

Azithromycin induced hyponatremia in elderly patients: a case report and review of the literature

Abstract

Elderly population possess various renal physiological changes; azithromycin can induce severe hyponatremia compatible with a picture of syndrome of inappropriate antidiuretic hormone (SIADH) secretion in this population. Here we report a case of an elderly patient who developed symptomatic hyponatremia that resolved after discontinuation of azithromycin, with no other appreciated cause that explained his hyponatremia.

Keywords: antibiotics, azithromycin, hyponatremia, antimicrobials, COVID-19

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Abdullah Elhosiny,¹ Ahmed AKL,^{1,2,3} Nezar Bahabri^{1,2}

¹Department of Medicine, Dr. Soliman Fakeeh Hospital, Jeddah, Saudi Arabia

²Fakeeh College of Medical Sciences, Jeddah, Saudi Arabia

³Urology & Nephrology center, Mansoura University, Egypt

Correspondence: Ahmed Akl, MD, FACP, FASN, Consultant of Nephrology & Transplantation, DSFH, Jeddah, Saudi Arabia, Consultant of Nephrology & Transplantation, Mansoura University, Egypt, Associate Professor, FCMS, Jeddah, Saudi Arabia, Email aiakl2001@yahoo.com

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Abbreviations: ADH, antidiuretic hormone; SIADH, syndrome of inappropriate antidiuretic hormone

Introduction

With its powerful gram positive and atypical coverage, azithromycin is a macrolides antibiotic that is commonly used in a variety of situation including respiratory tract infections, sexually transmitted diseases and sometimes in malaria infections. Furthermore, azithromycin is used more frequently now with the new pandemic of COVID-19 and the new data that support its antiviral activity. Elderly population possess various renal physiological changes making them more prone to develop electrolytes disturbance, most commonly hyponatremia.¹ In addition to that, they tend to have multiple other risk factors that increase their risk for developing hyponatremia that various from systemic chronic illness like heart failure and chronic kidney disease and their use to allot of medications that commonly cause hyponatremia like diuretics and anti-psychotics.^{1,2} Drugs can cause hyponatremia in many different ways either by enhancing the release of sodium in the renal tubules or by inappropriately releasing ADH. Herein, we report a case of an elderly male patient, whom developed hyponatremia after taking a course of azithromycin.

Table 1 Before starting Azithromycin

Laboratory test	Results	Units
Wight Blood Cells	7.88	10 ³ /uL
Hemoglobin	9.9	g/dl
Platelets	117	10 ³ /uL
Creatinine	1.5	Mg/dl
Blood Urea Nitrogen	26	Mg/dl
Sodium	133	Mmol/L
Potassium	4.35	Mmol/L
Chloride	96.5	Mmol/L

Table 2 After finishing the course of Azithromycin

Laboratory test	Results	Units
Wight Blood Cells	8.01	10 ³ /uL
Hemoglobin	6.4	g/dl
Platelets	246	10 ³ /uL
Creatinine	2.8	Mg/dl
Blood Urea Nitrogen	53.4	Mg/dl
Sodium	119	Mmol/L
Potassium	4.2	Mmol/L
Chloride	80.3	Mmol/L
Serum Osmolality	271.41	Mosmol/kg

Case report

87-years-old male, suffers diabetes mellitus, hypertension, coronary artery disease with a coronary artery bypass grafting (CABG) 15 years ago, presented to the emergency room (ER) with fever, cough, expectoration, orthopnea, and oedema in his lower limbs. The RT-PRO BNP was 2857 pg/ml which suggested decompensated congestive heart failure that was caused by a bronchitis that was confirmed by a chest x-ray, thus his diuretic dose was increased. His initial serum sodium was 141meq/l and serum creatinine was 1.5 mg/dl. Azithromycin was initiated to control his upper respiratory tract infection along with increased diuresis for his congestive heart failure. In four days, his serum sodium dropped down to 120 meq/l, at this point, diuresis was held and patient started regimen of normal saline, his serum sodium was fluctuating as it was difficult to correct with neither diuresis nor normal saline, eventually his serum sodium started to stabilize with gradual improvement. Patient was discharged home at this point with follow up. Patient was discharged on his usual diuretics regimen at this point. After 4 days, patient came back to ER with dizziness and numbness in his right upper limb, he was found to have severe hyponatremia with a serum sodium of 119 meq/l associated with acute kidney injury in which serum creatinine raised

to 2.8 mg/dl, his serum osmolality was 271.4 mosmol/kg and urine osmolality 267.5 mosmol/kg. Further work up revealed a positive occult blood in stool, this was followed by a colonoscopy which revealed small angiodysplasia. While SIADH was confirmed, poor response to diuretic therapy was observed. In 16 days after stoppage of azithromycin, patient regained his normal serum sodium 136 meq/l with the routine management (Figure 1).

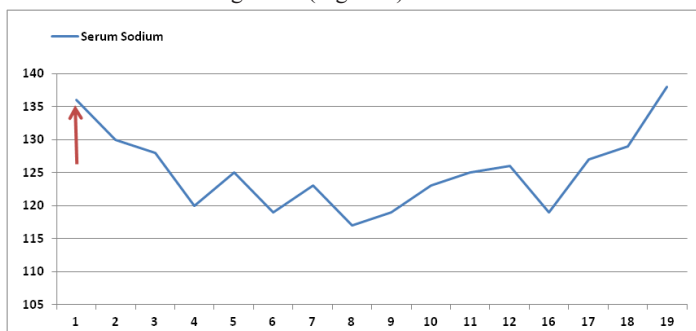


Figure 1 Trend of Serum Sodium levels, after finishing a course of Azithromycin.

Discussion

Decrease in the serum sodium concentration is the elderly population is common. Multiple physiological changes, their poly-pharmacy along with other co-morbidities that causes appropriate or inappropriate release of antidiuretic hormone (ADH), put them at high risk of developing hyponatremia.^{1,2} antibiotics such as fluoroquinolones, bactrim, linezolid, and aminoglycoside are now being reported much more often to cause hyponatremia primarily with a picture compatible with SIADH.³⁻⁶ While most of the drugs can cause hyponatremia by inappropriately increasing the ADH levels, antibiotics on the rule hand still not well defined. Similar to our patient, this has often occurred in elderly patients, frequently with multiple other factors that helped in the development of hyponatremia. Macrolides antibiotics in particular azithromycin, are less reported compared to some other antibiotics in terms of the possibility in inducing hyponatremia in witch only one reported case back in 1997 with almost no other reports in the literature.⁸ In our patient, after finishing a 4 days course of azithromycin, he kept developing a difficult to control hyponatremia along with a laboratory work up that is compatible with SIADH, his laboratory findings were almost similar to the previously reported case what support our theory is the pharmacodynamics and pharmacokinetic properties of azithromycin as it's considered to be a bacteriostatic drug that can last for almost 16 days in the body after taking a full course. Sodium level started to improve with no more episodes of hyponatremia after almost 2 weeks

of azithromycin course. In SARS-Cov 2 (COVID-19) virus pandemic azithromycin became one of the main drugs utilized in the world wide protocol to fight COVID-19 infections.⁹ In conclusion, in current situation of COVID-19 pandemics where elderly patients are among the high risk group, we recommend to follow up sodium level and to withhold azithromycin once elderly patient develop hyponatremia as it may risk his life.

Acknowledgments

None.

Conflicts of interest

The author declares there is no conflict of interest.

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