PREVALENCE OF HYPERURICEMIA IN THE BIOCHEMISTRY LABORATORY OF ARISTIDE LE DANTEC HOSPITAL

Abstract

Introduction : Hyperuricemia is a common biochemical abnormality associated with several pathologies such as chronic kidney disease, arterial hypertension, and cardiovascular diseases. The aim of our study was to determine the prevalence of hyperuricemia among hospitalized patients at Aristide Le Dantec Hospital.

Methodology: This was a retrospective study covering the period from January 4, 2021, to January 4, 2022, focusing on serum samples from hospitalized patients sent to the biochemistry laboratory of Aristide Le Dantec University Hospital for blood uric acid measurement. Uric acid assay was performed on the ARCHITECT ci4100 analyzer (Abbott). Data were collected from the registry of results for hospitalized patients and processed using Microsoft Excel 2013.

Results: Our study included 444 patients aged from 10 days to 88 years, with a mean age of 42 years and a male-to-female sex ratio of 1.27. The prevalence of hyperuricemia in our population was 61.03%, with a higher frequency among patients aged 61 to 80 years (37.63%). 53.03% of hyperuricemia cases originated from the cardiology department, followed by pediatric oncology (26.20%). The prevalence of hyperuricemia in cardiovascular diseases was 68.45%, 57.04% in cancer patients, 86.7% in renal diseases, and 75% in patients with pre-eclampsia.

Conclusion : At the end of our study, we observed a high prevalence of hyperuricemia, more frequent in cardiovascular pathologies, followed by cancers and renal diseases.

Keywords: Hyperuricemia, cardiovascular diseases, HALD (Hôpital Aristide Le Dantec).

1. INTRODUCTION

In humans, uric acid is a physiological molecule, the final product of purine base metabolism (adenine and guanine). During human evolution, the enzyme uricase, which degrades uric acid into allantoin (a highly soluble compound) through oxidation, was lost. Physiological degradation of uric acid is therefore no longer possible, and the only elimination pathways are renal (75%) and intestinal (25%) [1]. At physiological pH, uric acid is almost completely ionized and present in plasma as sodium urate. Uric acid and sodium urate are relatively insoluble and easily precipitate in aqueous solutions such as urine or synovial fluid when present at high concentrations [2]. Hyperuricemia is a common biochemical abnormality resulting from excessive urate production and/or reduced renal excretion of uric acid. Its definition is based on the solubility limit of urate in body fluids and has been defined as a urate concentration >60 mg/L in women and >70 mg/L in men [3]. Recent experimental and epidemiological data correlate hyperuricemia with chronic kidney disease, arterial hypertension, and cardiovascular diseases [4]. Despite the simplicity of uric acid measurement, data on the prevalence of hyperuricemia in the Senegalese population are rare or even nonexistent. It is in this context that we conducted this study, whose general objective is to determine the prevalence of hyperuricemia among hospitalized patients at Aristide Le Dantec Hospital during the year 2021.

2. METHODOLOGY

We conducted a study on serum samples from patients referred to the Biochemistry Laboratory of Aristide Le Dantec University Hospital for uric acid assay, performed as part of routine or emergency care. This was a retrospective and descriptive study over a one-year period from January 4, 2021, to January 4, 2022.

Included were all hospitalized patients at Aristide Le Dantec University Hospital whose samples were received at the Biochemistry Laboratory during this period for blood uric acid measurement and analyzed using the Architect ci4100. Excluded were patients with missing or incomplete information (sex, age, etc.), or measurements performed in biological fluids other than blood. Blood samples were collected in dry tubes or heparinized tubes by venipuncture at the elbow crease.

Samples were transported in dedicated bags in accordance with current standards to prevent any alteration, then centrifuged at 3000 rpm for 5 minutes at the Biochemistry Laboratory of Dantec, where analysis was performed immediately. For our study, we used the WHO definition criteria for hyperuricemia: uric acid level >70 mg/L in men, >60 mg/L in women, and >40 mg/L in children [5].

All observations were entered and coded in Windows Excel 2016, then analyzed using SPSS software. Graphs were generated using Excel 2016. Results are presented in tables and figures.

3. RESULTS

A total of 444 patients received at the Biochemistry Laboratory of Aristide Le Dantec University Hospital were included. The mean age of this population was 40.27 years, with a male-to-female sex ratio of 1.27 (Table 1). The mean age was 40.27 years, ranging from 10 days to 88 years. The most represented age groups were 0–20 years (35%) and 61–80 years (34%). The other age groups were distributed as follows: 17% aged 41–60 years, 9% aged 21–40 years, and 4% aged 80–90 years (Figure 1). The study population included 249 males and 195 females (56% and 44%, respectively). The M/F sex ratio was 1.27, indicating male predominance (see Figures 2 and 3). Most patients came from the cardiology department (46%), followed by pediatric oncology (29%). Internal medicine and ophthalmology each accounted for 5.4%, CGO (likely Gynecology-Obstetrics) for 5%. The remaining patients were distributed across other departments of the hospital (Rheumatology, Urology, Dermatology, etc.), each with ≤4% **(**Figure 4). We found that 46.39% of prescriptions were for cardiovascular diseases (acute coronary syndrome, global heart failure, various cardiopathies, etc.). Cancers (malignant hemopathies, retinoblastomas, nephroblastomas, etc.) ranked second at 30.46%, followed by other indications (cirrhosis, cholestasis, infectious syndrome, pneumopathy, etc.) at 12%. Pre-eclampsia, renal diseases, hypertension, and initial check-ups each accounted for <4% (Figure 5). The prevalence of hyperuricemia in our study population was 61.03%. Out of 444 patients, 271 presented with hyperuricemia (Figure 6)**.** Hyperuricemia was more frequent in patients aged 61–80 years (37.63%) and 0–20 years (29.89%). In other age groups: 18.83% aged 41–60 years, 9.23% aged 21–40 years, and 4.43% aged 80–90 years (Figure 7). Prevalence was higher in males (52%) than in females (48%) (Figure 8). In our study, 52.03% of hyperuricemia cases came from the cardiology department, followed by pediatric oncology at 26.20%. Nephrology and CGO each accounted for 4.8%. Other departments had <3% (Figure 9). The prevalence of hyperuricemia in cardiovascular diseases (ACS, global heart failure, various cardiopathies, etc.) was 68.45%, 57.04% in cancers (malignant hemopathies, retinoblastomas, nephroblastomas, etc.), 75% in pre-eclampsia, and 86.67% in renal diseases (Figure 10).

4. DISCUSSION

The general objective of our work was to assess the prevalence of hyperuricemia among hospitalized patients at Aristide Le Dantec Hospital. To this end, we conducted a retrospective study on 444 serum samples processed at the biochemistry laboratory of Aristide Le Dantec University Hospital in Dakar from January 4, 2021, to January 4, 2022. Analysis of our results showed a mean patient age of 40.27 years (range: 10 days to 88 years). The most represented age groups were 0–20 years (35%) and 60–80 years (34%). There was male predominance with a sex ratio of 1.27 (M/F). The prevalence of hyperuricemia in our population was 61.03%. This result is high compared to several studies, such as those by MALOBERTI A et al. in Italy [6] and PADYA BJ et al. in America [7], which reported 28.2% and 21.2%, respectively. This can be explained by the fact that our study was conducted in an unhealthy population of hospitalized patients with various pathologies, unlike the cited studies which involved apparently healthy subjects. Hyperuricemia was more frequent in patients aged 61–80 years (37.63%). This is similar to the study by ALAYA A et al. in Tunisia [8], which found 35.6% in subjects over 60 years. This is related to the fact that diseases associated with

hyperuricemia most often manifest in older subjects. The prevalence of hyperuricemia was slightly higher in males (52%) than in females (48%). This is consistent with the study by EL AISSAOUI M. [9], which also reported male predominance (80.5% in men vs 19.5% in women). This result is due to the male predominance observed in our study population (56%). The distribution of hyperuricemia by prescribing department was as follows: 52.03% from cardiology, followed by pediatric oncology at 26.20%. Nephrology and CGO each accounted for 4.8%. Other departments had <3%. In cardiovascular diseases (ACS, global heart failure, various cardiopathies, etc.), the prevalence of hyperuricemia was 68.45%. This is consistent with studies by EL AISSAOUI M. [9] and PALAZZUOLI A. [8], which reported similar values (53% and 43%). Indeed, heart failure is characterized by overactivation of xanthine oxidase, leading to increased free radical release and hyperuricemia [9]. Moreover, diuretic treatment used in heart failure patients promotes joint reabsorption of filtered Na+ and urate anions in the renal tubule to compensate for distal sodium loss induced by diuretics, contributing to elevated uric acid levels [10]. In patients followed for cancer (malignant hemopathy, retinoblastoma, nephroblastoma, or others), the prevalence of hyperuricemia was 57.04%. This is higher than the study by ANNEMANS et al. [11], which reported 18.9%. This may be explained by the fact that ANNEMANS et al. [50] studied 788 cancer patients, unlike our study which included only 135 patients. This may also be due to tumor lysis syndrome, resulting from rapid and massive lysis of cancer cells, releasing components in quantities exceeding renal excretion capacity. It can be spontaneous or secondary to chemotherapy and is characterized by hyperuricemia, hyperkalemia, hyperphosphatemia, and hypocalcemia, constituting a metabolic emergency in oncology and hematology [12]. We found that among patients with renal diseases, 86.67% had hyperuricemia. This is consistent with the study by NGOIE S M. in Congo [13], which reported a similar result (57.14%). Indeed, in chronic kidney disease, reduced glomerular filtration of urate leads to hyperuricemia [14]. Among all patients presenting with pre-eclampsia, 75% had hyperuricemia. This is higher than the study by TCHAOU B A in Benin [15], which found 36%. This difference may be explained by the fact that TCHAOU B A's study involved 103 pregnant women with pre-eclampsia, unlike our study which included only 16 patients. This result is related, on one hand, to excessive uric acid production by the ischemic placenta during pre-eclampsia, associated with reduced renal excretion in the third trimester of pregnancy, and on the other hand, to the presence of arterial hypertension which further increases hyperuricemia [16] [17].

Table 1: Epidemiological characteristics of the population

Variable	**Value**
Total Number	444
Mean age (years)	40,26
Sex ratio (Males/Females)	1,27

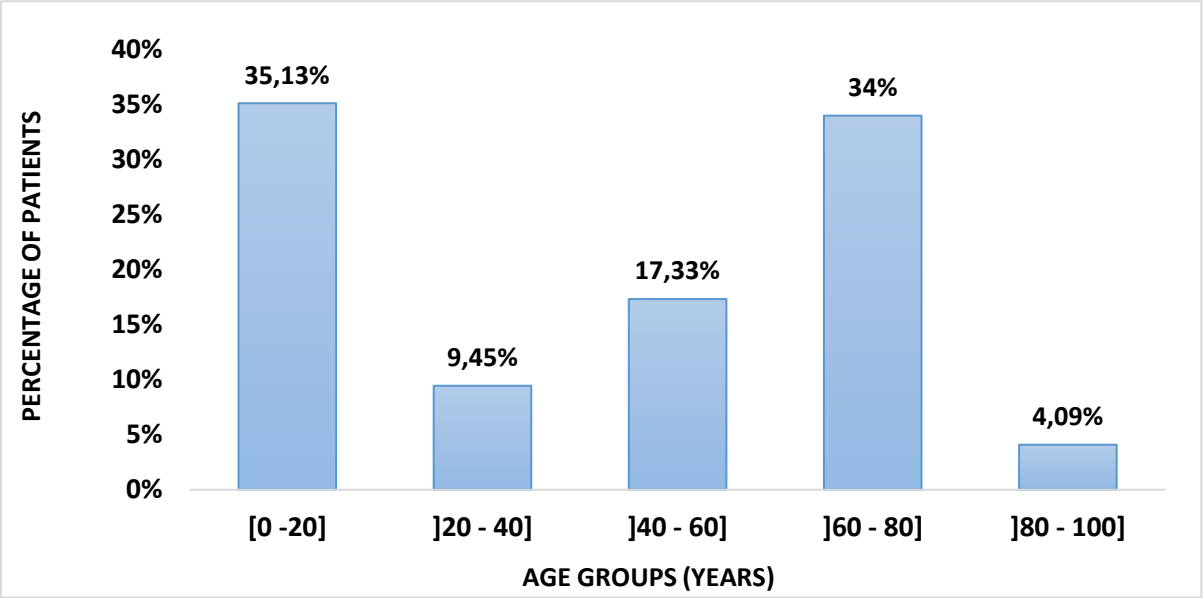

Figure 1: Distribution of patients by age group.

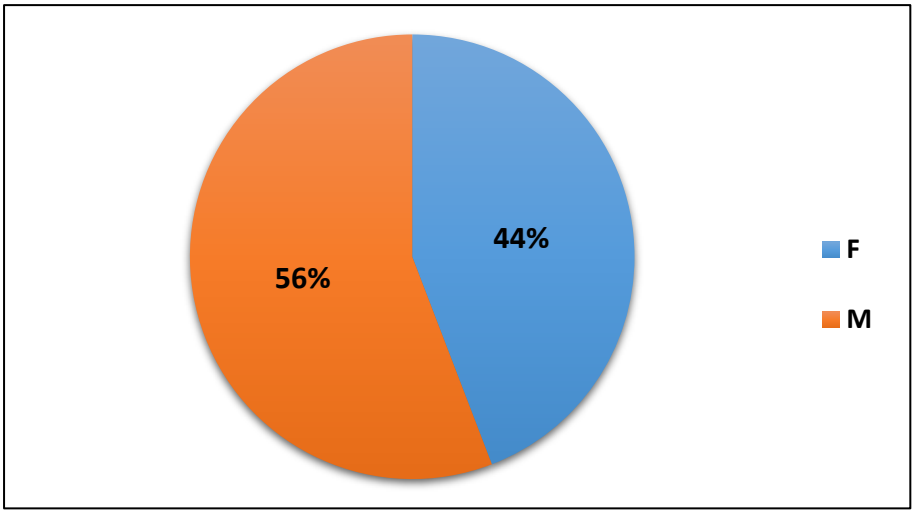

Figure 2: Distribution of patients by sex.

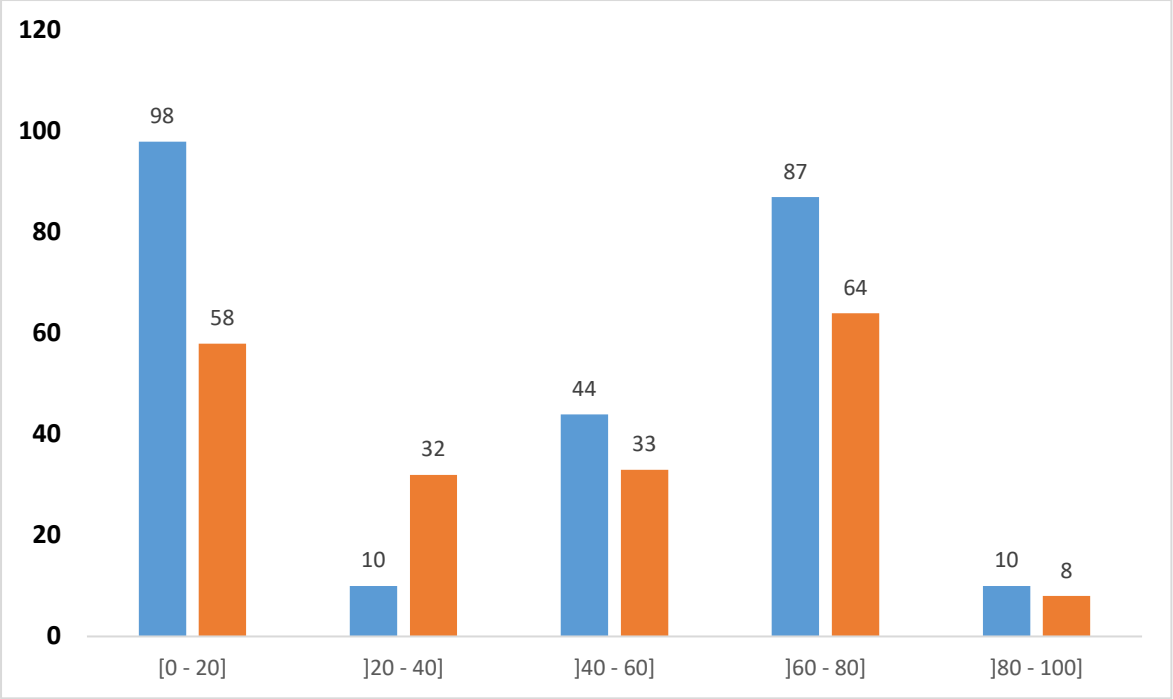

Figure 3: Age and sex distribution of patients.

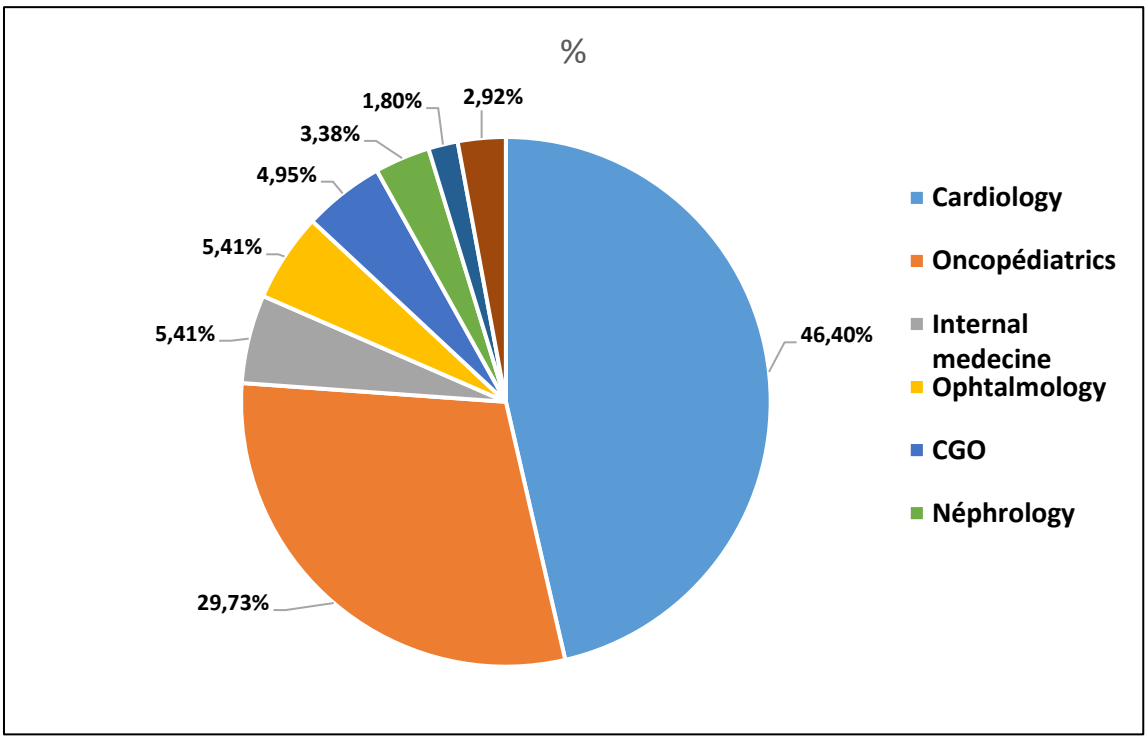

Figure 4: Distribution of patients according to prescribing services

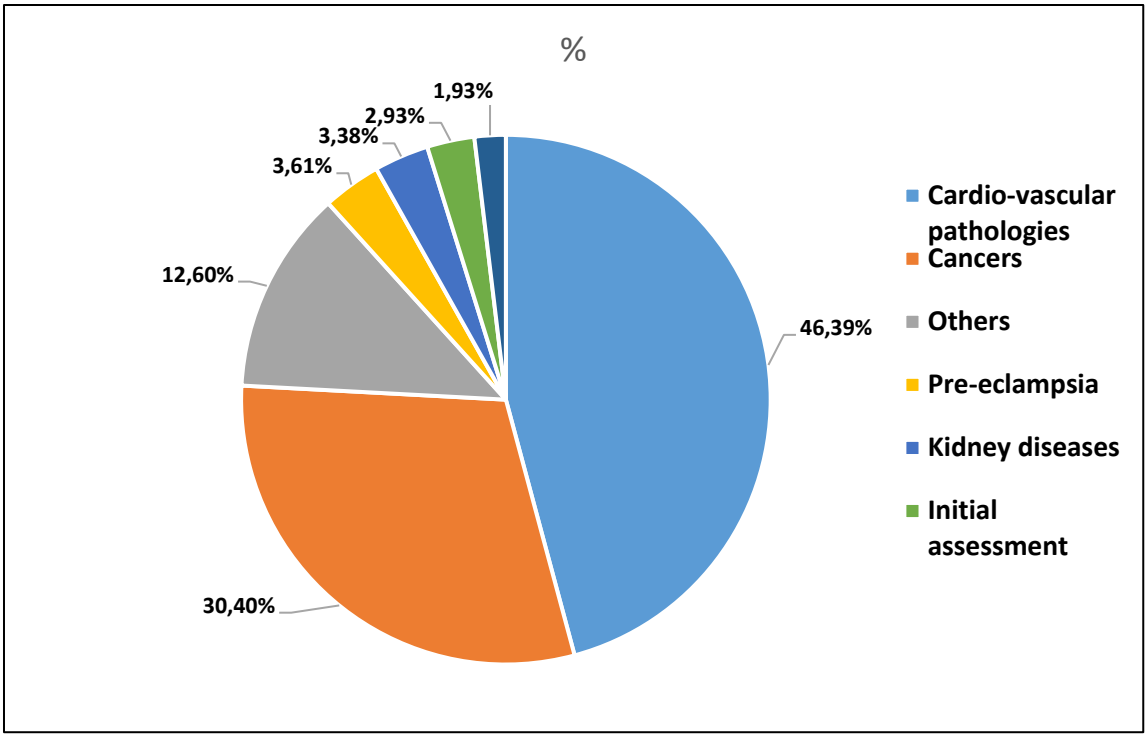

Figure 5: Distribution of patients according to the reason for prescription

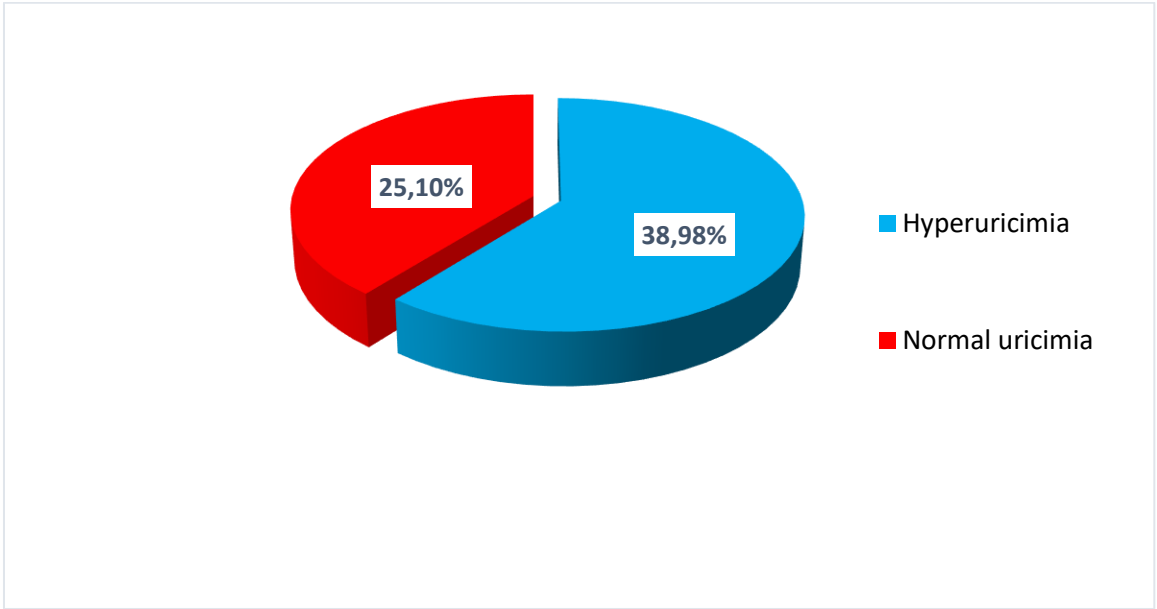

Figure 6: Prevalence of hyperuricemia

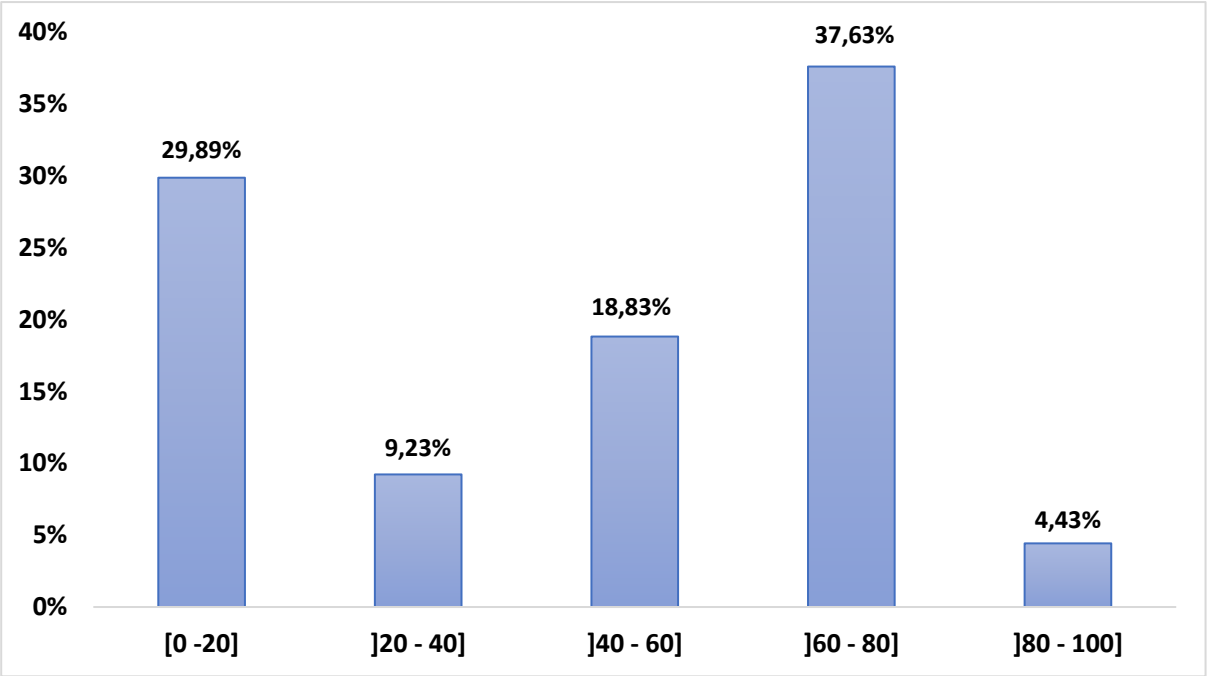

Figure 7: Distribution of hyperuricemia according to age

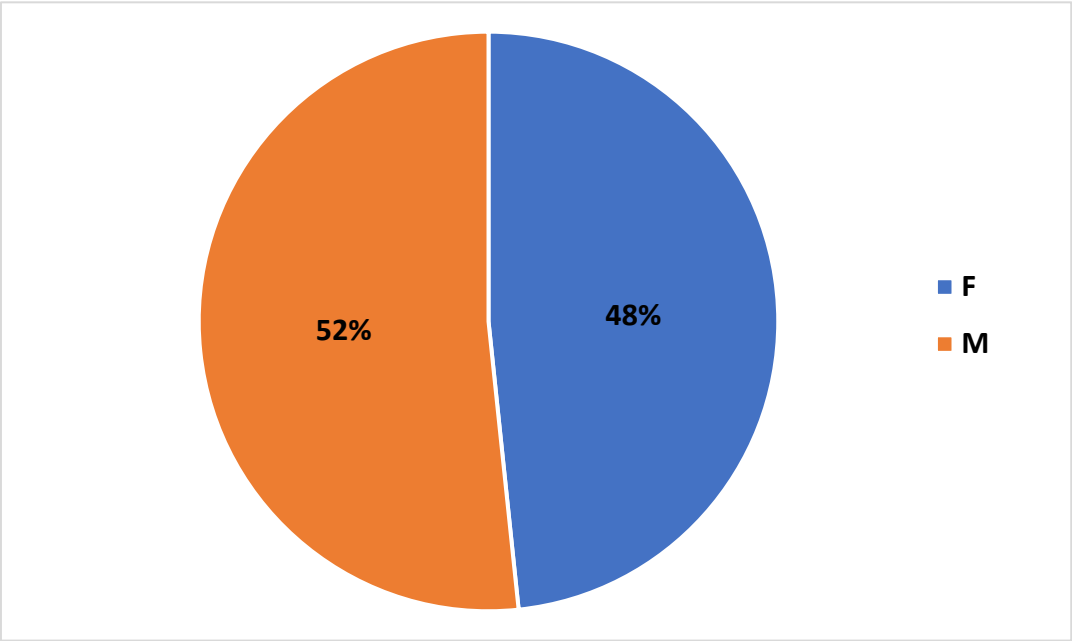

Figure 8: Distribution of hyperuricemias according to sex.

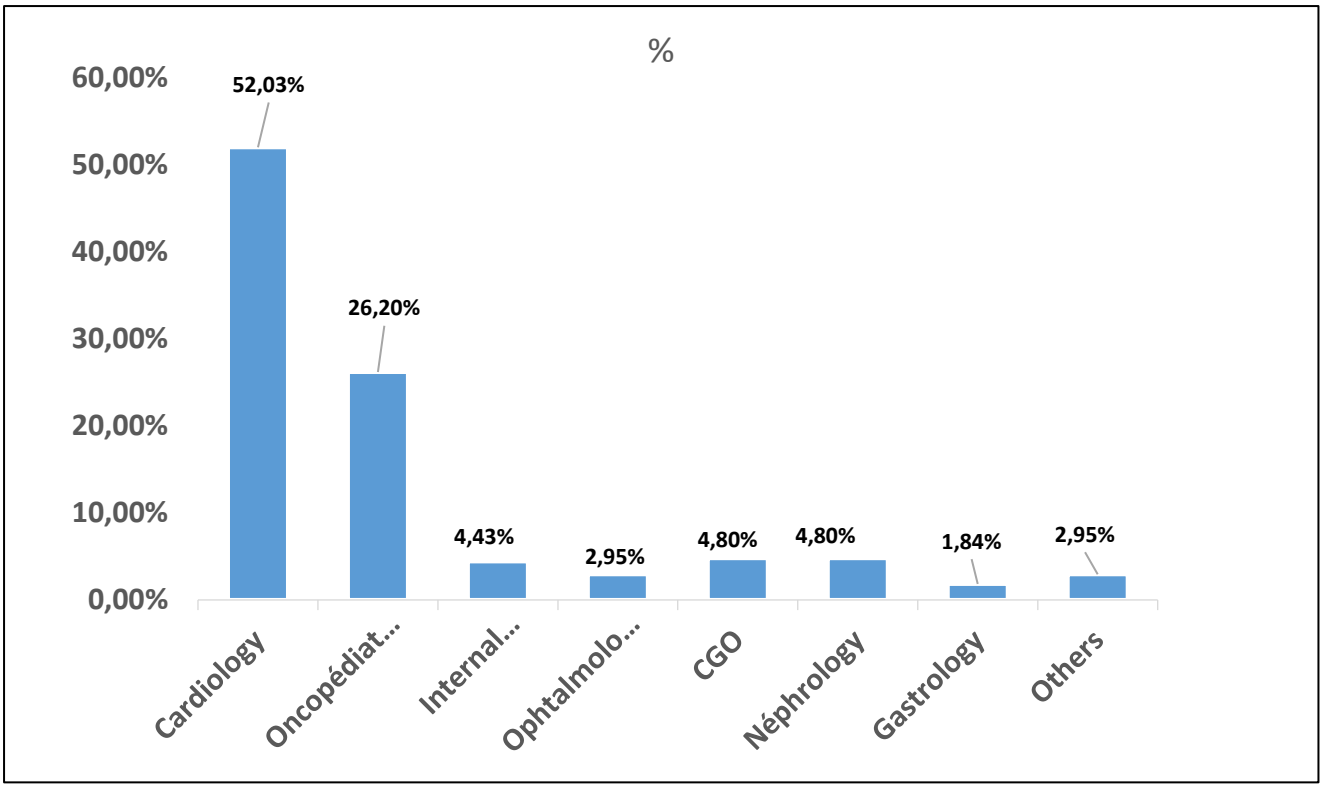

Figure 9: Distribution of hyperuricemia cases according to the prescribing service.

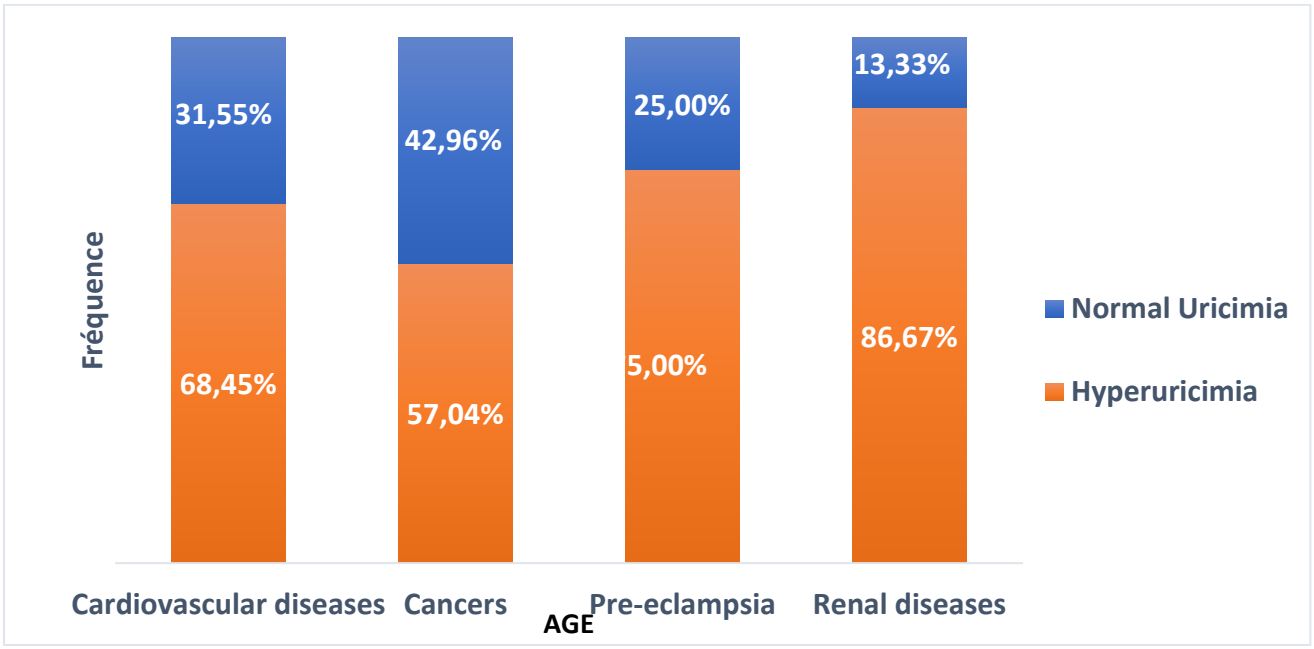

Figure 10: Prevalence of Hyperuricemias According to the Reason for Prescription.

Conflict of interest: authors declare no conflict of interest

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Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.