



Carbamazepine-Induced Hyponatremia

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Abstract

Carbamazepine-induced hyponatremia is a rare condition. The patients may or may not be symptomatic. Epilepsy is considered a social taboo. Most patients with carbamazepine-induced hyponatremia are asymptomatic, as was our patient, and the diagnosis is made incidentally following routine blood tests. We present a case of a 52-year-old female patient presenting in general medicine department with history of carbamazepine-induced hyponatremia. She gave history of two episodes of focal seizures with secondary generalization 2 months back and she was started on carbamazepine. Serial monitoring of sodium level were also low, considering the possibility of carbamazepine induced hyponatremia.

Keywords: Antiepileptic agent, Seizures, Hyponatremia, Carbamazepine

INTRODUCTION

Carbamazepine, an anticonvulsant and psychotropic drug, is used commonly for the treatment of epilepsy, neuralgia, mental retardation and psychiatric disorders. ^(1,2) Hyponatremia is defined as a serum sodium (Na^+) level of <136 mmol/L, and is considered significant when levels are between 115 and 125 mmol/L. Acute hyponatremia (less than 48 hours) can cause neurologic complications. The main mechanism by which carbamazepine causes hyponatremia is by increased antidiuretic hormone (ADH) secretion, but it has also been related to increased sensitivity of the renal tubules to ADH activity as well as increased aquaporin 2 channel expression in the renal tubule. ⁽³⁾

Case report

We present a case of a 52-year-old female patient presenting in general medicine with complaints of numbness felt all over the body. No history of fever, chest pain, cough and breathlessness. She was diagnosed Seizure disorder, Primary generalized epilepsy, systemic hypertension, who was apparently normal before 1 week, presented with involuntary movements of both upper and lower limbs. She gave history of two episodes of focal seizures with

secondary generalization 2 months back for which she had consulted a neurologist. She was started on carbamazepine (200 mg thrice daily). She was hypertensive since 2 years for which she was taking Bisoprolol 5 mg OD regularly. On examination, she was conscious and oriented. Her blood pressure was. Patient is conscious, oriented, afebrile, BP-170/90mmHg, PR-86bpm, RR-16/mIn, Spo2-96% on RA, CVS-S1S2+, RS-B/L NVBS+, P/A-Soft, non-tender, CNS-No FND Pedal edema was present. Other causes of syndrome of inappropriate antidiuretic hormone (SIADH) were also ruled out such as malignancy, pulmonary diseases, and central nervous system pathology by doing relevant investigations. Her serum and urine osmolality were low. Vitamin D was also low. Neurology review was obtained. Serial monitoring of sodium level were also low, considering the possibility of carbamazepine induced hyponatremia, neurology review was obtained and they advised to send Carbamazepine level, urine and serum osmolality.

Laboratory investigations were suggestive of hyponatremia (serum sodium was 120 meq/L), serum potassium was 3.86 mmol/L, and thyroid secreting

hormone was 2.15mIU/L. Her serum glucose was 97 mg/dL and serum urea was 11.4mg/dL. Blood urea nitrogen was 7.52 mmol/L, serum creatinine was 0.42 mmol/L, and serum uric acid was 4.91 mg/dL. Urine osmolality was 224 mOsm/kg of water and serum osmolality was 276 mOsm/kg of water. Her lipid profile was normal. Urinary sodium was 49 mmol/L and finally the serum carbamazepine level was 16 µg/mL. So it was sure that hyponatremia is caused by Carbamazepine. The treatment included stopping of carbamazepine as suspected cause of hyponatremia. For seizures, she was started on levetiracetam 500 mg thrice daily. Oral tolvaptan 30mg once daily. Her serum sodium on day 3 of starting medication was 125 mEq/L. On day 4, it was 130mEq/L. Thereafter, after 7 days of treatment on follow-up, it was 136mEq/L.

Discussion

Serum sodium less than 136 mmol/L is defined as hyponatremia. Usually, acute-onset hyponatremia occurs in less than 48 h and is associated with multiple neurological complications such as seizures and coma.⁽⁴⁾ Most of the patients of hyponatremia become symptomatic at serum sodium less than 120 mEq/dL approximately. As sodium is the primary electrolyte of extracellular fluid and is the dominant factor of serum osmolality, imbalances in the serum sodium levels can lead to pathological variation in cellular functions.^(5,6) Hyponatremia, both symptomatic and asymptomatic, has been found to be directly related to increased mortality and morbidity of the primary disease. There are multiple causes of hyponatremia such as medications like diuretics, antiepileptics, and antipsychotics. Diuretics are the most common cause of hyponatremia. In our case, hyponatremia was caused by carbamazepine. Carbamazepine is commonly used for the treatment of seizures, neuralgia, and psychiatric disorders. Carbamazepine-induced hyponatremia is more common in females, patients of age more than 40 years, low baseline serum sodium levels, psychiatric illness, surgery, and hypothyroidism.^(7,8) Possible mechanisms for the anti-diuretic effects of carbamazepine include alteration in sensitivity or set-point of hypothalamic osmoreceptors or increased sensitivity of the renal tubules to circulating anti-diuretic hormone.⁽⁹⁾ Carbamazepine can induce kidney water absorption by increasing aquaporin-2 expression in inner medullary collecting ducts. In our patient a 52-year-old female patient presenting in general medicine department with

history of carbamazepine-induced hyponatremia. She gave history of two episodes of focal seizures with secondary generalization 2 months back and she was started on carbamazepine. Serial monitoring of sodium level was also low, considering the possibility of carbamazepine induced hyponatremia. Finally, Carbamazepine level was found to be 16 µg/mL. After stopping carbamazepine her serum sodium on day 3 was 125 mEq/L. On day 4, it was 130mEq/L. Thereafter, after 7 days it was 136mEq/L. A previous study has also reported a case of a 52-year-old female patient who presented with grand mal epilepsy as a consequence of hyponatremia due to carbamazepine.⁽¹⁰⁾ Other anticonvulsants causing hyponatremia are oxcarbamazepine and lamotrigine. All these drugs alter the vasopressin levels in the renal tubules.⁽¹¹⁾ The incidence of drug-induced hyponatremia is on the rise as a result of polypharmacy and self-medication especially in the elderly patients.⁽¹²⁾

Conclusion

Most patients with carbamazepine-induced hyponatremia are asymptomatic, as was our patient, and the diagnosis is made incidentally following routine blood tests. Mild cases maybe managed either by stopping the drug or by careful observation if the drug is considered essential. In severe cases, medication withdrawal, urgent treatment and referral are necessary. With increasing polypharmacy and an ageing population, the prevalence of drug-induced hyponatremia is likely to increase. Non-drug causes of hyponatremia should always be considered.

Conflicts of interest

There are no conflicts of interest.

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