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Prevalence and Factors Associated with Elevated Serum Creatinine among Patients Admitted to the Emergency Department of the National Reference University Hospital Center in N'Djamena, Chad

Hassan Khamis[1,2], Abdel-Hamid Abdallah Abakar[3], Saleh Mahamat Alkhatip Ahmad[3], Jeanne D'Arc Wendmintiri Kabre[1], Cisse Hama[1], Pierre Koulnoudji[2], Djibrine Mahamat Djibrine[2], Tahir Senoussi[2], Djibrine Adoum Oumar[3], Nadjiouroum Nga-Asra[2], Adama Sawadogo[1], Abdelsalam Tidjani[4], Aly Savadogo[1]

[1]Laboratory of Applied Biochemistry and Immunology (LaBIA), Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso
[2]Emergency Department Laboratory, National Reference University Hospital Center (CHU-RN), N'Djamena, Chad
[3]Laboratory of Research on Natural Substances, Faculty of Exact and Applied Sciences (FSEA), University of N'Djamena, N'Djamena, Chad
[4]Laboratory of Food Science and Nutrition Research (LaRSAN), Faculty of Human Health Sciences (FSSH), University of N'Djamena, N'Djamena, Chad
Email: djibfitri@yahoo.fr

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Abstract

Renal function abnormalities constitute a major health concern in hospital settings, particularly in emergency departments, where patients may present with acute conditions and multiple renal risk factors. This study aimed to assess abnormalities in blood urea, serum creatinine, and estimated glomerular filtration rate (eGFR), as well as associated factors, among patients admitted to the Medical Emergency Department of the National Reference University Hospital Center (CHU-RN) in N'Djamena. This was a descriptive and analytical cross-sectional study conducted from August 3 to September 3, 2026, at the Medical Emergency Department of the CHU-RN in N'Djamena. The study included 121 patients who underwent serum urea and creatinine measurements. Sociodemographic, clinical, and biological data were collected from medical records and information provided by the patients. The eGFR was estimated from serum creatinine using the 2021 CKD-EPI equation. Patients were classified according to eGFR categories. Descriptive analysis was performed, followed by an assessment of associations between renal function abnormalities and sociodemographic and clinical characteristics using appropriate sta-

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tistical tests. Statistical significance was set at $p < 0.05$. Among the 121 patients studied, 71 (58.68%) had elevated serum creatinine levels, while 74 (61.16%) had elevated blood urea levels. Elevated serum creatinine affected 59.32% of men and 58.06% of women. The 39 - 59-year age group was the most represented (42.98%). Overall, 74 patients (61.16%) had at least one medical history or renal risk factor, including diabetes mellitus (20.66%), hypertension (16.52%), non-steroidal anti-inflammatory drug (NSAID) use (11.57%), and the use of medicinal plants (12.40%). Regarding eGFR, stage G5 was the most frequent, accounting for 43 patients (35.54%), followed by stage G2 with 29 patients (23.97%). Stages G3a to G5 accounted for 78 patients (64.46%). This study revealed a high frequency of abnormalities in blood urea, serum creatinine, and eGFR among patients admitted to the emergency department of the CHU-RN in N'Djamena. These findings highlight the importance of early and systematic assessment of renal function in emergency settings, particularly among patients with risk factors such as diabetes, hypertension, or exposure to potentially nephrotoxic medications. Multicenter studies with larger sample sizes and longitudinal follow-up are needed to better determine the factors associated with renal impairment in Chad.

Keywords

Renal Function, Creatinine, Blood Urea, Estimated Glomerular Filtration Rate, Elevated Serum Creatinine, Renal Impairment, Emergency Department, N'Djamena, Chad

1. Introduction

Elevated serum creatinine, or hypercreatininemia, is a biological abnormality characterized by an increase in blood creatinine concentration, most often reflecting a reduction in the glomerular filtration rate (GFR) and impaired renal function [1]. Creatinine is a by-product of muscle creatine metabolism and is eliminated almost exclusively through glomerular filtration, making it one of the most widely used biomarkers for assessing renal function in clinical practice [2] [3]. An increase in serum creatinine is an important warning sign that may indicate acute kidney injury, chronic kidney disease, or renal impairment secondary to various systemic conditions, such as diabetes, hypertension, sepsis, or severe dehydration [4] [5]. According to international recommendations, an increase in serum creatinine is one of the main diagnostic criteria for acute kidney injury (AKI), a condition frequently encountered in emergency departments and associated with substantially increased morbidity, mortality, and healthcare costs [6]. Worldwide, kidney diseases represent a major public health concern and are responsible for several million deaths each year, with their incidence continuing to increase due to population aging and the growing burden of non-communicable diseases [7] [8]. In low- and middle-income countries, particularly in sub-Saharan Africa, the diagnosis of renal disorders remains frequently delayed because of limited access

to laboratory investigations, widespread self-medication and use of traditional medicine, as well as inadequate screening programs [9] [10]. Hospital emergency departments receive patients on a daily basis with severe conditions that may lead to rapid deterioration of renal function, including shock, severe infections, poisoning, trauma, and metabolic complications [11]. In these patients, elevated serum creatinine is frequently observed and constitutes an adverse prognostic marker, being associated with longer hospital stays, increased need for dialysis, and higher in-hospital mortality [12]. In Africa, several studies have shown that acute kidney injury (AKI) is a frequent complication among patients admitted to emergency departments, with contributing factors including sepsis, dehydration, hypertension, diabetes, infectious diseases, and exposure to nephrotoxic drugs or substances [13] [14]. In Chad, epidemiological data on renal function disorders remain limited, particularly in referral hospitals. Studies conducted in N'Djamena nevertheless highlight the importance of renal impairment among hospitalized populations. [15] reported a high proportion of patients with end-stage chronic kidney disease among deaths related to this condition at the National Reference University Hospital Center (CHU-RN) in N'Djamena. More recently, a study conducted at the CHU-RN showed that acute kidney injury represented a significant clinical issue in intensive care, while another study published in 2025 investigated prognostic factors associated with mortality among patients with acute kidney injury in N'Djamena. Furthermore, [16] reported a high frequency of abnormalities in renal parameters, including elevated serum creatinine and reduced glomerular filtration rate, among children with type 1 diabetes followed at the Mother and Child University Hospital Center in N'Djamena. These findings highlight the importance of assessing renal function in healthcare facilities in Chad. Uremia is a clinical and biological syndrome resulting from the accumulation of substances normally eliminated by the kidneys, particularly in advanced or severe acute kidney failure. It is not limited to an increase in blood urea levels but involves the accumulation of numerous uremic toxins [17]. Determining the prevalence of elevated serum creatinine and identifying its associated factors among patients admitted to this department is essential for improving the early detection of renal impairment, optimizing therapeutic management, and reducing complications and mortality related to renal dysfunction [18]. It is within this context that the present study, entitled "Prevalence and Factors Associated with Elevated Serum Creatinine among Patients Admitted to the Emergency Department of the National Reference University Hospital Center (CHU-RN) in N'Djamena", was conducted. The objective was to determine the prevalence of elevated serum creatinine and uremia and to identify the main demographic, clinical, and biological factors associated with elevated serum creatinine in this hospital population.

2. Materials and Method

2.1. Study Design and Setting

This was an observational, analytical, cross-sectional study with a descriptive

component, conducted in the Emergency Department of the National Reference University Hospital Center (CHU-RN) in N'Djamena, Chad. The CHU-RN is a referral hospital that receives patients from the city of N'Djamena as well as from various provinces across the country (Figure 1).

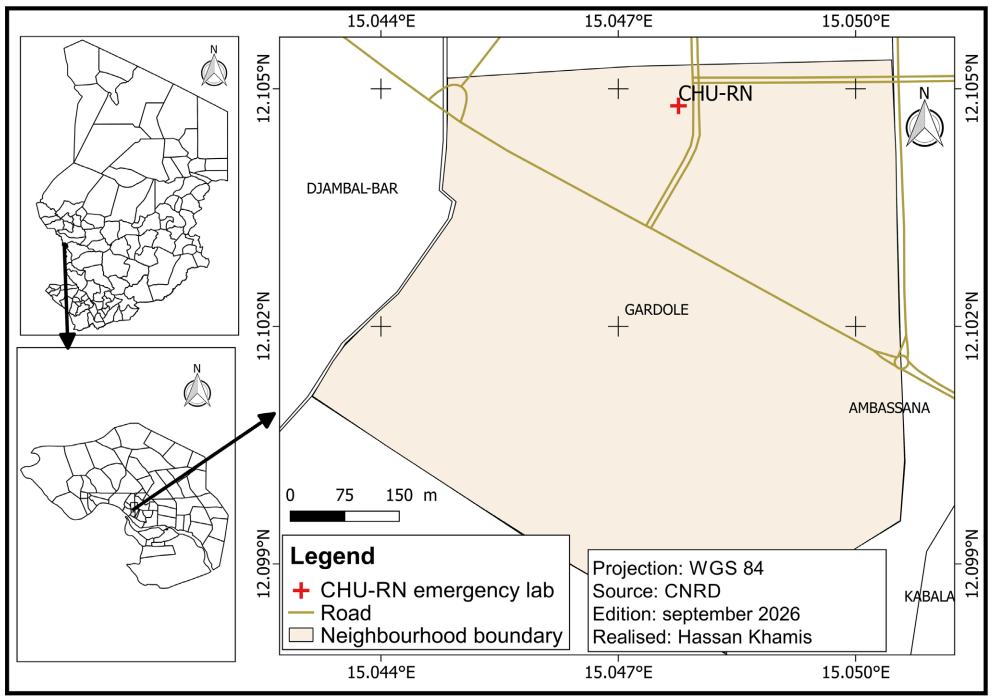

Figure 1. Map of the study area.

2.2. Study Period, Population, Data Collection, and Study Variables

This was a retrospective, descriptive, observational study of biological parameters of renal function among patients examined in the emergency department of CHU-RN. Data collection covered the period from August 3 to September 3, 2026.

2.3. Study Population

The initial study population consisted of 400 patients examined during the study period. After reviewing the available medical records, 121 records were retained for analysis, while 279 records were not included in the analytical sample. The individual reasons for non-inclusion were not systematically documented; therefore, no breakdown of exclusions by reason was established.

2.3.1. Inclusion Criteria

Medical records were included if they concerned patients examined in the emergency department during the study period and contained the information required to analyze the biological parameters under investigation.

2.3.2. Non-Inclusion Criteria

Records that did not contain sufficient information to address the study objectives

were not retained for analysis. Since the individual reasons for non-inclusion were not systematically recorded, they were not categorized further.

2.4. Data Collection

Data were collected retrospectively from available medical records and laboratory test results. Relevant information was entered into a data collection form and subsequently organized in an electronic spreadsheet for analysis. Depending on data availability, the variables studied included:

- Sociodemographic characteristics, particularly age and sex;
- Serum creatinine concentration;
- Blood urea concentration;
- Estimated glomerular filtration rate (eGFR);
- eGFR categories.

Other relevant clinical and laboratory information available in the records.

For each variable, the denominator used to calculate frequencies and percentages corresponded to the number of patients with usable data for that variable. Missing data were identified and accounted for in the corresponding calculations.

2.5. Laboratory Parameters Studied

2.5.1. Serum Creatinine

Serum creatinine was investigated as the primary laboratory parameter of renal function. Results were extracted from the available laboratory reports.

Creatinine concentrations were interpreted according to the reference intervals used by the laboratory that performed the analyses. Values exceeding the upper reference limit were classified as elevated serum creatinine.

Serum creatinine was reported in its original measurement unit when describing the results. When necessary, values were converted to mg/dL for eGFR calculation.

2.5.2. Blood Urea

Blood urea was investigated as an additional biochemical parameter. Results were extracted from the available laboratory reports and classified according to the laboratory's reference values.

Values exceeding the upper reference limit were considered elevated. The exact numerical thresholds used were required to correspond to the reference intervals actually applied by the laboratory; no undocumented thresholds were retrospectively assigned.

2.5.3. Estimation of the Glomerular Filtration Rate

The estimated glomerular filtration rate (eGFR) was calculated using serum creatinine, age, and sex according to the 2021 CKD-EPI creatinine equation, which does not include a race coefficient [19].

The equation used was:

$$\text{eGFR} = 142 \times \min(\text{SCr}/\kappa,1)\alpha \times \max(\text{SCr}/\kappa,1) - 1.200 \times 0.9938\ \text{Age} \times \text{sex factor}$$

where:

- SCr represents serum creatinine expressed in mg/dL.
- κ (kappa) is 0.7 for women and 0.9 for men.
- α (alpha) is −0.241 for women and −0.302 for men.
- The sex factor is 1.012 for women and 1.000 for men.
- Age is expressed in years.

The functions min and max represent the minimum and maximum, respectively, of the specified arguments.

Serum creatinine values reported in mg/L were converted to mg/dL by dividing by 10. Values reported in µmol/L were converted to mg/dL by dividing by 88.4. These conversions were performed before eGFR calculation to ensure consistency with the units required by the equation [20].

The equation was applied to adult patients for whom the required demographic and laboratory data were available. The results were expressed in mL/min/1.73 m^2.

2.5.4. eGFR Classification

eGFR values were classified into six categories according to the KDIGO recommendations.

Category	eGFR (mL/min/1.73 m^2)	Interpretation
G1	≥90	Normal or high
G2	60 - 89	Mildly decreased
G3a	45 - 59	Mildly to moderately decreased
G3b	30 - 44	Moderately to severely decreased
G4	15 - 29	Severely decreased
G5	<15	Severely reduced kidney function

An eGFR below 60 mL/min/1.73 m^2 was considered indicative of a decreased glomerular filtration rate. However, a single measurement is insufficient to establish a diagnosis of chronic kidney disease. According to KDIGO recommendations, chronicity must be established by demonstrating that kidney abnormalities persist for at least three months or by identifying other clinical, laboratory, or imaging evidence of chronicity [21].

In the emergency department setting, results were therefore interpreted as biological abnormalities observed at the time of examination. When serum creatinine changes acutely, eGFR estimates may be less reliable because the equation assumes a sufficiently stable relationship between creatinine production and elimination. Consequently, eGFR categories were used for descriptive purposes and were not considered, on their own, sufficient to establish an etiological or chronic diagnosis.

2.6. Variables and Outcome Measures

The primary outcome was the proportion of patients whose serum creatinine concentration exceeded the laboratory's upper reference limit.

The secondary outcomes were:

- proportion of patients with elevated blood urea;
- The distribution of patients across eGFR categories;
- The proportion of patients with an eGFR below 60 mL/min/1.73 m^2;
- The distribution of laboratory abnormalities according to the available socio-demographic characteristics.

The calculated proportions applied to the included records with usable data. They should not automatically be interpreted as the prevalence of renal abnormalities among all 400 patients initially examined or in the general population.

2.7. Statistical Analysis

Data were organized and analyzed using Microsoft Excel.

The analysis was primarily descriptive. Categorical variables were summarized as frequencies and percentages. Quantitative variables were described using appropriate descriptive statistics, including the mean and standard deviation when suitable for the distribution, or the median and interquartile range when more appropriate.

For each variable, the percentage was calculated by dividing the observed number of patients by the number of patients with usable data for that variable and multiplying the result by 100.

Since no hypothesis testing, regression modeling, or multivariable analysis was planned, no claims of statistical significance or independent associations were made.

2.8. Ethical Considerations

The study was based on the retrospective review of available medical records and laboratory reports. The confidentiality of individual information was to be maintained throughout data collection, entry, and analysis Any statement concerning ethical approval, institutional authorization, or a waiver of informed consent must be supported by documentation actually obtained. The approval number and the name of the competent ethics committee should be specified when available. In the absence of documented information, no specific approval can be claimed in the manuscript.

3. Results

3.1. Sociodemographic Analysis

3.1.1. Distribution of Patients According to Sex (N = 121)

Among the 59 male patients, 35 (59.32%) had elevated serum creatinine, compared with 24 (40.68%) who had normal serum creatinine levels. Among the 62 female patients, 36 (58.06%) had elevated serum creatinine, compared with 26 (41.94%) who had normal serum creatinine levels. Overall, 71 patients (58.68%) had elevated serum creatinine, whereas 50 (41.32%) had normal serum creatinine levels. The proportion of elevated serum creatinine was therefore similar among

male and female patients (Table 1).

Table 1. Distribution of patients according to sex.

Serum creatinine status	Male n 59	% Male	Female n = 62	% Female	Total N = 121	Total %
Normal serum creatinine	24	40.68%	26	41.94%	50	41.32%
Elevated serum creatinine	35	59.32%	36	58.06%	71	58.68%
Total	**59**	**100%**	**62**	**100%**	**121**	**100%**

3.1.2. Distribution of Patients According to Age Group (N = 121)

The 39 - 59-year age group was the most represented, comprising 62 patients (42.98%). Patients aged 18 - 38 years and those aged ≥ 60 years accounted for 28.10% and 28.92% of the study population, respectively. Women predominated in the 18 - 38-year and 39 - 59-year age groups, whereas men were predominant among patients aged ≥ 60 years (Table 2).

Table 2. Distribution of patients according to age group (N = 121).

Age group (years)	Male (n)	Female (n)	Total (n)	Proportion (%)
18 - 38	10	24	34	28.10
39 - 59	23	29	52	42.98
≥60	26	9	35	28.92
Total	**59**	**62**	**121**	**100**

3.1.3. Distribution of Patients According to Geographic Origin

Among the 121 patients, 81 (66.94%) were from N'Djamena, whereas 40 (33.06%) came from the provinces. Women accounted for 62 patients (51.24%), compared with 59 men (48.76%) (Table 3).

Table 3. Distribution of patients according to geographic origin.

Geographic origin	Male n (%)	Female n (%)	Total n	Proportion (%)
N'Djamena	37 (30.58)	44 (36.36)	81	66.94
Provinces	22 (18.18)	18 (14.88)	40	33.06
Total	**59 (48.76)**	**62 (51.24)**	**121**	**100.00**

3.1.4. Medical History and Risk Factors

Among the 121 patients, 74 (61.16%) had at least one medical history or risk factor, whereas 47 (38.84%) had none. Diabetes mellitus was the most frequently reported factor (20.66%), followed by hypertension (16.52%). The use of medicinal plants and non-steroidal anti-inflammatory drugs (NSAIDs) was reported in 12.40% and 11.57% of patients, respectively. These factors may be associated with impaired renal function; however, no causal relationship can be established from these data (Table 4).

Table 4. Medical history and risk factors among patients.

Medical history/Risk factor	Male (n)	Female (n)	Total (n)	Percentage (%)
Diabetes mellitus	13	12	25	20.66
Hypertension	9	11	20	16.53
NSAID use	5	9	14	11.57
Use of medicinal plants	9	6	15	12.40
None	23	24	47	38.84
Total	**59**	**62**	**121**	**100.00**

3.2. Biological Results

3.2.1. Distribution of Patients According to Urea and Creatinine Status by Sex (N = 121)

Among the 121 patients, abnormalities were frequent for both blood urea (61.16%) and serum creatinine (58.68%). Blood urea abnormalities were slightly more frequent among men (64.52%) than among women (57.63%). For serum creatinine, the proportions were nearly similar among men (59.32%) and women (58.06%) (Table 5).

Table 5. Distribution of patients according to urea and creatinine status by sex (N = 121).

Biological parameter	Sex	Normal n (%)	Abnormal n (%)	Total n (%)
Blood urea	Male	22 (35.48%)	40 (64.52%)	62 (100%)
	Female	25 (42.37%)	34 (57.63%)	59 (100%)
	Total	**47 (38.84%)**	**74 (61.16%)**	**121 (100%)**
Serum creatinine	Male	24 (40.68%)	35 (59.32%)	59 (100%)
	Female	26 (41.94%)	36 (58.06%)	62 (100%)
	Total	**50 (41.32%)**	**71 (58.68%)**	**121 (100%)**

Note: Abnormal refers to values above the laboratory reference range.

3.2.2. Distribution of Patients According to Urea Status, Place of Origin, and Sex

Among the 121 patients included in the study, elevated blood urea was observed in 74 patients (61.16%), whereas 47 patients (38.84%) had blood urea levels within the normal range. Elevated blood urea was more frequent among patients from the provinces (67.50%) than among those from N'Djamena (58.02%).

According to sex, among patients from N'Djamena, the proportion of elevated blood urea was slightly higher in men than in women, whereas the proportions observed among patients from the provinces were relatively similar between men and women.

These findings are descriptive and should be complemented by an appropriate statistical test to determine whether the observed differences according to place of origin and sex are statistically significant (Table 6).

Table 6. Distribution of patients according to urea status, place of origin, and sex.

Place of origin	Sex	Normal blood urea n (%)	Elevated blood urea n (%)	Total n (%)
N'Djamena	Male	15 (37.50%)	25 (62.50%)	40 (100%)
	Female	19 (46.34%)	22 (53.66%)	41 (100%)
N'Djamena subtotal		**34 (41.98%)**	**47 (58.02%)**	**81 (100%)**
Provinces	Male	7 (31.82%)	15 (68.18%)	22 (100%)
	Female	6 (33.33%)	12 (66.67%)	18 (100%)
Provinces subtotal		**13 (32.50%)**	**27 (67.50%)**	**40 (100%)**
Grand total		**47 (38.84%)**	**74 (61.16%)**	**121 (100%)**

Note: Elevated blood urea refers to blood urea levels above the laboratory reference range.

3.2.3. Distribution of Patients According to eGFR Stages

In our study, stage G5 was the most frequent, accounting for 43 patients (35.54%), followed by stage G2, with 29 patients (23.97%). Stages G3a to G5 comprised 78 patients (64.46%), indicating a substantial proportion of patients with reduced estimated glomerular filtration rate (eGFR). Stage G5 was particularly frequent among patients aged 39 - 59 years, with 27 cases, followed by patients aged 60 years and older, with 12 cases (Table 7).

Table 7. Distribution of patients according to eGFR stages.

eGFR Stage	18 - 38 years	39 - 59 years	≥60 years	Total	%
G1	8	3	3	14	11.57%
G2	9	12	8	29	23.97%
G3a	4	5	3	12	9.92%
G3b	2	2	5	9	7.44%
G4	7	3	4	14	11.57%
G5	4	27	12	43	35.54%
Total	**34**	**52**	**35**	**121**	**100%**

Note: eGFR, estimated glomerular filtration rate. eGFR stages were classified according to the KDIGO categories.

4. Discussion

In our study, elevated serum creatinine was observed in 58.68% of patients, with a similar frequency among men (59.32%) and women (58.06%), with no significant association with sex. This lack of difference contrasts with some African studies that reported a male predominance, particularly in Brazzaville [22]. and Zimbabwe [23]. However, other studies have reported variability according to population characteristics and sex [24] [25]. The similar distribution between men and women in our study may be related to the emergency-care setting and the pres-

ence of common risk factors, such as diabetes mellitus, hypertension, nonsteroidal anti-inflammatory drug (NSAID) use, and medicinal plant use. Therefore, the clinical context and associated risk factors should be considered when interpreting elevated serum creatinine.

In our study, the 39 - 59-year age group was the most represented, comprising 52 patients (42.98%), followed by patients aged ≥ 60 years (28.93%) and those aged 18 - 38 years (28.09%). Women predominated among patients aged 18 - 38 and 39 - 59 years, whereas men predominated among patients aged 60 years and older. This distribution is comparable to that reported in Cameroon in 2025 by Teuwafeu *et al.*, who studied 165 patients hospitalized for non-renal medical and surgical conditions. The mean age was 50.7 ± 17.3 years, with a predominance of the 35 - 55-year age group (47.27%) and a proportion of 26.06% among patients aged ≥ 65 years. These findings are relatively close to those observed in our population, in which patients aged 39 - 59 years also constituted the largest age group [26]. In Ethiopia, a study published in 2025 among 222 patients with acute kidney injury admitted to emergency departments reported a mean age of 48 ± 18 years, with an almost equal distribution between men (49.5%) and women (50.5%). This mean age is also close to that suggested by our age distribution, in which the majority of patients were aged 39 - 59 years (2025). Furthermore, a recent study conducted in Tanzania in 2025 among 200 adult patients with upper gastrointestinal bleeding reported a median age of 62 years. Age ≥ 60 years was significantly associated with the occurrence of acute kidney injury [27]. Another study published in Tanzania in 2025 also identified age > 60 years as a factor associated with mortality among patients with acute kidney injury (2025). Overall, our findings indicate a population predominantly composed of middle-aged adults, while also including a substantial proportion of older patients. This observation is particularly relevant in the emergency-care setting, as advancing age is generally associated with an accumulation of risk factors such as hypertension, diabetes mellitus, cardiovascular diseases, and the use of potentially nephrotoxic medications. The Tanzanian study by [28]. notably reported hypertension as a frequent comorbidity and age ≥ 65 years as one of the risk factors for acute kidney injury.

In our study, 81 patients (66.94%) were from N'Djamena, compared with 40 (33.06%) from the provinces. The predominance of patients residing in N'Djamena could be mainly explained by the geographical proximity of the CHU-RN and by the concentration of referral hospitals and specialized services in the capital. The CHU-RN is a referral facility that receives patients managed across various specialized departments, particularly those with conditions requiring specific investigations and specialized care [29]. Nevertheless, the proportion of patients from the provinces, which represented one-third of the study population (33.06%), reflects the attractiveness of the CHU-RN beyond the capital. This situation could be explained by the need for laboratory investigations and specialized care that are not always available in peripheral health facilities. In the Chadian context, difficulties in accessing healthcare in some remote areas further highlight the im-

portance of referral and counter-referral mechanisms toward facilities with greater diagnostic and therapeutic resources. [30] notably emphasized the importance of strengthening the quality and accessibility of healthcare in resource-limited settings, including through the use of clinical decision-support tools. This finding also fits within the broader context of geographical access to healthcare in sub-Saharan Africa. [31] showed that accessibility to healthcare facilities can vary considerably between urban areas and less advantaged areas across several cities in sub-Saharan Africa. Such differences in geographical accessibility may influence healthcare-seeking behavior and contribute to a concentration of patients in referral facilities. Thus, the high proportion of patients from N'Djamena in our study could primarily be related to the proximity of the CHU-RN and the concentration of specialized services in the capital, whereas the presence of 33.06% of patients from the provinces highlights its role in providing care to patients referred from other regions of the country. However, the present study does not allow an association to be established between geographical origin and the severity of blood urea or serum creatinine abnormalities, as this relationship would require a specific statistical analysis.

This observation is particularly relevant to our study population, as 20.66% of patients had diabetes mellitus and 16.52% had hypertension. The coexistence of these two conditions may contribute to impaired renal function in some patients. However, in our study, these findings remain descriptive and do not allow us to conclude that diabetes or hypertension is statistically associated with elevated serum creatinine in the absence of a comparative analysis between patients with normal and elevated serum creatinine levels.

Regarding NSAIDs, their use was reported in 14 patients (11.57%). This exposure deserves particular attention among patients admitted to emergency departments, as NSAIDs may contribute to acute kidney dysfunction, particularly when combined with other risk factors. A nationwide cohort study published in 2025 showed that adding an NSAID to treatment combining a renin-angiotensin system inhibitor and a diuretic was associated with an increased risk of acute kidney injury [32]. This relationship is also supported by a systematic review and meta-analysis published in 2025, which reported an increased risk of acute kidney injury associated with the combination of NSAIDs, diuretics, and renin-angiotensin system inhibitors [33].

The use of medicinal plants, reported in 12.40% of patients, is also an important factor to consider. In the African context, traditional medicine may coexist with conventional treatments, potentially exposing patients to multiple substances simultaneously. This situation is particularly relevant among individuals who already have renal risk factors, such as diabetes or hypertension. Limited access to healthcare facilities may further complicate patient management in sub-Saharan Africa. Friesen *et al.* (2025) examined differences in walking access to healthcare facilities between formal and informal areas in 19 sub-Saharan African cities, highlighting geographical inequalities in healthcare accessibility [34]. Neverthe-

less, this study does not directly establish a relationship between medicinal plant use and renal dysfunction.

Furthermore, recent literature emphasizes the importance of metabolic and cardiovascular factors in the burden of kidney disease in sub-Saharan Africa. A systematic review and meta-analysis by Yirga *et al.* (2025) investigated chronic kidney disease among patients with hypertension in the region and examined associated factors [35]. These findings provide a relevant epidemiological context for our observation of a substantial prevalence of diabetes mellitus and hypertension among the patients studied.

Overall, 61.16% of our patients had at least one documented medical history or renal risk factor, with diabetes mellitus and hypertension among the most frequently reported conditions. These findings are broadly consistent with the recognized importance of metabolic and cardiovascular conditions in kidney disease. However, statistical analyses of the associations between individual risk factors and elevated serum creatinine remain necessary to determine their specific contribution in our study population.

In our study conducted at the Medical Emergency Department of the CHU-RN in N'Djamena among 121 patients, biochemical abnormalities were frequent, with 61.16% of patients presenting elevated blood urea and 58.68% presenting elevated serum creatinine. Elevated blood urea was more frequent among men (64.52%) than among women (57.63%), whereas elevated serum creatinine occurred at similar proportions in men (59.32%) and women (58.06%). In Chad, a study conducted in the emergency departments of two hospitals in N'Djamena reported acute kidney injury in 11.57% of admitted patients [36]. However, direct comparison with our findings requires caution because our study assessed elevated blood urea and serum creatinine, whereas the other study investigated acute kidney injury, which requires specific diagnostic criteria.

The authors mainly reported infectious, hypovolemic, and obstructive causes of acute kidney injury. More recently, Berhe *et al.* [37], in a study conducted in the emergency department of a teaching hospital in Ethiopia, reported that infections, volume depletion, and obstructive uropathy were among the leading causes of acute kidney injury. Our findings are therefore consistent with the burden of renal abnormalities observed in sub-Saharan African hospital settings, although the proportion of 58.68% in our study refers to elevated serum creatinine and does not directly represent the prevalence of acute kidney injury.

In our study, the high frequency of elevated blood urea and serum creatinine highlights the importance of routinely assessing renal biochemical parameters in patients admitted to emergency departments. In South Africa, Dlamini *et al.* [38] conducted a prospective study evaluating the demographic characteristics, clinical management, and outcomes of patients with acute kidney injury in Cape Town, highlighting the clinical importance of AKI in hospital settings. Similarly, Georges *et al.* [39] investigated the causes and outcomes of acute kidney injury among adult patients admitted to two hospitals of different categories in Cameroon,

demonstrating the importance of this condition in sub-Saharan African healthcare settings. Nevertheless, biochemical abnormalities do not necessarily indicate acute kidney injury. A definitive diagnosis of AKI requires the application of the Kidney Disease: Improving Global Outcomes (KDIGO) criteria, based on changes in serum creatinine over time and/or urine output.

In our study, 74 out of 121 patients (61.16%) had elevated blood urea levels. This proportion was higher among patients from the provinces (67.50%) than among those from N'Djamena (58.02%). According to sex, elevated blood urea was more frequent among men in N'Djamena (62.50% versus 53.66% among women), whereas the proportions were comparable among patients from the provinces (68.18% in men versus 66.67% in women). This frequency is close to that reported by Halle *et al.* [40], who investigated acute kidney injury among hospitalized patients in Cameroon. However, the comparability of these findings depends on the definitions and thresholds used to classify elevated blood urea. In contrast, Tia *et al.* [41], in a study conducted in Gabon, reported different proportions of renal abnormalities among patients with COVID-19, including 31.6% in intensive care units and 4.4% in internal medicine. These differences may be explained by variations in the characteristics of the study populations, disease severity, diagnostic criteria, and healthcare settings. However, the findings of our study remain descriptive and do not allow us to establish a statistically significant association between elevated blood urea, place of origin, and sex.

In our study, stage G5 was the most frequent estimated glomerular filtration rate (eGFR) category, accounting for 43 patients (35.54%), followed by stage G2, with 29 patients (23.97%). Stages G3a to G5 comprised 78 patients (64.46%), indicating that a substantial proportion of patients had a reduced eGFR at the time of assessment. In Nigeria, Moukambi *et al.* [42] investigated biochemical alterations associated with COVID-19 severity, whereas Ovwasa *et al.* [43] examined trends in chronic kidney disease in a semi-urban tertiary hospital in sub-Saharan Africa. In South Africa, Urade *et al.* [44] described the epidemiology and referral patterns of patients living with chronic kidney disease in Johannesburg. These studies provide relevant regional context for the burden of renal dysfunction; however, their findings should not be directly compared with our eGFR distribution unless the study populations, clinical settings, and classification criteria are comparable. Furthermore, a single eGFR measurement cannot confirm chronic kidney disease, as reduced kidney function must persist for at least three months, or other evidence of chronic kidney damage must be established.

5. Study Limitations

This study has several limitations. First, it was conducted in a single hospital department, over a relatively short period, and included a limited sample of 121 patients, which may limit the generalizability of the findings to the broader Chadian population. Second, the cross-sectional design does not allow causal relationships to be established between the risk factors investigated and abnormalities in renal

function. Third, blood urea and serum creatinine measurements, as well as eGFR estimation, were performed at a single time point, making it impossible to reliably distinguish acute kidney injury from chronic kidney disease. Indeed, confirmation of chronic kidney disease requires persistence of the abnormalities for at least three months. Finally, some information regarding medical history, medication use, and medicinal plant use was based on patient self-report and may therefore have been subject to recall bias. Despite these limitations, this study provides useful data on renal function abnormalities among patients admitted to the Emergency Department of the CHU-RN in N'Djamena and contributes to the limited evidence available on renal impairment in the Chadian hospital setting.

6. Conclusions

At the end of this study conducted among 121 patients admitted to the Medical Emergency Department of the CHU-RN in N'Djamena, the findings revealed a high frequency of renal function abnormalities. Elevated serum creatinine was observed in 58.68% of patients, while elevated blood urea was found in 61.16%. Diabetes mellitus (20.66%), hypertension (16.52%), NSAID use (11.57%), and medicinal plant use (12.40%) were the main renal risk factors identified.

Assessment of estimated glomerular filtration rate (eGFR) showed a substantial proportion of patients with reduced kidney function, with stage G5 predominating (35.54%), followed by stage G2 (23.97%). Stages G3a to G5 accounted for 64.46% of patients. However, these findings should be interpreted with caution, as a single eGFR measurement does not allow acute kidney injury to be distinguished from chronic kidney disease.

The elevated blood urea and serum creatinine levels, together with the reduced eGFR observed in this population, highlight the importance of early and systematic assessment of renal function in patients admitted to emergency departments. Consideration of medical history, risk factors, clinical context, and medication use is also essential for improving the identification of patients at increased risk of renal impairment.

Finally, multicenter studies involving larger sample sizes and follow-up of at least three months, combined with multivariable statistical analyses, are needed to identify factors independently associated with renal function abnormalities and to better characterize the actual burden of kidney disease in Chad.

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Author Contributions

The authors contributed to the conception and planning of the study, data collection and verification, as well as data analysis and interpretation.

The authors also contributed to the literature review, manuscript drafting, and

critical revision of the manuscript.

All authors read and approved the final version of the manuscript and accept responsibility for its scientific content and integrity.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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