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Prevalence of Electrolyte Disorders in Oncology: Descriptive Cross-Sectional Study in the Cancer Department of the National Hospital Dalal Jamm

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Abstract

This study aimed to determine the prevalence of electrolyte disorders in patients hospitalized in the oncology department of a Senegalese hospital. Through a retrospective cross-sectional analysis of 160 patient records over a two-year period, the authors found a high prevalence of these disorders (80.6%). Hyponatremia was the most common disorder (51.5%), with the highest rates observed in patients with stomach cancer.

Keywords

Electrolytes, Cancer, Senegal

1. Introduction

Cancer is a chronic disease that, due to its natural progression and/or treatment, is frequently accompanied by electrolyte disturbances. These disturbances are associated with increased mortality, longer hospital stays, and higher healthcare costs in cancer patients [1].

Several studies have been conducted on the mechanisms underlying these disorders and their impact on overall survival and mortality in oncology [2]-[4]. However, there are few studies on the prevalence of these electrolyte disorders in cancer patients, particularly in sub-Saharan Africa.

In this study, our objective was to determine the prevalence of electrolyte disorders in hospitalized cancer patients.

2. Materials and Methods

2.1. Study Type and Population

We conducted a descriptive cross-sectional study with retrospective data collection over a two-year period between January 1, 2021, and December 31, 2022, in the oncology department of the Dalal Jamm National Hospital Center in Dakar, Senegal.

The study population consisted of patients hospitalized in the aforementioned department and included patients:

- with a histological diagnosis of cancer and
- hospitalized for at least 24 hours and
- having a standard blood ionogram (sodium, potassium, and chloride levels).

2.2. Data Collection

Sociodemographic and clinical data were collected from patients' hospital medical records.

The variables collected were:

- Sociodemographic variables: age, sex;
- Clinical variables: blood ionogram report, affected organ, cancer stage, type of cancer treatment.

Data collection and descriptive analysis were performed using Microsoft Excel 2013 software.

2.3. Definition of Electrolyte Disorders

The reference values used were those of the biochemistry laboratory at the Dalal Jamm National Hospital Center and were defined as follows:

- Sodium: [135 - 145] mmol/L
- Potassium: [3.5 - 5.3] mmol/L
- Chloremia: [98 - 106] mmol/L

Thus, hyponatremia was defined as natremia below 135 mmol/L, hypernatremia as natremia above 145 mmol/L, hypokalaemia by a potassium level below 3.5 mmol/L, hyperkalaemia by a potassium level above 5.3 mmol/L; hypochloremia by a chloride level below 98 mmol/L and hyperchloremia by a chloride level above 106 mmol/L.

Samples were taken without a garrotte and at a puncture site away from any infusion.

3. Results

During the study period, we included 160 patients who met the criteria. Sociodemographic and clinical characteristics are reported in Table 1.

Among the patients included in the study, 80.6% (n = 129) had at least one electrolyte disorder. Hyponatremia was the most common disorder, present in 51.5% of patients, followed by hypokalemia, hypochloremia, and hyperkalemia,

with prevalences of 36.5%, 28.1%, and 15.6%, respectively. Table 2 details the prevalence of each disorder according to the organ affected.

Table 1. Sociodemographic and clinical characteristics.

Gender	
Male	35.6%
Female	64.4%
Age	
18 - 40	25%
40 - 60	32.5%
Over 60	42.5%
Stage	
Localized	11.2%
Locally advanced	41.9%
Métastatic	46.9%
Cancer treatment	
Surgery	28.3%
Chemotherapy	68.7%
Radiotherapy	16.6%

Table 2. Prevalence of disorders according to cancer site.

	$HypoNa^+$	$HypoK^+$	$HypoCl^-$	$HyperK^+$	$HyperCl^-$	$HyperNa^+$
Stomach	81.8	45	27.2	0	9	0
Cervix/uterine body	64.2	25.9	34.6	48.1	18.5	0
Colon/rectum	50	33.3	27.7	14.2	11.1	0
Breast	42.8	35.7	37	17.8	14.2	0
Pancreas	40	60	13.3	0	33.3	0
Ovary	33.3	36.6	19	6.6	19	0
Esophagus	36.6	83.3	33.3	16.6	66.6	33.3

4. Discussion

In our study, the prevalence of electrolyte disturbances was 80.6%. This high prevalence could be explained, on the one hand, by the predominance of advanced stages (locally advanced and metastatic), which accounted for 88.8% of cases in our study, and, on the other hand, by the high proportion of elderly people, with 42.5% of patients aged over 60.

Among the most common disorders are hyponatremia and hypokalemia, which were more pronounced in cancers of the upper digestive tract and were related to stenosis in these organs, a consequence of the advanced stage. Similarly, hyper-

kalemia was more pronounced in cancers of the uterus, and the mechanism most often found in the literature was compression of the urinary tract, causing acute obstructive renal failure [5]-[7].

An overall prevalence of 58% was found in a study in China, however, the study included a small proportion of patients with metastases (7.6%) [1]. Similarly, Bharti *et al.* reported a prevalence of 42% in India [8].

Hyponatremia was the most common disorder with a prevalence of 51.5%. Syndrome of inappropriate ADH secretion (SIADH) is the main cause of hyponatremia in cancer patients, particularly those with lung cancer [9] [10]. Water-sodium depletion is also a major cause of hyponatremia; it is most often secondary to digestive losses, particularly in gastrointestinal tumors [9].

Hypokalemia was found in 36.5% of patients. Several etiologies are responsible for hypokalemia in oncology, including intake deficiencies (malnutrition, anorexia, etc.) and digestive losses [11]. Hypokalemia may also be linked to inappropriate refeeding syndrome [12]. Hypochloremia was found in 28.1% of patients; it is mainly due to digestive losses [13].

Hyperkalemia was found in 16.5% of patients. Tumor lysis syndrome is the main cause of hyperkalemia in oncology; it can occur spontaneously or after the initiation of chemotherapy [14]. Hyperchloremia was found in 16.2% of cases. It is mainly iatrogenic in origin, due to the chlorine content of the replacement fluids [15]. Hypernatremia was found with a prevalence of 1.2%. It may be related to free water loss. It may also be iatrogenic [16].

Limitations of the study: this was a retrospective, single-center study with a small sample size.

5. Conclusion

This study highlighted a high prevalence of electrolyte disturbances in oncology. We therefore recommend systematic monitoring of electrolytes in high-risk patient groups, such as those with upper gastrointestinal tract cancers and prophylactic urinary diversion, particularly through the placement of a double J stent in advanced uterine cancers. Future studies should investigate the impact of electrolyte disturbances on length of hospital stay, initiation of anticancer treatment, and mortality in our regions.

Conflicts of Interest

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

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