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Ionic Disorders in the Multipurpose Intensive Care Unit of the Zinder National Hospital (HNZ)

Hassan ML[1], Magagi A[2], Maikassoua M[3], Hassan[4], Gagara M[5], Daddy H[6], Abdou GA[7], Chaibou MS[8]

Abstract

Introduction: Ionic disorders are common in intensive care. These disorders can cause several symptoms that can sometimes be life-threatening Patients. The objective of the study is to determine the epidemiological aspects of ionic disorders in the intensive care unit of HNZ.

Methodology: This was a descriptive study with prospective data collection over a period of 8 months carried out in the HNZ multipurpose intensive care unit.

Results: During this study, 115 patients were admitted to intensive care. 56 Patients either 48.69% had ionic disorders. The male sex predominated with Sex- ratio of 1.94. The average age was 51.01±22.04 ears with extremes of 5 and 88 years. The socio-economic level was low in 55.35%.The history of HTA was found in 25% of cases. More than four out of five patients were impaired consciousness on admission, 51.78% were dehydrated. The Pathologies Neurological and nephrological were the most found and represented 60.71%. Hypernatremia was found In 58.92% of cases, Hyponatremia in 28.58% All diagnostics at admission. Hyperkalemia in 19.64%, hypokalemia in 30.36%, dyscalcemia about 71, 4% and dyschloremia 80.3%. The evolution was marked by the death of 16 patients, or 28.58% of lethality.

Conclusion: Electrolyte disorders are common in intensive care dominated by dysnatremia. They constitute an important pejorative factor on the prognosis of patients admitted to intensive care. Work is needed to specify the etiological and adequate management electrolyte disorders in intensive care, in order to Improve the prognosis.

Keywords: Ionic Troubles; Resuscitation; Zinder

Introduction

Ions refer to mineral salts present in the body such as sodium, potassium, calcium, chlorine, phosphorus and magnesium.Everyone plays a specific and essential role in the proper functioning of the body. Homeostasis Is defined as a permanent process of regulating Ion of the internal environment within the limits of normal values. The Main Constants Are the hydroelectrolyte balance, Acid-base, glycemique, thermal [1].

We talk of ionic disorder when there is an abnormal concentration of ions in the body. The main most important ions of the body are sodium, which is almost exclusively in the extracellular sector, and potassium, which is intracellular [2]. These disorders can be the cause of several symptoms that can sometimes be life-threatening for patients [3.4]. Their presence could

Affiliation:

[1]University of André Salifou of Zinder, Faculty of sciences and Health, National Hospital of Zinder, Niger

[2]University of André Salifou of Zinder, Faculty of sciences and Health, National Hospital of Zinder, Niger

[3]Faculty of Health Sciences, Dan Dicko Dankoulodo University of Maradi, Niger.

[4]University of André Salifou of Zinder, Faculty of sciences and Health, National Hospital of Zinder

[5]Faculty of Health Sciences, Abdou Moumouni University, FSS; Niamey, Niger

[6]Faculty of Health Sciences, Abdou Moumouni University, FSS; Niamey, Niger

[7]Faculty of Health Sciences, Abdou Moumouni University, FSS; Niamey, Niger

[8]Faculty of Health Sciences, Abdou Moumouni University, FSS; Niamey, Niger

***Corresponding author:**
Magagi A, University of André Salifou of Zinder, Faculty of sciences and Health, National Hospital of Zinder, Niger.

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even be used as an indicator of the quality of care [5.6] . Ionic disorders can affect all ions but most often affect sodium and potassium metabolism [7-9]. They can be the reason for hospitalization in intensive care or often develop during hospitalization [5.10]. A retrospective study carried out in the Emergency services to United States of America notes that on 50000 (47089) Patients, 9.1% had dyskalemia [8]. Another study involving 10,899 patients had found a Incidence of 5.5% of hyponatremia [11] in Mali, a study carried out in the Intensive care unit of the Gabriel Touré University Hospital has regained a prevalence of ionic disorders at 15.17% [12]. In Libreville a prospective study on 201 patients carried out in the service of resuscitation had Found : at admission, 23 patients or 21.7% associated hyponatremia and hypokalemia. A hypernatremia was found in 9 patients or 8.5%, Hypokalemia was found in 5 patients [13].

In Niger, published work on this topic is rare and at the Zinder National Hospital no documented study had yet been conducted in this area , and that motivated us To lead this preliminary study In the intensive care unit of HNZ. The objective was to describe the epidemiological aspects of ionic disorders in HNZ Intensive Care Unit.

Method

We conducted a descriptive study with prospective data collection, in the multipurpose intensive care unit of HNZ, over a period of 8 months from January 1 to August 31, 2023. All patients admitted to the multipurpose intensive care unit during the period study patients presenting with an ionic disorder such as dysnatremia and/or dyskalemia were included. We considered the HNZ laboratory standards (Table 1) as reference values. We noted the following elements: sociodemographic, clinical, paraclinical data and the evolution of patients. The data collected was entered and analyzed using Microsoft Word, Excel, and Spss 22 software. Zotero software was used to process bibliographic references. Qualitative variables were presented as proportions (percentages) and quantitative variables as means +/- standard deviation. For qualitative variables, the comparison of percentages required the Pearson chi-square test; a probability $p \leq 0.05$ was considered statistically significant. Verbal informed consent was obtained after explaining the objective of this study to the patients, the confidentiality of the data was respected, the results of this work were only used for scientific purposes.

Table 1: Laboratory standards HNZ For the ionogram

Blood ion	Normal laboratory value
Sodium Na+	135-145 mmol/l
Potassium K+	3.5-5.10 mmol/l
Calcium Ca2+	1.12-1.32 mmol/l
Chlorine Cl-	98-108.0 mmol/l

Results

During this study we recorded 115 patients admitted to the intensive care unit, of whom 56 patients presented an ionic disorder, or 48.69%. The mean age was 51.01 years ± 22.04, with extremes of 5 and 88 years. More than half of the patients were aged greater than or equal to 50 years (57.14%) (Table 2). A male predominance was found with a male/female ratio (M/F) of 1.94.

Table 2: Distribution of patients by age

Age	Frequency	Percentage %
[5-18]	6	10.72
[19-49]	18	32,14
≥50	32	57.14
Total	**56**	**100**

Arterial hypertension as a history was predominant in 25% of cases followed by diabetes 9%, 25 patients or 44.67% had no history. More than four out of five patients (80.36%) presented an alteration of consciousness (Glasgow less than or equal to 12) on admission, i.e. 45 patients. Clinical dehydration: skin fold, dry skin and mucous membrane, orthostatic hypotension, was found in 51.78% of patients. A biological alteration of renal function was found in 50% of patients (n=28) with an increase in serum creatinine from 120 to 1400mmol/l. Neurological, neurosurgical and nephrological pathologies represented 26.79 respectively; 17.87% and 12.5% (Table 3).). The ionic disorders found were distributed as follows: hypernatremia in 58.92% (n=33), hyponatremia in 28.58% (n=16), hyperkalemia in 19.64% (n=11) and hypokalemia in 30.36 % (n=17). Dyscalcemia was present in 71.4% of cases and dyschloremia in 80.3% (Table 4). The evolution was marked by the death of 16 patients, i.e. 28.58% case fatality and a mortality rate of 14%. We did not find a statistically significant relationship between the occurrence of ionic disorders and the evolution (Table 5).

Table 3: Distribution of patients according to the S affections

Affections	Frequency	Percentage %
Neurological	15	26.79
Neurosurgery	10	17.85
Nephrological	9	16.07
Infectious diseases	7	12.5
Cardiology	4	7,14
Digestive surgeries	4	7,14
Gynecological	3	5,36
Dermatological	2	3,57
Metabolic	1	1,79
Urological surgery	1	1,79
Total	**56**	**100**

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Table 4: RepaTion of patients according to other ionic disorders

Ionic disorders		Frequency	Percentage %
DYsnatremia	Hyponatremia	33	58,9
N=56	Hypernatremia	16	28,6
	Normal	7	12,5
Dyskalemia	Hypokalaemia	17	30,4
N=56	Hyperkalaemia	11	19,6
	Normal	28	50
Dyscalcemia	Hypocalcaemia	31	55,4
N=56	Hypercalcaemia	9	16
	Normal	16	28.6
Dyschloremia	Hypochloremia	11	19,6
N=56	Hyperchloremia	34	60,7
	Normal	11	19,6

Table 5: Relationship between ionic disorder is the evolution

Ionic disorders	Deceased	Alive	Total	p-value
Dysnatremia	16(33%)	33 (67%)	49	0,07
Dyskalemia	5(17.8%)	23(82.1%)	28	0,07
Dyscalcemia	11(27.5)	29(72.5)	40	0,7
Dyschloremia	15(33.3)	30(66.7)	45	0,1

Discussion

During our study, 115 patients were admitted to the intensive care unit, among whom 56 (48.69%) presented with ionic disorders. Essola et al (Libreville) and N'guessan et al (Ivory Coast) found 59% and 55% respectively [13,14]. This high frequency could be explained by the presence of underlying pathologies. In fact, the majority of patients were hypertensive, diabetic or had kidney damage, these pathologies generating ionic disorders either through their complications or through their treatments. The average age was 51.01 years. Patients aged over 50 were the most affected (57.14%). Which is similar to the results of Rabenjarison et al (Antananarivo) who observed that the most affected age group was 40-64 years old with 47.41% [15 A study carried out in the intensive care unit of Cocody University Hospital found 49% and 48% corresponding respectively to the age groups 20 to 50 and 50 to 75 years [14]. This distribution could be explained by the presence of risk factors such as hypertension, diabetes and renal failure which are more common in elderly subjects. We observed a male predominance of around 66.07%. This result is similar to those of Yeung P and Al (Hong Kong) [16] and Djobsou.K et al (Mali) [17] who found a male predominance of 61.6% and 62% respectively. This male predominance could be explained, in addition to degenerative comorbidities, by the high frequency of head trauma among the male subjects in our study; factor in the occurrence of ionic disorders [18] Hypertension was the main antecedent in 25% of cases followed by diabetes 9%, these two pathologies were frequently found in patients presenting ionic disorders [17,19]. In our study 80.36% of patients were admitted with altered consciousness, the latter was found by Stelfox et al (London) [20]. The alteration of the state of consciousness could be explained by the predominance of underlying neurological pathologies (stroke, head trauma, etc.) but also the type of ionic disorder dominated by dysnatremia. Clinical dehydration was found in 51.78% of our patients. This result was similar to that of Sogoba et al (Mali) [21] who found 54.78% of dehydrated patients. This could be explained by the application of certain treatment protocols before admission to intensive care. Most of these patients had impaired central renal and neurological function. They then benefited from diuretics: furosemide, mannitol.

The alteration of the state of consciousness will also contribute to the appearance of dehydration to the extent that the patient does not drink as much as desired. In our study, 50% of patients had a biological alteration of renal function. The study by Sogoba et al (Mali) [21] concluded with the same findings. Koné GS et al (Mali) [22] reported an even higher frequency with 61%. the kidney being a crucial organ in hydroelectrolytic homeostasis, any disturbance could cause ionic disorders. Neurological, neurosurgical and nephrological pathologies were the most represented with 26.79%, 17.85% and 16.07% respectively. This result could be explained by the presence of older patients; age being a predisposing factor for stroke and kidney failure. Also the high frequency of hypertension in our population, self-medication, traditional treatments and non-compliance with the highway code causing most accidents on public roads. We recorded 33 cases (58.92%) of hypernatremia and 16 cases of hyponatremia (28.58%) and all dysnatremia were diagnosed upon admission, this high frequency of ionic disorder upon admission was report in Burkina Faso by KB K et al [23]. In our study we found a predominance of hypernatremia, this situation is encountered in iatrogenic contexts, especially in intensive care units [5]. Patients admitted to intensive care had stayed in the emergency department and received infusions of physiological saline and mannitol, so the majority of patients presented an altered state of consciousness with an inability to drink voluntarily if necessary [24]. However, many studies have described the predominance of occurrence of hyponatremia compared to hypernatremia [7, 17, 21, 23, 24]. Dyskalemia was marked by a predominance of hypokalemia in 30.36% (n=17) followed by hyperkalemia in 19.64% (n=11), Cissé et al (Mali) also found a predominance of hypokalemia in hyperkalemia as does Dembélé K, et al (Mali) [12], on the other hand Kone GS, et al (Mali) [22] and Agbakou SA et al (Morocco) [9] found the opposite. These variations could be linked to impaired renal function. The evolution was marked by the death of 16 patients, representing a case fatality rate of 28.58% and a mortality rate of 14%. Dembélé K et al [12] and Dembélé B et al [25] reported similar lethality

results with 26.2% and 28.4% respectively. All the deaths presented dysnatremia (five cases of hyponatremia and 11 hypernatremia), dysnatremia was frequently described as being a factor worsening the prognosis of the patients [17,23, 24]. However, we do not have a significant statistical difference between the occurrence of death and dysnatremia (p=0.07) probably because we have a restricted sample.

Conclusion

Electrolyte disorders are common in intensive care units dominated by dysnatremia. They constitute a significant negative factor in the prognosis of patients admitted to intensive care. Work is necessary to clarify the etiologies and adequate management of electrolyte disorders in intensive care, in order to improve the prognosis.

Conflicts of interest

The authors do not declare any conflict of interest.

Authors' contributions

All the authors contributed to the realization of this work.

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