Clinical and Experimental Pathology Research
(An Open Access Journal for Clinical and Diagnostic Pathology Research)

Prevalence and risk factors of electrolytic disorders in the elderly patients in hospital area. About 154 patients hospitalized in the Internal Medicine Service of Kamenge University Hospital Center

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Abstract

Objective: The objective of the study is to determine the prevalence and risk factors of electrolyte disturbances in the elderly patients in hospital aria. **Methodology:** It is a prospective study over a period of 10 months from May 2016 to March 2017 involving 154 cases of elderly patients with electrolyte disorders. The study was conducted in the Internal Medecine department at Kamenge University Hospital Center. Being over or equal 60 years old, being hospitalised in the internal medecine department during the study period and having results of the hydroelectrolytic balance were the criteria for inclusion. Natremia, kaliemia, calcemia and chloremia disturbances with their risk factors were seeked. The data were collected using the survery form after interrogation, physical and clinical examinations and follow up in hospital. **Statistical analysis:** Data were entered and analyzed using the epi info 7.2 software. The proportions were copmared using the exact Fischer test with p<0.05 considered as significant. **Results:** In our serie, 154 patients were included. Electrolyte disturbances were found in 125 patients or a prevalence of 81.7%. Hyponatremia was found with a prevalence of 50.65%, hypernatremia with a prevalence of 5.84%, hypokalaemia with a prevalence of 27.92%, hyperkalaemia with a prevalence of 20.77%, hypochloremia and hyperchloremia with prevalences of 31.81% and 25.32% respectively. For 109 patients in whom the calcemia was checked, 29 patients (21%) had hypocalcemia and 11 patients (8%) hypercalcemia. Among risk factors analysed, age between 60 and 75 is a risk factor of hyperkalaemia (p=0.02), male sex is a risk factor of Hyponatremia (p=0.03) and hypochloremia (p=0.02), use of diuretics is a risk factor of hyperkalaemia (p = 0.05), processing hyponatremia (p = 0.007) and hyperchloremia (p = 0.005) so that anti-diabetics is a risk factor of hyperchloremia (p=0.01). A total of 127 patients (82.5%) improuved and 27 (17.5%) died. Hyperkalaemia is the most deadly disorder (p=0.05). **Conclusion:** The prevalence of electrolyte disturbances is high and varies from study to another depending on whether patients are hospitalized or not especially in the elderly. Hyponatremia is the most common electrolyte disorder and hyperkalemia is the most deadly disorder. Male sex, age, taking diuretics and antidiabetics were the risk factors for electrolytes disturbances in our serie. Electrolyte disturbances are multifactorial and a single factor can cause more than one disorder.

Keywords: Prevalence, Electrolyte disturbances, Risk factors, Elderly people.

INTRODUCTION

Electrolyte disorders, also called ionic disorders, concern the disturbance of the main electrolytes in the blood such as bases, salts, acids, but also proteins. Commonly involved pathologies are renal, cardiac, digestive, tumoral, infections, metabolic disorders, intervention procedures in the elderly, drugs, etc. [1, 2]. As the elderly people constitute a group at high risk of pathology among them electrolyte desorders, we have judged to determine the prevalence and risk factors of dysnatremia, dyskaliemia, dyscalcemia and dyschloremia in this category of persons. The study was carried out on patients hospitalized in the internal medicine department of the Kamenge University Hospital Center. The risk factors are diversified and divided into 2 main categories [1.3]:

- Exogenous factors: Drugs, alcoholism, smoking and undernutrition in hyponatremia, vomiting in hypokalaemia, alcoholism, infusion, poisoning, surgical procedures.

- Endogenous factors: Renal failure and diabetes in hyperkalaemia, cardiac decompensation in hyponatremia, pathologies of the digestive sphere, age itself, visceral pathologies, some infections, tumor pathologies.

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METHODOLOGY

It is a prospective study over period of 10 months from May 2016 to March 2017 involving 154 cases of elderly patients with electrolyte disorders. The study was conducted in the Internal Medicine department at Kamenge University hospital Center (CHUK). Being over or equal 60years old, being hospitalized in the Internal Medicine Department during the study period and having results of the hydro electrolytic balance were the criteria for inclusion. Patients with age ≥60 years who did not have results of the hydro electrolytic balance and those aged under 60 years were excluded from the study Natremia, kaliemia, calcemia and chloremia disturbances with their risk factors were seemed. The data were collected using the survey form after interrogation, physical and clinical examinations and follow up in hospital. Taking into account the usual values commonly used in most of studies, it was considered to be: Hypernatremia: a sodium level> 145mmol / L, Hyponatremia: a sodium level <135mmol / L, Hyperkalaemia: a potassium level> 5mmol / L, Hypokalaemia: a potassium level <3.5mmol / L, Hyperchloremia: a rate of Chlorine> 107mmol / L, Hypochloremia: a rate of Chlorine <98mmol / L, Hypercalcemia: a calcium level> 2.65mmol / L, Hypocalcaemia: a calcium level <2.0mmol /L.

Statistical analysis

Data were entered and analyzed using the epi info 7.2 software. The proportions were compared using the exact Fischer test with p<0.05 considered as significant.

RESULT

In our study, 154 patients met the inclusion criteria. The mean age of our patients was 67.61 ± 8.8 years with extremes of 60 and 95 years. The 60-75 age group was the most represented with a frequency of 83.77% (Graph 1). The female sex predominated (60%) with a sex ratio of 0.65% The personal history sought and background was medical, surgical and related drugs. Cardiovascular pathologies were found in 65 patients (42.21%), diabetes in 50 patients (32.47%), parasitosis in 20 patients (12.99%), renal pathology in 19 patients (12.34%), HIV infection in 18 patients (11.69%), digestive pathology in 15 patients (9.74%), viral hepatitis C in 13 patients (8.44%), urological pathology and rheumatological pathology each in 12 patients (7.79%), asthma in 10 patients (6.49%), diabetic foot in 7 patients (4.55%), epilepsy in 6 patients (3.90%) %), tuberculosis in 5 patients (3.25%), neoplasia in 4 patients (2.60%), viral hepatitis B in 3 patients (1.95%) and cirrhosis in 2 patients (1, 30%). Among the surgical personal history, hernia and appendicitis were each found in 4 patients (2.60%), 3 patients (1.95%) had undergone a thyroidectomy and digestive cancer was found in 2 patients (1.30%). The other surgical conditions (hemorrhoids, tibial fracture, osteomyelitis, fibroma, uterine cancer, rectal prolapse, cholecystitis, hip fracture) were found in 18 patients. (Tables 1). We considered the consumption of alcohol and tobacco as well as the usual treatment of patients as lifestyle habits. In all, 132 patients (85.71%) usually took various medications, 64 (41.56%) consumed alcohol and 11 (7.14%) smoked tobacco. Regarding drugs, 62 patients (40.26%) were taking antihypertensive drugs, 50 patients (32.47%) took antidiabetics, 33 patients (21.43%) took diuretics with aldactone and furosemide in the lead, 20 patients (12.99%) took antiparasitics, 18 patients (11.69%) took antiretrovirals, 14 patients (9.09%) took non-steroidal anti-inflammatory drugs, 12 patients (7.79%) took drugs of gout, 11 patients (7, 14%) took antibiotics, 5 patients (3.25%) took anti-tuberculosis drugs, 3 patients (1.95%) took antiulcer drugs, 2 patients (1.29%) took antiemetics, 1 patient (0.65 %) took antiepileptics and 1 patient (0.65%) was on simple analgesics (Graph 2). The hydro electrolytic components sought in our sample were sodium, potassium, chlorine and calcemia and their object was to search for electrolyte disturbances. Among the patients included, 125 patients had presented with electrolyte disturbances, as an overall prevalence of 81.17%. It should be noted that 78 patients (50.65%) presented with hyponatremia, 9 patients (5.84%) with hypernatremia, 43 patients (27.92%) with hypokalaemia, 32 patients (20.77%) with hyperkalaemia, 49 patients (31.81%) with hypochloremia and 39 patients (25.32%) with hyperchloremia. For 109 patients in whom calcemia was made, 29 patients (26.61%) had hypocalcemia and 11 patients (10.09%) had hypercalcemia (Graphic 3). A patient could have one or more electrolyte disturbances. The reseached risk factors associated with electrolyte disturbances were age, sex, body mass index (BMI), alcohol, tobacco, antihypertensive therapy, anti-diabetic therapy, and use of diuretics. Age between 60 and 75 years was a risk factor for hyperkalemia (p = 0.02), male sex for hyponatremia (p = 0.03) and hypochloremia (p = 0.02), taking diuretics for hyperkalaemia (p = 0.05), processing hyponatremia (p = 0.007) and hyperchloremia (p = 0.005) while antidiabetics drugs were risk factors for hyperchloremia (p = 0.01) (Tables 2, 3, 4, 5, 6, 7, 8, 9). In total, 127 patients were improved under treatment for disorder correction and 27 (17.53%) died. The patients died could have one or more electrolyte disturbances the same time. Thus, 15 deaths had hyponatremia, 2 deaths had hypernatemia, 6 deaths had hypokalemia, 11 deaths had hyperkalemia, 9 deaths had hypochloremia, 3 deaths had hyperchloremia, 7 deaths had hypocalcemia and 1 death had hypercalcemia. Hyperkalaemia is the deadliest disorder (p=0.05) (Table 10).
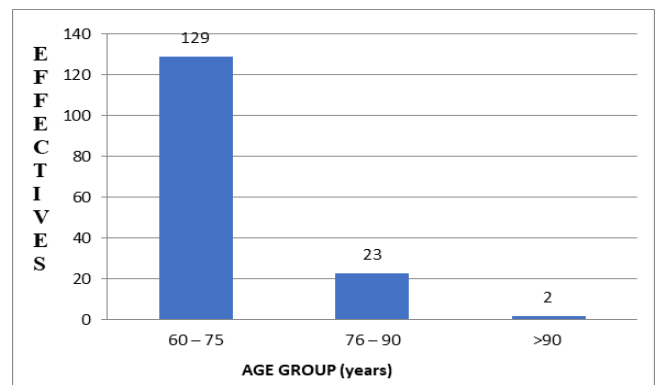
Graph 1: Distribution of patients by age group
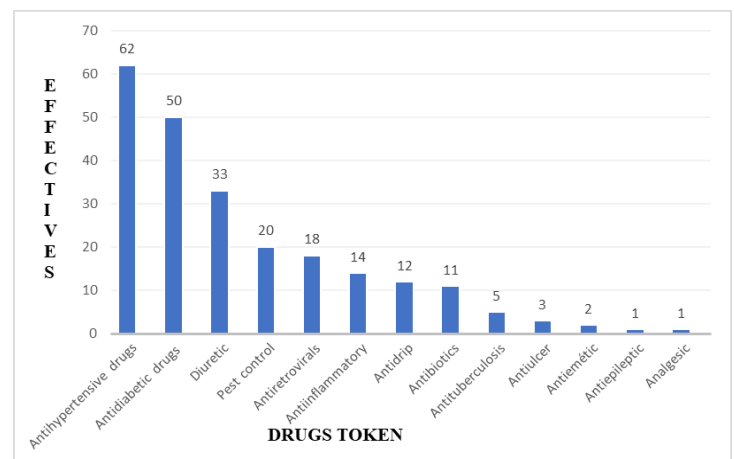
Graph 2: Distribution of patients by drug history
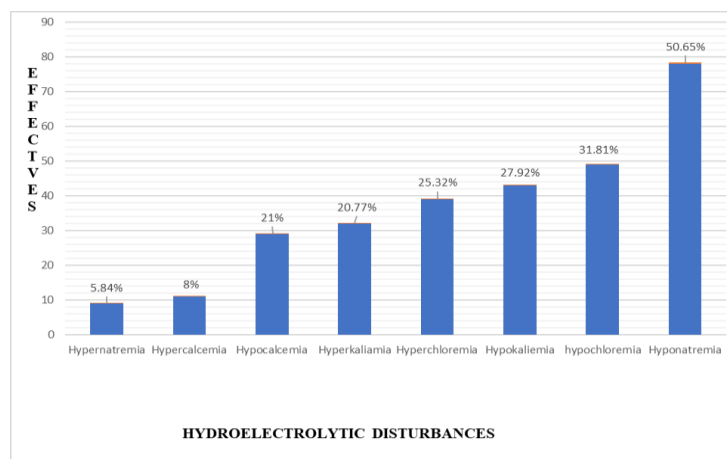
Graph 3: Frequency of electrolyte disturbances

Table 1: Distribution of patients according to medical and surgical history

Background		Effective	Percentage (%)
Medical	cardiovascular pathologies	65	42.21
	Diabete	50	32.47
	Parasitosis	20	12.99
	Renal Pathologies	19	12.34
	HIV≠	18	11.69
	Digestive Pathology	15	9.74
	Viral Hepatite C	13	8.44
	Urological pathology	12	7.79
	Rhumatologique pathology	12	7.79
	Asthma	10	6.49
	Diabetic foot	7	4.55
	Epilepsy	6	3.90
	Tuberculosis	5	3.25
	Neoplasia	4	2.60
	Viral Hepatite B	3	1.95
	Cirrhosis	2	1.30
Surgical	Hernia	4	2.60
	Appendicitis	4	2.60
	Thyroidectomy	3	1.95
	Stomach cancer	2	1.30
	Other pathologies	18	11.69

≠ : *Human Immunodeficiency Virus*

DISCUSSION

During the study period, 154 patients met the inclusion criteria. Female sex predominated (60%). The mean age of our patients was 67.61 ± 8.8 years with extremes of 60 and 95 years. The 60-75 age group was the most represented with a frequency of 83.77%. Cardiovascular pathologies, diabetes, parasitosis and renal pathologies were the most personal medical history found respectively in 42.21%, 32.47%, 12.99% and 12.34%. Antihypertensive drugs, antidiabetics and diuretics were usually taken respectively in 40.26%, 32.47% and 21.43%. Among patients included, 125 patients had presented with electrolyte disturbances, as an overall prevalence of 81.17%. Dysnatremia was the most important disorder with 50.65% of hyponatremia and 5.84% of hypernatremia. Age, sex, anti-diabetic therapy and use of diuretics were risk factors of electrolyte disturbances. Improvement under

treatment was observed in 127 patients and death in 27 patients. Hyperkaliemia is the most deadly disorder.

Our sample including 93 women (60%) against 61 men (40%). This female predominance reflects the configuration of Burundi's population which is a developing country and that has just gone through a long period of war in which men were the most affected group. The mean age of the patients was 67.61 +/- 8.8 years with extremes of 60 and 95 years. Most of the patients were in the 60-75 years age range (83.77%). Our results differ from those of Bazzano LA et al [4] who found that the majority of patients were in the age group of 75-89 years. This difference could be explained by the fact that these studies were carried out in countries where life expectancy is also different. Drugs usually taken were antihypertensives (40.27%), anti-diabetics (32.47%) and diuretics (21.43%). This makes sense because the main medical history was cardiovascular disease (42.21%) and diabetes (32.47%). This could be explained by the fact that our study concerns the elderly people in whom cardiovascular disease and its risk factors are frequent [4] and therefore the antihypertensive treatment. Our constant joins that of Guibert B [5] who in his study on the elderly had found that antihypertensive drugs were a frequent drug habit with results similar to ours (50%). In 154 patients, 64 patients (41.56%) consumed alcohol. This rate is justified by the fact that many of our respondents had hypertensive and or diabetic pathology, which usually are areas where alcohol consumption is often prohibited as suggested by the study by Haaz S et al [6]. However, in our society, consuming alcohol is a deliberately unacknowledged behavior, as also confirmed by the study by Radermacher et al [7]. And according to the literature, following the neurological consequences associated with alcoholism with falls and often fractures, the proportion of excessive drinking tends to decrease in the elderly [8-10]. As for smoking, 11 patients (7.14%) were smokers. As most people smoke out of curiosity and pleasure, especially at a young age, this reduced number of smokers is thought to be due to the fact that our study concerns the elderly who have passed this stage in addition to their commorbidities (hypertension, diabetes) which are limiting [4,6]. Other studies such as those by Radermacher et al [7] and Guibert B [5] found low proportions of smokers, respectively 9% and 13.9%. Hydroelectrolyte disorders are fairly frequent and are multifactorial especially in the elderly. Our study found an overall prevalence of 81.17%. This percentage is high when compared with the prevalence of other similar studies. Indeed, the results of a Belgian study in hospitalized patients showed a prevalence of 1.5% and another study carried out in the community in the Netherlands noted that one in 6 people had an electrolyte disorder [1, 11]. These data show that the prevalence of electrolyte disturbances in the elderly varies from study to study depending on whether patients are hospitalized or not. Also, the sample size which differs in these studies would explain this difference in the results. Regarding the types of electrolyte disturbances in included patients, dysnatremia was the most common disorder. Hyponatremia was found in 78 patients and hypernatremia in 9, for a respective prevalence of 50.65% and 5.84%. Dysnatremia is a disorder that has been noted by other studies in the elderly. Indeed, Sweed H [12] in France found a prevalence of 39.5% for hyponatremia and Agarwal S et al [13] of 34.1%. In Belgium, Radermacher L et al [1] found a prevalence of 43%. A greater prevalence of hyponatremia was reported by Moulin B et al [14] in France with 75.3%. The hypernatremia was superior to the results of Hawkins RC [15] in France and inferior to those of Polderman K et al [16] in Cameroon who found respective prevalence of 1.43% and 9%. It was close to the results of Hoorn E et al [17] and Molaschi M et al [18] in Mali who found hypernatremia with respective prevalence of 5.72% and 6.4%. These results show that for dysnatremia, the dominant disorder is hyponatremia in the elderly. Through changes in body, kidney or hormonal composition, sodium and water homeostasis are made particularly fragile in elderly patients. The frequency of nutritional disorders, in particular protein malnutrition, also makes the elderly subject to the development of hyponatremia. Although diuretic treatments, mainly thiazides, are a common cause of hyponatremia in

Table 2: Risk factors and hyponatremia

Risk factors		Effective	Hyponatremia	Percentage (%)	P
Age	60-75	129	68	52.7	0.27
	> 75	25	10	40	
Sex	Female	93	42	45.16	0.03
	Male	61	36	59	
BMI*	<25	132	68	51.51	0.81
	≥ 25	22	10	47.61	
Alcohol	Yes	64	34	53.1	0.62
	No	90	44	48.8	
Tobacco	Yes	11	8	72.7	0.20
	No	143	70	48.9	
Antihypertensive drugs	Yes	62	30	48.3	0.74
	No	92	48	52.1	
Antidiabetic drugs	Yes	50	23	46	0.49
	No	104	55	52.8	
Diuretics	Yes	33	12	7.8	0.007
	No	121	66	42.8	

* : Body Mass Index. This table shows that in our series, male sex was the risk factor for hyponatremia (p = 0.03); however, patients who took diuretics were at greater risk of developing hyponatremia (p = 0.007).

Table 3: Risk factors and hypernatremia

Risk factors		Effective	Hypernatrmia	Percentage	P
Age	60-75	129	8	6.2	1
	> 75	25	1	4	
Sex	Female	93	7	7.5	0.32
	Male	61	2	3.3	
BMI*	<25	132	8	6.1	1
	≥ 25	22	1	4.8	
Alcohol	Yes	64	3	4.7	0.73
	No	90	6	6.7	
Tobacco	Yes	11	0	0	1
	No	143	9	6.3	
Antihypertensive drugs	Yes	62	3	4.8	0.74
	No	92	6	6.5	
Antidiabetic drugs	Yes	50	2	4	0.71
	No	104	7	6.7	
Diuretics	Yes	33	4	12.1	0.09
	No	121	5	4.1	

* : Body Mass Index. In our series, none of the factors studied were significantly related to hypernatremia (because p always greater than 0.05).

Table 4: Risk factors and hypokaliemia

Risk factors		Effective	Hypokaliemia	Percentage	P
Age	60-75	129	37	28.7	0.80
	> 75	25	6	24	
Sex	Female	93	26	28	1
	Male	61	17	27.9	
BMI*	<25	132	36	27.3	0.60
	≥ 25	22	7	33.3	
Alcohol	Yes	64	19	29.7	0.71
	No	90	24	26.7	

Tobacco	Yes	11	2	18.2	0.72
	No	143	41	28.7	
Antihypertensive drugs	Yes	62	19	30.6	0.58
	No	92	24	26.1	
Antidiabetic drugs	Yes	50	12	24	0.56
	No	104	31	29.8	
Diuretic	Yes	33	8	24.2	0.66
	No	121	35	28.9	

* : Body Mass Index. This table shows that in our series, none of the variables studied was a risk factor for hypokalaemia (p always greater than 0.05).

Table 5: Risk factors and hyperkaliemia

Risk factors		Effective	Hyperkaliemia	Percentage (%)	P
Age	60-75	129	31	24	0.02
	> 75	25	1	4	
Sex	Female	93	15	16.1	0.10
	Male	61	17	27.9	
BMI*	<25	132	26	19.7	0.38
	≥ 25	22	6	28.6	
Alcohol	Yes	64	11	17.2	0.42
	No	90	21	23.3	
Tobacco	Yes	11	3	27.3	0.69
	No	143	29	20.3	
Antihypertensive drugs	Yes	62	15	24.2	0.42
	No	92	17	18.5	
Antidiabetic drugs	Yes	50	13	26.0	0.29
	No	104	19	18.3	
Diuretics	Yes	33	13	39.4	0.05
	No	121	19	15.7	

* : Body Mass Index. This table shows that in our series, the age between 60 and 75 years (p = 0.02) and taking diuretics (p = 0.05) were the risk factors for hyperkalaemia

Table 6: Risk factors and hypochloremia

Risk factors		Effective	Hypochloremia	Percentage	P
Age	60-75	129	45	34.9	0.09
	> 75	25	4	16	
Sex	Female	93	23	24.7	0.02
	Male	61	26	42.6	
BMI*	<25	132	39	29.5	0.14
	≥ 25	22	10	45.5	
Alcohol	Yes	64	19	29.7	0.72
	No	90	30	33.3	
Tobacco	Yes	11	5	45.5	0.32
	No	143	44	30.8	
Antihypertensive drugs	Yes	62	21	33.9	0.72
	No	92	28	30.4	
Antidiabetic drugs	Yes	50	15	30.0	0.85
	No	104	34	32.7	
Diuretics	Yes	33	8	24.2	0.39
	No	121	41	33.9	

* : Body Mass Index. Among the factors studied in our series, only males were a risk factor for hypochloremia (p = 0.02).

Table 7: Risk factors and hyperchloremie

Risk factors		Effective	Hyperchloremia	Percentage	P
Age	60-75	129	30	23.3	0.21
	> 75	25	9	36	
Sex	Female	93	23	24.7	0.85
	Male	61	16	26.2	
BMI*	<25	132	33	25	0.78
	≥ 25	22	6	28.6	
Alcohol	Yes	64	18	28.1	0.57
	No	90	21	23.3	
Tobacco	Yes	11	2	18.2	0.73
	No	143	37	25.9	
Antihypertensive drugs	Yes	62	15	24.2	0.85
	No	92	24	26.1	
Antidiabetic drugs	Yes	50	19	38	0.01
	No	104	20	19.2	
Diuretics	Yes	33	15	45.5	0.005
	No	121	24	19.8	

* : Body Mass Index. This table shows that taking antidiabetics (p = 0.01) and diuretics (0.005) were the risk factors for hyperchloremia.

Table 8: Risk factors and hypocalcemia

Risk factors		Effective	Hypocalcemia	Percentage	P
Age	60-75	90	25	27.8	0.77
	> 75	19	4	21.1	
Sex	Female	66	16	24.2	0.51
	Male	43	13	30.2	
BMI*	<25	92	25	27.2	1
	≥ 25	17	4	23.5	
Alcohol	Yes	41	12	29.3	0.65
	No	68	17	25	
Tobacco	Yes	7	3	42.9	0.37
	No	102	26	25.5	
Antihypertensive drugs	Yes	44	13	29.5	0.65
	No	65	16	24.6	
Antidiabetic drugs	Yes	27	7	25.9	1
	No	82	22	26.8	
Diuretics	Yes	24	6	25	1
	No	85	23	27.1	

* : Body Mass Index. Hypocalcaemia was not related to any of the risk factors studied in our series (p> 0.05).

Table 9: Risk factors and hypercalcemia

Risk factors		Effective	Hypercalcemia	Percentage	P
Age	60-75	90	10	11,1	0,68
	> 75	19	1	5,3	
Sex	Female	66	4	6,1	0,10
	Male	43	7	16,3	
BMI*	<25	92	10	10.9	1
	≥ 25	17	1	5.9	
Alcohol	Yes	41	5	12.2	0.74
	No	68	6	8.8	
Tobacco	Yes	7	2	28.6	0.14

	No	102	9	8.8	
Antihypertensive drugs	Yes	44	2	4.5	0.19
	No	65	9	13.8	
Antidiabetic drugs	Yes	27	3	11.1	1
	No	82	8	9.8	
Diuretics	Yes	24	2	8.3	1
	No	85	9	10.6	

* : *Body Mass Index. This table shows that the factors studied in our series were not related to hypercalcemia (p> 0.05).*

Table 10: Distribution of deaths by electrolyte disturbance

Electrolytic desorder	Effective	Death	Percentage (%)	P
Dysnatremia				
Hypernatremia	9	2	22.22	1
Hyponatremia	78	15	19.23	
Dyskaliemia				
Hyperkalaemia	32	11	34.38	0.05
Hypokalaemia	43	6	13.95	
Dyschloremia				
Hyperchloremia	39	3	7.69	0.21
Hypochloremia	49	9	18.37	
Dyscalcemia				
Hypercalcemia	11	1	9.09	0.40
Hypocalcemia	29	7	24.14	

geriatrics, normovolemic hyponatremia, and more particularly the syndrome of inappropriate antidiuretic hormone secretion, is the most frequently encountered cause. The prevalence of hypokalaemia was 27.92% and that of hyperkalaemia 20.78%. A study done in Belgium [1] found a prevalence of 32% for hypokalaemia and 32% for hyperkalaemia. Other series such as that of Hawkins RC [19] had found a prevalence of 20.5% for hyperkalaemia, that of Menanga et al [20] a prevalence of 38.7% and that of Diallo A et al [21] reported a prevalence of hyperkalemia of 52.7%. Dyskalaemia is also a common electrolyte disorder in the elderly with varying frequencies. Calcemia was measured in 138 patients, 29 patients had hypocalcemia and 11 patients had hypercalcemia, ie a respective prevalence of 21% and 8%. Abboud B et al [22] found a frequency of 1.83% for hypocalcemia. Other series note high frequencies of hypercalcemia such as that of Guarrigues A et al [23] in France and Abdelhafidh B et al [24] in Tunisia with respective prevalence of 81.5% and 68.8%. These data show that calcium disorders vary from study to study. In our sample, the frequency of hypochloremia was 31.81% and that of hyperchloremia 25.32%. Rarely isolated, chlorine disorders depend on other associated electrolyte disorders, in particular sodium and potassium, and their metabolisms are most often linked as prouved by Ichai C et al [25]. Thus, in the study by Klouche K et al [26], hyperchloremia was found with a prevalence of 43.6% and hypochloremia of 12.7%. This discrepancy with our results could be explained by the study population of Klouche K et al, which consisted of patients undergoing an infusion with physiological serum which often induces hyperchloremia. In our series, age between 60 and 75 years was the risk factor for hyperkalaemia (p = 0.02). In fact, the elderly patient is the target of hyperkalaemia, especially iatrogenic, due to the cumulative risks they incur such as the deterioration of renal function common in this category of people [27, 28]. Also, the study by Indertermitt et al [29] had shown that the prevalence of hyperkalaemia increases exponentially with age. On the other hand, for Kleinfeld M et al [30] and Zuccala G et al [31], having an advanced age further increases the risk of hypokalaemia. The study by Radermacher L et al [32] showed a highly significant increase in risk in the elderly (p = 0.0001), regardless of the electrolyte disorder. This discrepancy is linked to the fact that the same factor can involve more than one disorder [29]. Male sex was the risk factor for hyponatremia (p = 0.03) and hypochloremia (p = 0.02). Some studies note that female sex is a risk factor for hyponatremia induced by diuretics, although the mechanism remains debated [31, 33]. But the overrepresentation of women in these cohorts studied could explain these differences. Other studies note that age is a factor associated with hyponatremia induced by diuretics regardless of gender [15, 34]. However, the expression of the thiazide-sensitive sodium / chlorine co-transporter is increased with estrogen impregnation leading to a risk of developing hyponatremia. Loop diuretics impair concentration rather than dilution mechanisms and are less often responsible for hyponatremia. The antidiabetic treatment concerned 50 patients (32.47%). This treatment constitutes an exogenous factor inherent in the behavior of individuals frequently implicated in ionic disorders, as suggested by the results of Jarman P et al [35] for hyponatremia and hyperkalemia (p = 0.0016). However, in our study, the influence of antidiabetics was statistically significant for hyperchloremia (p = 0.01). This discrepancy in the results could be explained by the fact that a single factor can imply more than one disorder as long as its metabolism is often intimate with that of bound electrolytes. Thirty-three patients (21.43%) usually took diuretics. These drugs were significantly related to hyperkalaemia (p = 0.05) and hyperchloremia (p = 0.005). In fact, in our cohort, potassium-sparing diuretics were the most common. Our constant in accordance with the literature. Thus, Radermacher L et al [32] had found that diuretics, especially potassium sparers, constituted an important iatrogenic factor for hyperkalaemia, mainly for older people (> 60 years). Whether in a hospital environment [31] or in an extra-hospital environment [36,37], the origin of electrolyte disturbances in particular serum and potassium levels, includes an important drug factor with diuretics in mind. Svensson M et al [38] had shown that potassium sparers (spironolactone) involved the occurrence of hyperkalaemia in 68% of cases. As for hyperchloremia, our results agree with the data in the literature. The study by Hoorn E et al [39] showed loop diuretics to be a risk factor for hyperchloremia (p = 0.0003). Loop diuretics often increase the excretion of potassium and sodium ions with retention of

chlorine inducing hyperchloraemic acidosis [40]. The evolution was marked by an improvement for 127 patients (82.7%) and death for 27 at a mortality rate of 17.53%. The deceased patients could have one or more electrolyte disturbances at a time. Dyskalemia and dysnatremia were more fatal disorders. There was no statistically significant difference at each ion for mortality except hyperkalemia which was more fatal than hypokalemia. Indeed, dyskalaemia represent the most dangerous electrolyte disturbances. Thus, Tropini F [41] affirms in his study that hyperkalaemia represents an immediate vital risk, to be recognized and to be prevented quickly. However, many electrolyte disturbances are unanimously recognized as markers of poor prognosis in the event of diagnostic delay, with an increase in mortality ranging from 2 to 6 times, depending on the type and extent of the ionic disorder [42,43]. The prognosis would therefore depend on the urgency of diagnosis and treatment. Yet, electrolyte disorders remain frequently poorly understood because they are associated with risk factors, a variety of disease states, etiologies, and multiple pathophysiological mechanisms. However, an improvement in the prevention and treatment of these electrolyte disorders inevitably requires a good understanding of their physiopathological mechanisms [44,45]. The major challenge is that these mechanisms, often complex and widely discussed in the literature, are not always easy to identify, especially in emergency situations.

CONCLUSION

Electrolyte disturbances are frequent and multifactorial in the elderly hospitalized. Their prevalence is high and varies from study to another in the elderly depending on whether patients are hospitalized or not. In our series, the prevalence of electrolyte disturbances is 81.17% Hyponatremia is the most common electrolyte disorder with a prevalence of 50.65%. Age between 60 and 75 years, males, taking diuretics and antidiabetics were risk factors for electrolyte disturbances. A single factor can involve more than an electrolyte disorder. The elderly is a high-risk group for electrolyte disturbances. Even if dysnatremia is the most often majority disorder, its evolution under corrective measures is favorable unlike dyskalaemia which is accompanied by a high rate of mortality. Improving the prevention and treatment of these disorders would require a good understanding of their pathophysiological mechanisms. The major challenge is that these mechanisms are often complex and are not always easily identified in an emergency situation. However, rapid diagnosis and adequate correction allows patient's good improvement.

Conflict of Interest

There is no conflict of interest.

Consent Statement

Written informed consent was obtained from the patient for publication of this article.

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