



Hyponatremia in hospitalized cancer patients: a three-month retrospective experience from Laghouat, Algeria

Mouna Khireddine¹; Zakia Batoul Benlahrech¹; Rafik Miloudi¹; Abderrahim Djellaoui¹; Slimane Ferhat²; Mahmoud Chiad³

1. Department of Medical Oncology, Amar Telidji University of Laghouat, Algeria

2. Laghouat Public Health Establishment, Laghouat, Algeria

3. Department of Nephrology, University of Constantine 3, HMRUC, Algeria

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ARTICLE HISTORY	ABSTRACT
Received: 04.08.2026 Final Revision: 25.08.2026 Accepted: 29.08.2026 Online Publication: 01.10.2026	Background: Hyponatremia is the most frequent electrolyte disorder in hospitalized patients and is particularly common in oncology, where it has been associated with prolonged hospital stay, impaired treatment response, and reduced survival. Data from North African oncology settings are scarce. Methods: We conducted a single-centre, retrospective, observational study in the Department of Medical Oncology of the Cancer Fighting Centre of Laghouat, Algeria, over a three-month period (April–June 2026). All patients admitted to the inpatient ward were screened. Hyponatremia was defined as a serum sodium concentration ($[Na^+]$) <135 mmol/L on the admission sample and graded as mild (130–134), moderate (125–129), or severe (<125 mmol/L). Tumour type, admission diagnosis, length of stay, and in-hospital mortality were recorded. Descriptive statistics were used. No inferential comparison with normonatremic patients was performed due to the absence of systematically retrievable clinical data for that group. Results: Among 68 hospitalized patients, 21 (30.9%) presented with hyponatremia on admission. Hyponatremia was mild in 10 (47.6%), moderate in 7 (33.3%), and severe in 4 (19.0%). The most frequent underlying malignancy was lung cancer (12 patients, 57.1%), followed by colorectal cancer (5, 23.8%), breast cancer (3, 14.3%), and hepatocellular carcinoma (1, 4.8%). The leading admission diagnoses were lower respiratory tract infection (10, 47.6%), global dehydration (4, 19.0%), febrile neutropenia (3, 14.3%), altered level of consciousness (3, 14.3%), and end-of-life care (1, 4.8%). Length of stay ranged from 3 to 10 days. Three patients (14.3% of the hyponatremic cohort) died during hospitalization. Conclusion: In this retrospective cohort, hyponatremia was present in nearly one-third of admissions, with lung cancer being the most frequent tumour type. The distribution of admission diagnoses suggests SIAD and hypovolaemia as likely mechanisms, but this remains inferential in the absence of a standardized etiological work-up. These findings highlight the need for prospective studies with standardized diagnostic protocols and appropriate comparator groups.
KEYWORDS	
Hyponatremia; cancer; syndrome of inappropriate antidiuresis; lung cancer; supportive care	
CORRESPONDING AUTHOR	
MOUNA KHIREDINE <m.khireddine@lagh-univ.dz>	
DOI	
10.34118/amr.v5i3.4877	

1. Introduction

Hyponatremia is defined as a serum sodium concentration ($[Na^+]$) below 135 mmol/L and is the most common electrolyte abnormality encountered in hospitalized patients, with a reported prevalence of approximately 30% [1,2]. Its aetiology is multifactorial, but the syndrome of inappropriate antidiuresis (SIAD) accounts for 40–50% of cases [3,4].

The clinical relevance of hyponatremia has been progressively reappraised. Severe acute hyponatremia produces cerebral oedema and may lead to seizures, brainstem herniation, respiratory arrest and death [2]. Chronic and even mild hyponatremia, long considered asymptomatic, is now known to be associated with gait disturbance, falls, attention deficits, bone demineralization and fractures, and with an independently increased risk of death [1,5,6].

In oncology, the burden of hyponatremia is substantial. It affects up to 40% of cancer patients on admission and nearly half during the disease course, with a peak prevalence of 75% in small-cell and non-small-cell lung carcinomas [5–8]. The underlying mechanisms are multifactorial and often overlap. They include ectopic arginine vasopressin (AVP) secretion by tumour cells ($>30\%$ of cases) [9,10]; drug-induced or potentiated AVP release (e.g., cyclophosphamide, vincristine, vinblastine, cisplatin, melphalan, opioids, antidepressants, antiepileptics, phenothiazine

antiemetics) [11,12]; secondary adrenal insufficiency due to immune checkpoint inhibitors or targeted agents [13]; and non-malignant factors such as nausea, vomiting, pain, diarrhoea, infection, chemotherapy hydration protocols, and cardiac, hepatic, or renal failure [12].

Beyond its diagnostic complexity, low serum $[Na^+]$ carries prognostic weight. It has been identified as an independent negative prognostic factor in several solid and haematological malignancies, it doubles the length of hospital stay and increases health-care costs, and it predicts a poorer response to chemotherapy and to targeted therapy [5,7,14,15]. Conversely, normalization of serum $[Na^+]$ has been associated with improved progression-free and overall survival [16,17].

Despite this evidence, hyponatremia remains under-recognized and inconsistently managed in day-to-day oncology practice, and epidemiological data from North African cancer centres are almost non-existent. The aims of the present study were:

1. To determine the prevalence and severity distribution of hyponatremia among patients admitted to our medical oncology ward over a three-month period,
2. To describe the tumour types and admission diagnoses associated with it,
3. To report length of stay and in-hospital mortality,

2. Patients and Methods

2.1 Study design and setting

This was a single-centre, retrospective, observational study conducted in the inpatient unit of the Department of Medical Oncology of the Cancer Fighting Centre (Centre de Lutte Contre le Cancer) of Laghouat, Algeria. The study period extended over three consecutive months, from 1 April 2026 to 30 June 2026.

2.2 Population

All patients with a histologically confirmed malignancy admitted to the medical oncology ward during the study period were screened. Patients were included in the hyponatremic cohort when a serum $[Na^+]$ below 135 mmol/L was documented on the biochemical panel performed at admission. No age limit was applied. Patients with repeated admissions during the study period would have been counted separately if they met inclusion criteria on a new admission; however, this situation did not occur. Patients admitted for planned chemotherapy, transfers from other departments, and palliative-care admissions were all included. No additional exclusion criteria were applied.

2.3 Definitions

Hyponatremia was defined and graded according to the biochemical thresholds used in the European clinical practice guideline [18]:

- Mild hyponatremia: serum $[Na^+]$ 130–134 mmol/L
- Moderate hyponatremia: serum $[Na^+]$ 125–129 mmol/L
- Severe (profound) hyponatremia: serum $[Na^+]$ below 125 mmol/L

The "admission sample" was defined as the first blood sample drawn after admission, before any intravenous fluid administration, and within the first 24 hours of hospitalization.

2.4 Data collection

The following variables were extracted from the medical records: age, sex, primary tumour site, admission diagnosis (the main clinical problem motivating hospitalization, as recorded by

the admitting physician), serum $[Na^+]$ at admission, length of hospital stay, and vital status at discharge. Admission diagnoses were classified into five mutually exclusive categories reflecting the dominant clinical presentation: lower respiratory tract infection, global dehydration, febrile neutropenia (febrile aplasia), altered level of consciousness, and end-of-life care. Information on anticancer treatments, medications (including those known to affect sodium balance), comorbidities, tumour stage, and metastatic status was not systematically available and was therefore not extracted.

2.5 Statistical analysis

Given the descriptive purpose and the sample size, the analysis was limited to descriptive statistics. Categorical variables are expressed as absolute numbers and percentages; length of stay is expressed as a range.

2.6 Ethics

The study was conducted in accordance with the Declaration of Helsinki. Data were collected retrospectively from routine medical records and were anonymized before analysis.

3. Results

3.1 Demographic characteristics

During the three-month study period, 68 patients were hospitalized in the medical oncology ward. The study population was predominantly male, with 55 men (80.9%) and 13 women (19.1%), yielding a male-to-female ratio of 4.23:1. The mean age was 52.5 years (median: 53.1 years). The age distribution spanned from 30 to over 70 years, with a predominance of patients in the 50–59 years age group (26 patients, 38.2%), followed by those aged 40–49 years (18 patients, 26.5%) and 60–69 years (12 patients, 17.6%). Patients aged 30–39 years accounted for 8 cases (11.8%), while those aged 70 years and older represented the smallest proportion (4 patients, 5.9%) Figure (1).

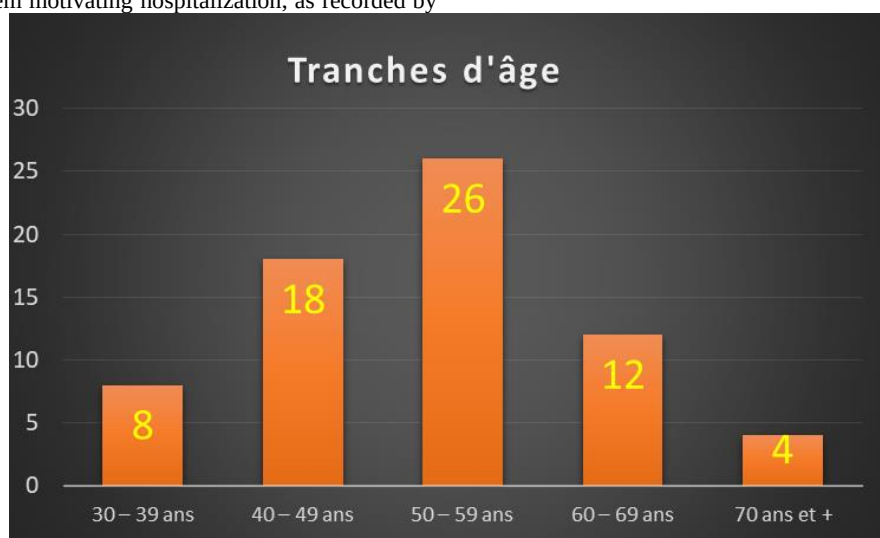


Figure 1. Age distribution of hospitalized patients (n = 68).

3.2 Prevalence of hyponatremia

Among these 68 patients, 21 presented with hyponatremia at admission, corresponding to an overall prevalence of 30.9% (21/68).

3.3 Severity distribution

The severity distribution of hyponatremia is presented in Table 1. Mild hyponatremia was the most frequent presentation, accounting for almost half of the cases (47.6%, 10/21), while profound hyponatremia (below 125 mmol/L) was found in approximately one fifth of the cohort (19.0%, 4/21).

Table 1. Severity distribution of hyponatremia (n = 21).

Severity grade	Serum $[Na^+]$ (mmol/L)	n (%) among hyponatremic patients	% of all admissions
Mild	130–134	10 (47.6)	14.7
Moderate	125–129	7 (33.3)	10.0
Severe (profound)	<125	4 (19.0)	5.9

3.4 Underlying malignancies

The distribution of primary tumour sites among hyponatremic patients is shown in Table 2. Lung cancer was the most frequently

Table 2. Primary tumour site in hyponatremic patients (n = 21).

Primary tumour	n	%
Lung cancer	12	57.1
Colorectal cancer	5	23.8
Breast cancer	3	14.3
Hepatocellular carcinoma	1	4.8

3.5 Admission diagnoses

The clinical problems motivating hospitalization are summarized in Table 3. Lower respiratory tract infection was the leading admission diagnosis, present in almost half of the

Table 3. Admission diagnosis in hyponatremic patients (n = 21).

Admission diagnosis	n	%
Lower respiratory tract infection	10	47.6
Global dehydration	4	19.0
Febrile neutropenia (febrile aplasia)	3	14.3
Altered level of consciousness	3	14.3
End-of-life care	1	4.8

3.6 Length of stay and outcome

Length of hospital stay in the hyponatremic cohort ranged from 3 to 10 days. The distribution of stay durations was not normally distributed; the range is provided as a descriptive summary. Three patients (14.3% of the hyponatremic cohort, equivalent to 4.4% of all 68 admissions) died during hospitalization. No comparative mortality data for normonatremic patients were available.

4. Discussion

4.1 Prevalence: consistent with international series

In our series, 30.9% of patients were hyponatremic at admission. This figure is consistent with the international literature. Doshi et al., in a large cohort of hospitalized cancer patients, reported hyponatremia in 47% of admissions, of which the great majority were mild [5]. Berghmans et al., in a prospective study of medical cancer patients, found comparable rates and identified SIAD as the leading cause [9]. Castillo et al., in a cross-sectional analysis of a large cancer population, confirmed that hyponatremia is both frequent and prognostically relevant, with the highest occurrence in lung cancer [7]. Abu Zeinah et al. reported hyponatremia in about 45% of cancer inpatients in a Middle Eastern population and confirmed a strong association with mortality [19].

Our slightly lower prevalence is most plausibly explained by methodological differences rather than by a genuinely lower biological risk. We considered only the sodium value obtained at admission, whereas several published series counted any episode occurring at any time during hospitalization or during the whole disease course — a design that mechanically captures chemotherapy-induced and hydration-related events that we could not detect. Case-mix differences are also relevant: our ward admits a substantial proportion of patients for planned supportive care and short symptom-control stays.

The severity distribution we observed (47.6% mild, 33.3% moderate, 19.0% severe) mirrors the classical pyramid described in general medical and oncological populations, in which mild forms clearly predominate [1,5,20]. It is nonetheless notable that one fifth of our hyponatremic patients had profound hyponatremia (below 125 mmol/L), a threshold at which the risk of cerebral

represented malignancy, accounting for more than half of the cases (57.1%, 12/21).

hyponatremic patients (47.6%, 10/21), followed by global dehydration (19.0%, 4/21). Altered level of consciousness and febrile neutropenia were each recorded in three patients (14.3%, 3/21 each), and one patient was admitted for end-of-life care (4.8%, 1/21).

oedema, of osmotic demyelination during correction, and of death is substantially increased [18,20].

4.2 Tumour distribution

Lung cancer accounted for 57.1% of our hyponatremic patients. This predominance is one of the most reproducible findings in the field. Lung tumours, and SCLC in particular, are the classical source of ectopic AVP secretion [9,10], and the reported prevalence of hyponatremia reaches 75% in patients with SCLC or NSCLC [7]. Hansen et al., in a retrospective study of 453 SCLC patients treated in a single institution, found hyponatremia in about 15% of patients at diagnosis and demonstrated a significantly shorter survival in this subgroup [21]. Berardi et al. subsequently showed, in advanced NSCLC treated with first-line therapy, that both overall and progression-free survival were significantly worse in patients who remained hyponatremic than in those whose serum $[Na^+]$ was normalized [16].

Colorectal cancer represented 23.8% of our cases. Choi et al. analysed the prognostic impact of hyponatremia in colorectal cancer and reported it as an independent predictor of poorer outcome [22]. Breast cancer accounted for 14.3%; hyponatremia is less typically associated with this tumour type, and in our patients it was more plausibly related to intercurrent events (infection, digestive losses, drug effects) than to paraneoplastic AVP secretion. Finally, our single case of hepatocellular carcinoma illustrates a distinct pathophysiological pathway: in cirrhosis, effective arterial hypovolaemia leads to non-osmotic AVP stimulation and dilutional hyponatremia, a well-recognized marker of disease severity [23].

Important methodological caveat: We could not calculate the prevalence of hyponatremia within each tumour type, because the tumour distribution of the whole admitted population (n = 68) was not extracted. The apparent predominance of lung cancer therefore partly reflects the recruitment profile of our ward and should not be interpreted as evidence of over-representation. This point should be addressed in a future extension of the work.

4.3 Admission diagnoses

The distribution of admission diagnoses in our cohort provides indirect information about possible underlying mechanisms, but it

is important to emphasize that these diagnoses do not establish the pathophysiological mechanism of hyponatremia.

- Lower respiratory tract infection (47.6%). Pneumonia is itself one of the most frequent non-malignant causes of hyponatremia, occurring in about 30% of patients hospitalized for community-acquired pneumonia, and SIAD is the dominant mechanism [24,25]. Pro-inflammatory cytokines, and interleukin-6 in particular, stimulate AVP release through both central and peripheral pathways, providing a common denominator between respiratory infection and hyponatremia [26]. In a lung-cancer-rich population such as ours, pneumonia and tumoral AVP secretion are frequently superimposed, and disentangling the two is often impossible at the bedside.
- Global dehydration (19.0%). These patients represent the hypovolaemic subgroup, in whom sodium and water depletion result from vomiting, diarrhoea, reduced oral intake, mucositis or fever. This distinction is not academic: hypovolaemic hyponatremia is corrected by isotonic saline, whereas the same infusion given to a patient with SIAD may leave the serum $[Na^+]$ unchanged or even lower it [12,18,27].
- Febrile neutropenia (14.3%). In these patients, hyponatremia is typically multifactorial, combining the effects of sepsis, cytokine-induced AVP release, digestive losses and recent cytotoxic chemotherapy — cisplatin being of particular interest, since in addition to inducing SIAD it may cause a genuine salt-losing nephropathy with renal sodium wasting [11,12].
- Altered level of consciousness (14.3%). Three patients were admitted with neurological impairment. Confusion, disorientation, unsteadiness and drowsiness are precisely the moderate-severity symptoms that, according to the European guideline, justify immediate hypertonic saline rather than a purely aetiological approach [18]. In an oncological population, however, these symptoms are notoriously non-specific and may equally reflect brain metastases, opioid accumulation, hypercalcaemia or sepsis, which makes prompt sodium measurement mandatory in every cancer patient presenting with new-onset neurological deterioration.
- End-of-life care (4.8%). In this context, hyponatremia is generally a marker of the terminal phase, and correction is not an objective in itself; management should focus on comfort and on avoiding futile interventions.

Crucially, none of these admission diagnoses can be equated with a confirmed mechanism of hyponatremia. In the absence of systematic urine osmolality, urine sodium, cortisol, TSH, and volume status assessment, any statement about the dominant mechanism remains speculative.

4.4 Length of stay and mortality

Length of stay in our hyponatremic patients ranged from 3 to 10 days. Doshi et al. showed that hyponatremia in hospitalized cancer patients approximately doubles the length of stay and significantly increases hospitalization costs [5,14]. Three of our patients (14.3%) died during hospitalization. This figure is consistent with published in-hospital mortality rates in hyponatremic cancer cohorts, which are typically two- to three-fold higher than those of normonatremic patients [5,19,20]. Waikar et al. demonstrated in a large general-hospital cohort that mortality rose progressively with the depth of hyponatremia and remained elevated even for mild forms [20], and the meta-analysis by Corona et al., which pooled 81 studies and approximately 150,000 participants, estimated a relative risk of death of 2.60 (95% CI 2.31–2.93) in hyponatremic compared with normonatremic subjects [6]. Large Danish population studies further showed that low serum $[Na^+]$ correlates not only with all-cause mortality but also with a higher risk of subsequently developing a malignancy [28,29].

Our study cannot establish whether hyponatremia acted as an independent contributor to death or simply as a marker of disease severity — a debate that has accompanied this literature since its beginning. The absence of a normonatremic comparator group is the main limitation in this respect. It is, however, worth

emphasizing that the interventional data available today favour a causal contribution: correction of serum $[Na^+]$ has been associated with improved overall and progression-free survival in SCLC and NSCLC [16,21] and with markedly longer survival in patients with advanced malignancies and severe hyponatremia [17].

5. Limitations

This study has several limitations. Its retrospective, single-centre, three-month design yielded only 21 hyponatremic patients, precluding multivariate/survival analyses and limiting generalisability. Only admission sodium was recorded, missing cases developing during hospitalisation and underestimating the true burden. The aetiological work-up was not systematic, so mechanisms were inferred rather than formally established. No normonatremic control group was included, and serial sodium values/correction data were unavailable. Data on medications, treatments, comorbidities, stage, and performance status were incomplete. Pseudohyponatremia could not be excluded. Finally, therapeutic recommendations are guideline-based and unvalidated in this population.

6. Conclusion

In this three-month retrospective experience in an Algerian medical oncology inpatient unit, hyponatremia was present at admission in 30.9% of patients. It was mild in nearly half of cases but profound in one fifth. Lung cancer accounted for more than half of the hyponatremic patients, and lower respiratory tract infection and dehydration were the dominant admission diagnoses, suggesting — but not establishing — SIAD and hypovolaemia as the two principal mechanisms. Three patients died during a hospital stay that ranged from 3 to 10 days. Without a normonatremic comparator group and systematic etiological work-up, no conclusions can be drawn about the prognostic impact of hyponatremia or the efficacy of its correction.

These findings, consistent with the international literature, argue for three simple measures in routine oncological practice: systematic measurement of serum $[Na^+]$ in every patient admitted and before every chemotherapy cycle; a structured aetiological work-up — volume status, urine osmolality, urine sodium — carried out before any fluid is administered; and a written, symptom-driven correction protocol respecting strict correction limits. Given the accumulating evidence that normalization of serum $[Na^+]$ independently improves the outcome of cancer patients, hyponatremia should be regarded not as an incidental laboratory finding but as a potentially treatable prognostic factor. Prospective studies are urgently needed to confirm these associations and to evaluate the impact of standardized management protocols in resource-limited settings.

7. Declarations

- Authors: All authors agree to be accountable for all aspects of the work.
- Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.
- Conflicts of interest: The authors declare no conflict of interest.

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