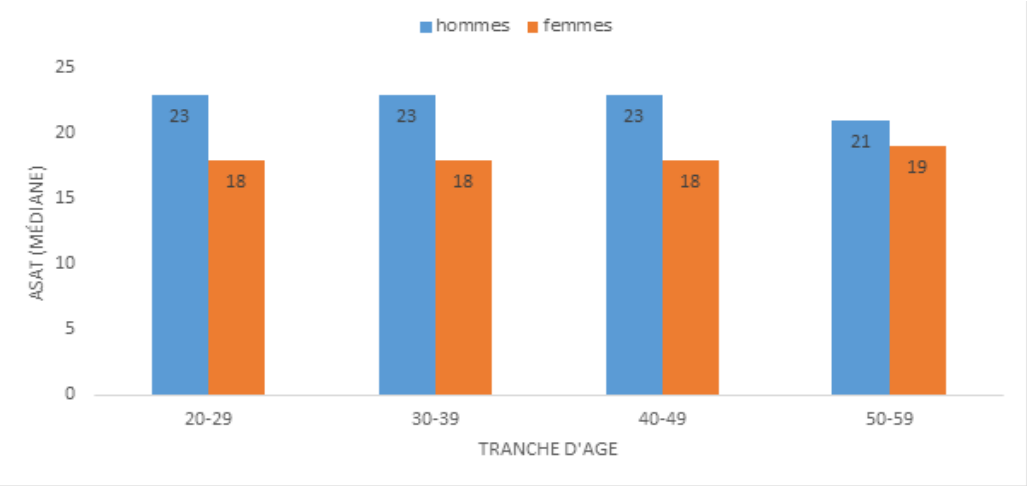

Figure 2. Normal ASAT values by age and sex

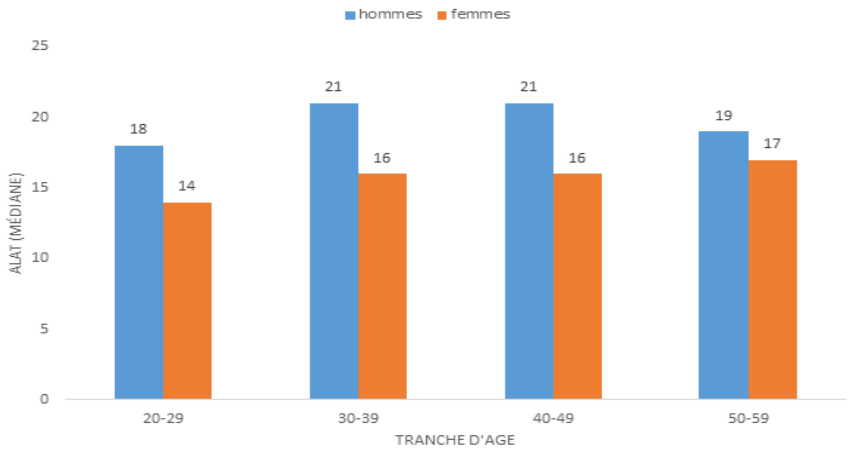

Figure 3. Normal ALAT values by age and sex

increase in transaminases with age in women and significantly higher rates in men compared to women (Figures 2 and 3).

DISCUSSION

The median values of AST and ALT activity in our population were respectively 21 IU / l and 18 IU / l with intervals of 12 to 40 IU / l and 8-46 IU / l Table 2). These figures are higher, compared to the usual values of the manufacturer (BIOLABO, Maizy, France) including those found by most of experienced firms such as IFCC (2002) and CLSI (Karita et al, 2009) and are close to the values of the CSCQ (2004).

Our reference values largely exceed those found in Côte d'Ivoire (Yapo et al, 1989) and Congo (Acker et al,

1989). These differences could be related to the analytical conditions, since these two studies used a temperature of 30 ° which is different from our temperature of 37 °. Indeed, temperature is well kn own as a factor that can influence the activity of transaminases (Acker et al, 1989; Vincent et al, 1983). The recommended temperature for standardization is 30 °, although, the assay can be performed at 37 °, kn owing that the results would be increased (IFCC, 2002).The presence or not of pyridoxal phosphate in the reagent can also be considered as another factor that may impact the results. In fact, most manufacturers do not use pyridoxal phosphate for better stability of the reagent.
However, studies carried out in Cameroon under the same conditions as ours Boun and Thanthou, 1985) reported results that are superior to ours. These data suggest the influence of other pre-analytical, analytical and even physiological factors on transaminase activity. According to some authors, the tourniquet application time must be as short as possible to avoid hemolysis and the withdrawal in the extended position, which gives values lower than in the sitting position Vincent et al, 1983.

Reference values for transaminases were significantly higher in males compared to females ($p < 0.05$). These findings corroborate those found in Kenya (Collins et al, 2015) and Uganda (Eller et al, 2008). This male predominance was found by the CSCQ (2004). Similarly, a study conducted in Belgium among blood donors found an increase in ALT in men [19]. In fact, most authors did not seek gender variation.

In addition to sex, the second factor studied was age. In our study, we did not find any significant variation in transaminases based on age. In this regard, authors have different views. Some authors reported a decrease in ALT based on age (Mamie et al; 2012), whereas others (Collins et al, 2015) reported an increase in ALT related to age only in males.

CONCLUSION

Normal values of transaminases in our study population are very different from those found in Western countries, which are our main suppliers of reagents. This shows the interest in determining the normal values which are specific to each population. Our results also showed that sex is a variation factor to be considered when interpreting transaminase results.

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