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Research Article

The Prevalence and Mortality of Hyponatremia in the Multipurpose Intensive Care Unit of the Tambohobe-Fianarantsoa Teaching Hospital

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Received: November 24, 2017; **Published:** December 27, 2017

Abstract

Introduction: Hyponatremia is the most common hydroelectrolyte disorder in intensive care. It is associated with significant morbidity and mortality. The objective of this study is to determine the prevalence and mortality associated with the occurrence of hyponatremia in patients hospitalized in intensive care for medical conditions.

Methods: This is a retrospective, descriptive study performed in the Polyvalent Resuscitation Department of the University Hospital Center (CHU) of Tambohobe Fianarantsoa, for a period of 12 months. All the patients admitted for a medical pathology and having a complete file were retained. A comparison was made between patients with hyponatremia and normonatremic patients.

Results: A total of 868 patients were selected for the study. The prevalence of hyponatremia was 18.3% (159 patients) during the study period. That of severe hyponatremia (Natremia < 125 mmol / l) was 2% (18 patients). Patients with hyponatremia were significantly older (57.2 +/- 11.7 years vs 46.3 +/- 14.3 years, p = 0.004). These patients were more likely to have a Glasgow score of ≤ 9 (p = 0.001), compared to patients with normonatremia. Mortality was higher in the hyponatremia group (42.8% vs. 31.3%, p = 0.006) and was 77.8%.

Conclusion: The prevalence of hyponatremia in intensive care is high. Our data confirm those of the literature in favor of a pejorative influence of hyponatremia on the evolution of patients.

Keywords: *Hyponatremia; Resuscitation; Mortality*

Introduction

Hyponatremia is defined by a plasma sodium concentration of less than 135 mmol per liter of plasma [1]. Hyponatremia is the most common electrolytic disorder in medical practice [2], with up to 30% of hospitalized patients, 3% of whom were severe (< 125 mmol/l) [3]. Hyponatremia is moderate below 138 mmol/L and severe below 125 mmol/L [3,4]. In intensive care, 42.6% of patients had hyponatremia either at admission or during their stay in intensive care [5]. The mortality of severe hyponatremia is 27% [6]. In our department, no studies have been conducted to determine the epidemiology of hyponatremia. The objective of this study is to determine the prevalence of hyponatremia and related mortality in hospitalized patients for medical conditions in Polyvalent Resuscitation at Tambohobe Fianarantsoa University Hospital Center (CHU).

Patients and Methods

This is a retrospective study over a 12-month period from January 2015 to December 2015. The medical file and the hospitalization record of the intensive care unit constituted the data sources. The study included all patients admitted to Adult Multiple Reanimation for

medical conditions, referred by the emergency department or other hospital departments. We identified patients with hyponatremia. As hyponatremia, we defined any value of natremia less than or equal to 135 mmol/L. We defined as severe hyponatremia any value of natremia less than 125 mmol/L. We calculated the prevalence of hyponatremia based on the number of patients hospitalized for medical conditions during the study period. The exclusion criteria were incomplete files. The studied parameters were age, gender, hospitalization pattern, Glasgow hyponatremia score, nosological diagnosis, level of hyponatremia, length of stay and patient progress in intensive care unit.

Data entry was done from the Excel software. The data was analyzed using the IBM SPSS Statistics 20.0 software. A difference is significant when p is less than 0.05.

Results

During the 12-month study period, 868 patients were hospitalized for medical conditions in the Polyvalent Resuscitation Department of the Tambohobe-Fianarantsoa Teaching Hospital. Hyponatremia was present in 159 patients at admission or during hospitalization, a prevalence of 18.3%. Severe hyponatremia was present in 18 patients, a prevalence of 2%. The mean age of patients with hyponatremia was 57.2 +/- 14.3 years (extreme 17 years and 90 years) compared to an average age of 46.3 +/- 11.7 years for patients with normal natremia (p = 0.004) (Table 1). Eighty-eight patients (55.3 %) were over 60 years . We noted a male predominance of hyponatremia with a sex ratio of 1.3. Awareness disorders were present at admission in 65.4% (n = 104). Loss of consciousness was the main reason for hospitalization encountered in 32.7 % (n = 52). The characteristics of hyponatremic and normonatremic patients are summarized in table 1. Patients with stroke comprised about one quarter of our hyponatremic patients. Forty-one patients (25.8%) had a Glasgow score of less than 9. The mortality of patients with hyponatremia was 42.8% compared to 31.3% for patients with normal natremia (p = 0.006) (Figure 1). The mortality rate for patients with stroke was 61% (n=25).

Parameters	Normonatremic patients > 135 mmol/l (n = 709)	Hyponatremic patients ≤ 135 mmol/l (n = 159)	P-value
Average age +/- AND (year)	46,3 +/- 14,3	57,2 +/- 11,7	0,004
Gender			
Male	394 (81,4%)	90 (18,6%)	0,813
Female	315 (82%)	69 (18%)	
Score de Glasgow			
15	268 (40,3%)	55 (34,6%)	
10 - 14	330 (46,5%)	63 (39,6%)	0,001
7 - 9	62 (8,7%)	29 (18,2%)	
< 7	31 (4,4%)	12 (7,5%)	
Nosological diagnosis			
Stroke	136 (19,2%)	41 (25,8)	
Cardiovascular illnesses	132 (18,6%)	26 (16,4)	0,0001
Hepato-gastroenterology	96 (16,5%)	25 (15,7)	
Infectious diseases	81 (11,4%)	16 (10,1)	
Endocrine and metabolic	50 (7,1%)	13 (8,2)	
Neurology	79 (11,1%)	13 (8,2)	
Nephrology	12 (1,7%)	12 (7,5)	
Poisoning	45 (6,3%)	9 (5,7)	
Respiratory diseases	78 (11%)	4 (2,5)	
Average Hospital Duration (day) eur	3,81	4,43	0,436

Table 1: *Characteristics and evolution of patients according to natremia.*

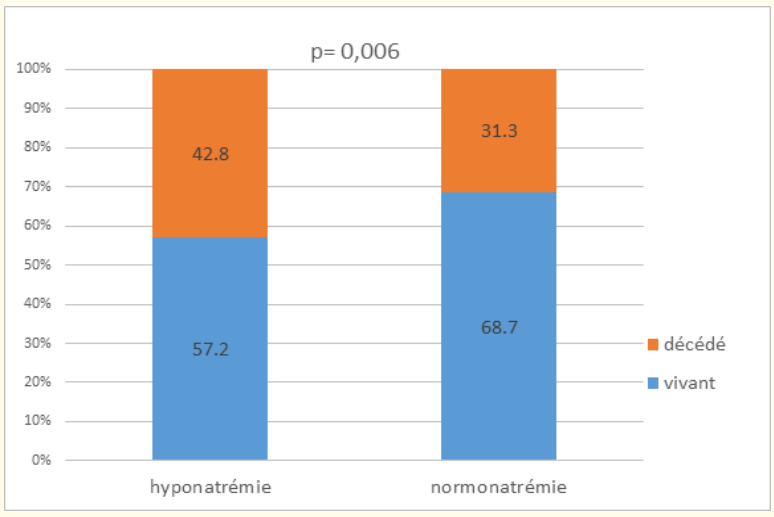

Figure 1: *Comparison of mortality of hyponatremic and normonatremic patients.*

The mortality of patients with a Glasgow score of less than 9 was 90.2% (P < 0.0005). The mortality of patients with hyponatraemia less than 125 mmol/L was 77.8% (p = 0.001). Table 2 compares the mortality of the patients according to the level of the natremia, the level of consciousness.

Parameters	Living n (%)	Both dead n (%)	P-value
Level of serum sodium			
135 - 126	87 (61,7)	54 (38,3)	
125 - 116	04 (22,2)	14 (77,8)	0,001
Score de Glasgow			
15	47 (51,6)	8 (11,8)	
10 - 14	40 (44)	23 (33,8)	0,0001
7 - 9	3 (3,3)	26 (38,2)	
< 7	1 (1,1)	11 (16,2)	
Nosological diagnostic score			
Stroke	16 (17,6)	25 (36,8)	
Cardiovascular illnesses	14 (15,4)	12 (17,6)	0,142
Hepato-gastroenterology	17 (68)	8 (32)	
Infectious diseases	10 (11)	6 (8,8)	
Endocrine and metabolic	8 (8,8)	5 (7,4)	
Neurology	11 (12,1)	2 (2,9)	
Nephrology	6 (6,6)	6 (8,8)	
Poisoning	6 (6,6)	3 (4,4)	
Respiratory diseases in Glasgow	3 (3,3)	1 (1,5)	

Table 2: *Mortality of hyponatremia by level of serum sodium, Glasgow score and nosological diagnosis.*

Discussion

Normal serum sodium is 138 - 142 mmol/L [7]. As a definition of hyponatremia, we have adopted any value of natremia strictly below 135 mmol/L [1]. This study allowed us to highlight the prevalence of hyponatremia which was 18.3%. The incidence and prevalence of hyponatremia are very variable because of the heterogeneity of the various studies, such as the threshold of serum sodium retained in the study or setting of the study. In the United States, the prevalence of hyponatremia below 134 mmol/L was 29.6% in resuscitation [8]. In Egypt, the prevalence of hyponatremia < 135 mmol/L was 39.1% in Geriatrics [9]. In France in 2007, in the internal medicine services, the overall prevalence of hyponatremia was 12.1% [10]. In Japan in 2013, the prevalence of hyponatremia < 135 mmol/L was 11.6% [11].

According to Nzerue., *et al.* [4] and Hoorn., *et al.* [3], severe hyponatremia is strictly less than 125 mmol/L. In our study, the prevalence of hyponatremia < 125 mmol/L of 2% is significantly lower than that found in France [10] and Singapore [5], with a prevalence of 4.5% and 6.7% respectively. These differences in prevalence could be related to the method of calculating prevalence. Pottier., *et al.* calculated the prevalence on the number of beds and not on the number of patients [10].

The average age of patients varies according to the service taken into account. It is 59.1 years for a resuscitation service (59.1 years) [12] and is around 65 to 70 years for a department of internal medicine [10,11,13,14].

In addition, we observed that the prevalence of hyponatremia increases with age (p = 0.004). Older age is a risk factor for hyponatremia [5,15]. Changes in water metabolism and renal function expose elderly subjects to the risk of hyponatraemia overloading in open water. Indeed, hyponatremia in the elderly can be explained by the loss of lean mass correlated with intracellular water loss and the decrease in glomerular filtration of 1 ml/min/1.73 m^2 from the age of 40 years old [16]. This age-related physiological change affects the ability to eliminate an overload in open water [17]. Hyponatremia is a secondary cerebral palsy regardless of the underlying pathology. In neuro-resuscitation, neurological signs may be difficult to distinguish from those of the underlying pathology [18]. Dysnatremia is the most common electrolytic abnormality in neurological pathology and is likely to worsen the prognosis [19,20].

Mortality in our department is very high, ranging from 5.4% to 6.1% for hyponatremia below 135 mmol/L [20,21]. This fact could be explained by the aggravation of the underlying pathologies under the effect of hyponatremia.

In our study, the most prominent underlying pathologies were stroke, cardiovascular disease and hepatogastroenterological pathology. The occurrence of hyponatremia is a poor prognosis for patients with stroke. We found a mortality rate of 77.8% (p = 0.001) for patients with severe hyponatremia. Moreover, the hospital mortality rate increases with the severity of hyponatremia [21]. Regardless of etiology, the mortality of our hyponatremic patients was very high compared to normonatremic patients (p = 0.006). This fact is already known [13,22,23]. Mortality is higher in hyponatremic patients with congestive heart failure or decompensation of hepatic disease [22].

Our study has limitations because its retrospective nature prevents us from studying in more detail the etiologies of hyponatremia.

Conclusion

This study makes it possible to determine for the first time the prevalence of hyponatremia in the intensive care unit of Fianarantsoa University Hospital. The mortality of hyponatremic patients is high. More refined studies are needed to determine etiologies and to re-evaluate the present study.

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Volume 3 Issue 4 December 2017