

PROSPECTIVE DETERMINATION OF THE INCIDENCE AND SEVERITY OF HYPONATRAEMIA IN OLDER HOSPITALISED PATIENTS WITH ACUTE URINARY TRACT OBSTRUCTION

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Introduction:

- Acute urinary tract obstruction (aUTO) is a common finding in older hospitalised patients.
- Anecdotal reports described hyponatraemia in patients with aUTO, which subsides rapidly with relief of the obstruction.
- The aim of this study was to determine the incidence, severity and subsequent correction of hyponatraemia in patients with aUTO.

Methods:

- This is a prospective, single center, observational study including inpatients in the internal medicine and geriatric wards.
- A total of 204 patients were investigated, 104 with aUTO and 100 controls.
- The prevalence, severity, and associations of hyponatraemia between aUTO and control patients were compared.

Results:

- A total of 204 hospitalised patients were evaluated, 104 with acute urinary retention (study group) and 100 with urinary catheter without urinary retention (control group).

Table 1: Baseline demographic and clinical characteristics, n (%)

Clinical Characteristic	Patients with urinary retention N = 104	Controls N = 100	p-value
Age	84 ± 8	83 ± 9	.686
Gender (Male) n (%)	63 (61%)	46 (46%)	.052
Comorbidities n (%)			
Hypertension	78 (75%)	63 (63%)	.089
Chronic Kidney disease	19 (18%)	19 (19%)	1.000
Acute Kidney Injury	42 (40%)	38 (38%)	.837
Diabetes mellitus	42 (40%)	39 (39%)	.953
No of comorbidities	1.7 ± 1	1.6 ± 1.2	.340

Table 1: Baseline demographic and clinical characteristics, n (%)

Clinical Characteristic	Patients with urinary retention N = 104	Controls N = 100	p-value
Admission Diagnosis n (%)			
Infection ¹	56 (54%)	65 (65%)	.139
Cardiovascular ²	26 (25%)	32 (32%)	.341
Other ³	22 (21%)	11 (11%)	.075
Admission Diagnosis n (%)			
Survival to discharge	83 (80%)	83 (83%)	.685

Infection¹- pneumonia, acute cholecystitis, cellulitis, etc.

Cardiovascular²- ischemic heart disease, myocardial infarction, etc.

Other³- e.g fracture of femoral neck

Table 1: Baseline demographic and clinical characteristics, n (%)

Clinical Characteristic	Patients with urinary retention N = 104	Controls N = 100	p-value
Laboratory results			
Haemoglobin, g/dL	11.5 ± 2.0	10.9 ± 2.3	.020
Sodium, mEq/L	137.5 ± 8.1	139.4 ± 7.8	.081
Potassium, mEq/L	4.1 ± 0.6	4.0 ± 0.7	.343
Creatinine, mg/dl	1.3 ± 1.0	1.4 ± 1.1	.668
Sodium < 135	29 (28%)	22 (22%)	.419
Mean sodium level mEq/L (<135)	127.7 ± 5.8	130.8 ± 3	.013
Sodium < 125	7 (7%)	1 (1%)	.0375

⁵one tail

Figure 1- Δ Na after Foley catheter insertion in patients with aUTO and hyponatraemia compared to control group

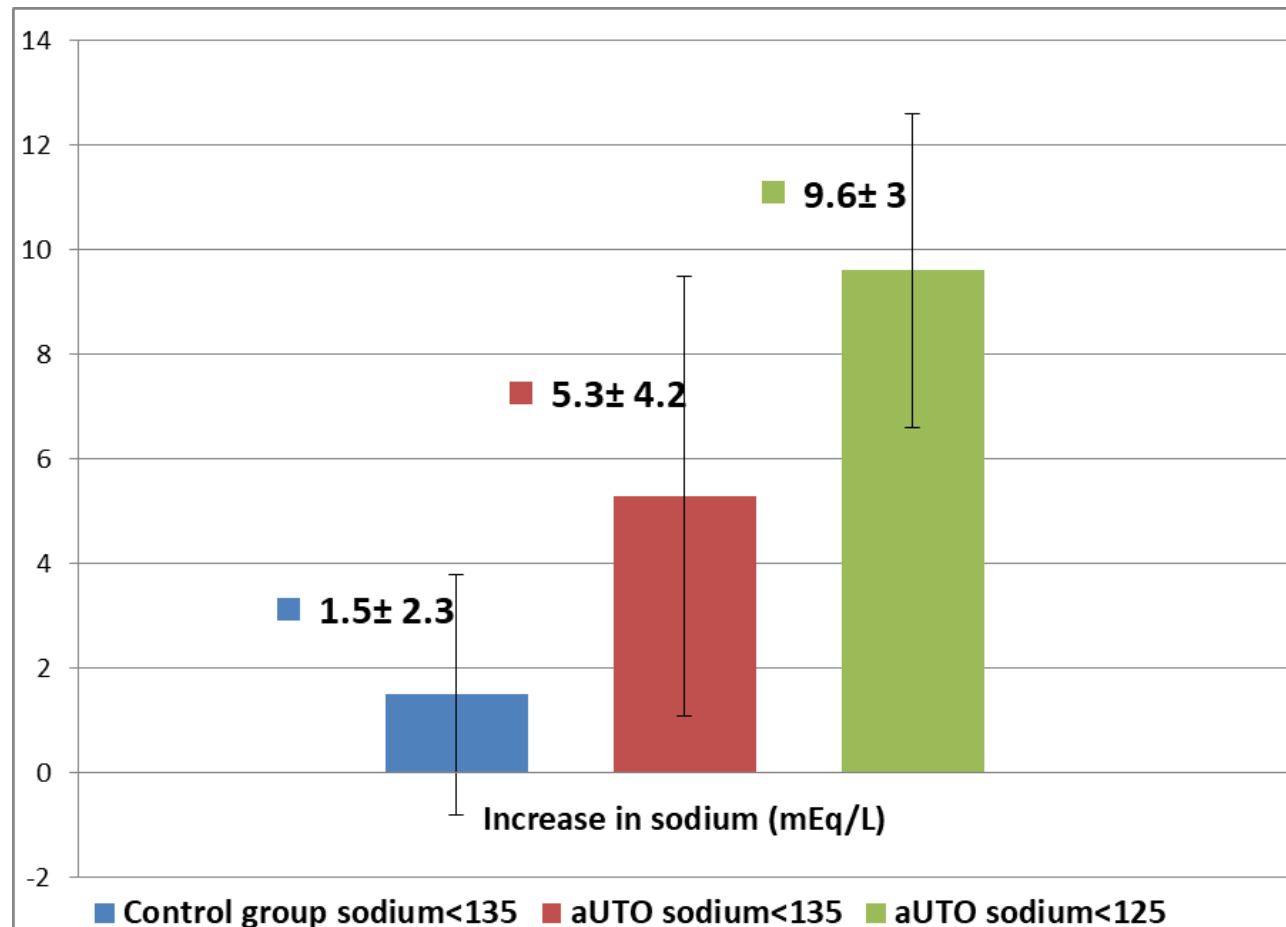


Table 2: Patients with urinary retention with or without hyponatraemia, n (%)

Variables	Patients with hyponatraemia* N = 29	Patients without hyponatraemia* N=75	p-value
Age	86 ± 7	83 ± 9	NS
Gender (Male)	18 (62%)	45 (60%)	NS
Volume of retention (ml)	716 ±244	891 ±448	0.049







Table 2: Patients with urinary retention with or without hyponatraemia, n (%)

Variables	Patients with hyponatraemia* N = 29	Patients without hyponatraemia* N=75	p-value
Hypertension	19 (65.5%)	59 (78.7%)	NS
Chronic Kidney disease	5 (17.2%)	14(18.7%)	NS
Acute Kidney Injury	11 (37.9)	31(41.3%)	NS
Diabetes mellitus	13 (44.8%)	29 (38.7%)	NS
Cerebrovascular accident	4 (13.8%)	20 (26.7%)	NS

Table 2: Patients with urinary retention with or without hyponatraemia, n (%)

Variables	Patients with hyponatraemia* N = 29	Patients without hyponatraemia* N=75	p-value
Laboratory results			
Mean sodium mEq/L	127.7 ±5.8	141.3±5.1	<0.001
Haemoglobin, g/dL	11.3 ± 1.8	11.6 ±2	NS
Potassium, mEq/L	4 ± 0.6	4.1 ± 0.6	NS
Creatinine, mg/dl	1.35 ± 1.1	1.3 ±1	NS
Survival to discharge	21 (72.4%)	62 (82.7%)	NS

Table 3: Patients with severe hyponatraemia (serum sodium <125 mEq/L)

	Gender	Age	Cause of hospitalization	Volume of retention (ml)	Na at retention (mEq/L)	Na within 48 hours following CI ¹ (mEq/L)	Potential additional cause of hyponatraemia
1	M	91	Hyponatraemia	500	113	122	Disothiazide, Duloxetine Hypothyroidism ² 
2	F	92	Hyponatraemia	1000	114	123	Mirtazapine Excess water intake 
3	F	88	Pneumonia	400	114	125	Pneumonia Excess water intake 
4	F	82	Upper respiratory tract infection	900	122	133	<u>Hypervolemic</u> Metolazone
5	F	83	Faecal impaction	900	123	137	Mirtazapine ³ 
6	M	75	Pneumonia	500	124	133	None ⁴ 
7	M	84	Congestive heart failure	500	124	128	<u>Hypervolemic</u> 
Mean		85±6		671±250	119 ±5	129 ± 6	

¹ Catheter insertion

² The patient was treated with saline 3% for 3 days -with no improvement. Immediate improvement after catheter insertion

³ Mirtazapine was continued despite hyponatraemia

⁴ Hyponatraemia developed during hospitalization following urinary retention

Table 4: Literature review of cases of hyponatraemia and aUTO

Patient	Reference	Age/sex	Urinary retention (ml)	Serum sodium at retention (mEq/L)	Serum sodium (mEq/L) following catheter insertion	cause
1	Galperin I	78/F	500	107	131	SIADH & rofecoxib
2	Galperin I	83/F	1,400	118	137	SIADH & hydrochlorothiazide
3	Galperin I	78/M	600	119	131	SIADH & chlorprothixen
4	Galperin I	92/M	800	121	128	SIADH
5	Galperin I	91/M	1,500	127	132	SIADH
6	Galperin I	90/F	800	129	135	SIADH
7	Mahajan R	76/M	--	127	137	SIADH
8	Lax JW	83/M	720	109	129	SIADH
9	Parikh J	63/M	1700	106	125	SIADH
10	Parikh J	40/F	4100	120	140	SIADH
11	Ezra N	80/M	1500	120	116	SIADH & hydrochlorothiazide & polydipsia
12	Pyle R	66/M	2800	116	131	polydipsia
13	Moskowitz DW	42/F	>1100	115	138	polydipsia
14	Irani M	31/F	2000	126	137	SIADH
15	Hogan PCP	83/F	1000	115	130	SIADH
Mean		72		118±7	132±6	

Discussion

- Relief of aUTO leads to a significant improvement in serum sodium level, over a short period of time.
- Although in our study, serum sodium remained unchanged in the control group, most of this group only had mild hyponatraemia.
- In a previous study in our hospital, the rate of sodium improvement in patients with severe hyponatraemia, when given active treatment, was approximately 4.6 ± 4.6 mEq/L in the first 48 hours.
- Thus, the significant improvement in sodium level following relief of aUTO which we have demonstrated, supports the hypothesis of a causal relation between aUTO and hyponatraemia.

Discussion- pathogenesis

- It is assumed that hyponatraemia in patients with urinary retention is caused by inappropriately high anti diuretic hormone secretion (SIADH) triggered by bladder distension or from the pain secondary to the distention.
- Most of our patients had euvolemic hyponatraemia consistent with SIADH and this was the most appropriate diagnosis according to thorough clinical and laboratory evaluation.
- In addition, many patients experiencing decreased urinary output believe that if they drink more they will be able to urinate, which itself may exacerbate the hyponatraemia.
- Despite the assumption that aUTO is the possible cause of hyponatraemia, one might hypothesise that older patients with hyponatraemia can develop altered mental status and thus, functional urinary retention.

Limitations

- The study and control groups were not large enough to reach a statistically significant difference in incidence of hyponatraemia.
- This was a single- centre study which could be enlarged to confirm the association of hyponatraemia and aUTO.
- It is difficult to prove that urinary retention was the single cause of hyponatraemia and our study was mainly focused on the clinical course thus we were unable to fully evaluate the pathogenesis; urinary electrolytes were not available in all our patients.
- Although urinary obstruction was diagnosed as being acute, some of the patients may have had subacute or chronic retention.

Key conclusion

- Hyponatraemia is a common finding in patients with aUTO and its severity positively correlates with urinary retention.
- We recommend a low threshold for bladder scanning in addition to history and physical examination in otherwise unexplained hyponatraemia.
- Insertion of a urinary catheter is often sufficient for the correction of hyponatraemia in older patients.

Prospective determination of the incidence and severity of hyponatraemia in older hospitalised patients with acute urinary tract obstruction

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