Association of hyponatremia and osteoporosis by analyzing serum sodium levels in elderly intertrochanteric fracture patients by Beckman coulter machine

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Abstract
Introduction: Hyponatremia is the most common electrolyte disorder seen in clinical practice, it is defined as a serum sodium concentration of less than 135 mmol/L, and there is accumulating evidence that even mild hyponatremia is associated with increased morbidity and mortality, furthermore it can be a novel marker for fracture risk.
Materials and Methods: The study was conducted in department of orthopaedics, S.R.G. Hospital and Medical College, Jhalawar (Rajasthan). The study comprised of 78 patients (48 males and 30 females) with intertrochanteric fractures.
Observations and Results: Out of total 78 patients taken in study 61 were found to be hyponatremic. Out of 48 males in study 39 were hyponatremic, and out of 30 females 22 were hyponatremic.

Keywords: Hyponatremia, Osteoporosis.

Introduction
Hyponatremia is most common electrolyte disorder seen in clinical practices,[1] it is defined as a serum sodium concentration of <135 mmol/L, and there is evidence that mild hyponatremia are associated with increased morbidity and mortality,[2–5] furthermore it can be a novel marker for fracture risk.

Studies demonstrate that a large amount of body sodium is stored in bone matrix[6] suggesting that bone may serve as a mobilize of sodium reservoir during periods of homeostatic stress.

My Study indicate that acute hyponatremia can induce a wide spectrum of neurological deficits, ranging from mild symptoms to more significant disorders. The neurological dysfunctions associated with hyponatremia have been shown to include gait instability[9] and fall on ground,[10,11] both of which could compound patient fracture risk.

My study aims to contribute to data concerning hyponatremia and fractures by determining the relationships between hyponatremia and fractures among a cohort of elderly patients presenting to S.R.G. Hospital, Jhalawar, Rajasthan, India with intertrochanteric fractures considering these fractures to be direct result of decreased bone mineral density.

Materials and Methods
Subjects
The study was conducted in department of orthopaedics, S.R.G. Hospital and Medical College, Jhalawar (Rajasthan). The study comprised of 78 patients (48 males and 30 females) with intertrochanteric fractures.
The inclusion criteria's were:
1. Age group 60-85 years.
2. No other associated co-morbidities.
3. Presenting within 3 days of injury.

The exclusion criteria's were:
1. Patients having intertrochanteric fracture and associated any other bony injury.
2. Fractures as a result of road traffic accident or assault.
3. Patients having neurovascular involvement.

Serum Sodium Assessment
Fasting serum was obtained at the baseline visit in all patients. Serum sodium was measured on thawed serum at the institute's central laboratory using a Beckman Coulter Machine.

Observations and Result
Out of total 78 patients taken in study 61 were found to be hyponatremic.

Out of 48 males in study 39 were hyponatremic, and out of 30 females 22 were hyponatremic.

Table 1

S. No.	Age (in years)	Sex	Serum Na+ level (in mmol/L)
1	77	F	127
2	85	M	132
3	75	M	130
4	80	M	131
5	65	F	134
6	80	F	134
7	66	F	132

8	68	F	135
9	70	M	128
10	65	F	132
11	82	F	141
12	70	M	120
13	70	F	131
14	61	F	133
15	70	M	134
16	80	F	139
17	62	M	137
18	77	M	134
19	62	M	136
20	82	F	141
21	78	F	127
22	80	F	128
23	64	M	124
24	70	M	128
25	65	F	131
26	68	M	131
27	78	M	129
28	75	M	141
29	65	F	141
30	65	F	138
31	65	F	137
32	69	F	137
33	85	F	129
34	74	F	133
35	62	M	136
36	70	M	141
37	65	M	135
38	65	M	148
39	70	F	126
40	70	F	133
41	80	M	135
42	70	F	131
43	85	F	133
44	65	F	122
45	70	M	135
46	80	M	142
47	70	F	138
48	70	F	131
49	70	M	141
50	65	M	138
51	62	F	131
52	75	M	132
53	80	M	124
54	67	M	128
55	61	M	127
56	84	M	133
57	75	M	135
58	68	F	128
59	69	M	124
60	78	M	129
61	75	M	123
62	74	M	134
73	85	M	128
74	74	M	134
75	76	F	133
76	71	M	128
77	61	M	134
78	77	M	130

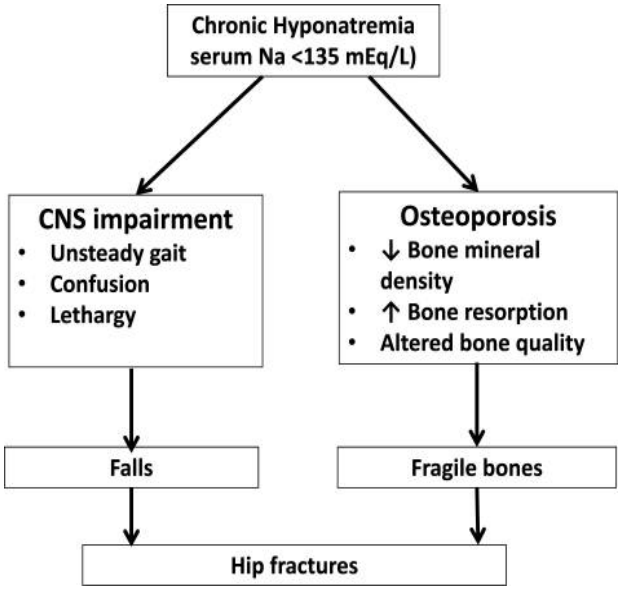
Discussion

We found that in our study 61 patients out of 78 i.e. around 78% had serum sodium levels < 135 mmol/L. Our results are consistent with previous studies that have reported on associations between hyponatremia and fractures. A case control study identified 513 cases of hip region fractures after a fall and fracture, by about 3 fold in men and women with hyponatremia (<135mmol/L), even after giving medications and medical conditions known to confound that association between fracture and serum sodium.[12] Another second case control study reported on the prevalence of hyponatremia (<135mmol/L) among 364 subjects presenting to the hospital with fractures of the hip/pelvis and femur compared with the incidence of hyponatremia in 364 controls.

Hyponatremia appears to contribute to falls and fractures by two mechanisms:

1. It produces mild cognition impairment resulting in disturbing gait and falls.
2. It directly contributes to bone demineralization and increased bone fragility by inducing increased bone resorption to mobilize sodium.

Chart 1



There is growing evidence that complications of hyponatremia include bone loss and osteoporosis, though unknown mechanism Hyponatremia can directly stimulate osteoclast genesis and osteoclastic resorption without activating of signals through osteoblasts.[14]

My study had some limitations. Most importantly, it is not possible to conclude that hyponatremia causes fractures and that correcting serum sodium will reduce the risk of fractures.

Conclusion

Hip fractures in person more that >60 years are frequently caused by a sudden fall on the ground, often produced by gait disturbances due to glutamate, which are also known to be associated with sodium disturbances.

Conflict of Interest: None.

Source of Funding: Nil.

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How to cite this article: Sharma S, Pahadiya R, Vijayvergia SC, Sharma SB. Association of hyponatremia and osteoporosis by analyzing serum sodium levels in elderly intertrochanteric fracture patients by Beckman coulter machine. *Indian J Orthop Rheumatol* 2019;5(1):11-3.