

Case Report

Pagophagia-Induced Hyponatremia: An Unusual Case

Aydanur Akbaba¹, Mustafa Bogan^{1*}, Ceren Karakeçili¹, Fatma Boğan², and Hasan Sultanoglu¹

¹Emergency Department, School of Medicine, Düzce University, Turkey

²Vocational School of Health Services, Düzce University, Düzce, Turkey

ORCID:

Mustafa Bogan: <https://orcid.org/0000-0002-3238-1827>

Abstract

Hyponatremia occurs when the serum sodium level is below 135 mmol/L. The symptoms include nausea, vomiting, confusion, headache, cardiorespiratory symptoms, profound somnolence or coma, and seizures are observed. Iron deficiency anemia can also cause pagophagia, a Pica subspecies. Although it has been emphasized that electrolyte disturbance may develop due to pagophagia, only a dearth of cases was reported. A 59-year-old male patient was brought to the emergency department with complaints of incoherent speech that started at night, disorientated movements (such as fluttering and climbing), insomnia, restlessness, and confusion. In 2017, he experienced hyponatremia due to pagophagia and a salt-free diet. At the index episode of hyponatremia, he experienced confusion, drowsiness, and sleepiness. It was learned that the patient enjoyed these symptoms. For this purpose, the patient made a habit of eating a completely salt-free diet and consumed plenty of water. Although pagophagia is considered to cause hyponatremia because it causes excessive water intake, there are not enough cases reported. It is to be noted that people develop habits or addiction to things they like.

Keywords: pagophagia, polydipsia, hyponatremia, habit, addiction

1. Introduction

Hyponatremia occurs when the serum sodium level is below 135 mmol/L. It is a common water imbalance in which symptoms such as nausea, vomiting, confusion, headache, cardiorespiratory symptoms, profound somnolence or coma, and seizures are observed (1). It has been shown that excessive water consumption causes hyponatremia, and the most common reason for consumption is psychogenic polydipsia (55%) (2).

Primary polydipsia can be defined as excessive drinking. This may occur due to different reasons. These reasons are usually due to various factors such as neurodevelopmental and psychiatric disorders, hypothalamic lesions, trauma, vascular or infiltrative diseases, and medical interventions or therapies. Under the influence of these factors, the mechanism and treatment of primary polydipsia differ (3). Diagnosis of primary

Corresponding Author: Mustafa Bogan; email: mustafabogan@hotmail.com

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Seid Ahmed Husain, MD, M.Sc,
MHPE, PhD.

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polydipsia needs to be done quickly (4). Otherwise, it can lead to life-threatening complications such as hyponatremia (4, 5).

Iron deficiency anemia can also cause pagophagia, a Pica subspecies (6,7). Pagophagia, which is generally seen in pregnant women and children, is a behavioral change and is the development of ice-eating and chewing behavior (6). Ice eating is considered a prominent finding of iron deficiency (6,8). It is less common in men. Barton *et al.* observed pagophagia in 14 (34.1%) of 41 male patients with iron deficiency that they followed, and in another study, 93% of the patients with pagophagia were female (9,10). Although it has been emphasized that electrolyte disturbance may develop due to pagophagia, there are not enough cases reported (11).

In this case report, a male patient who entered hyponatremia due to pagophagia and then tried to induce hyponatremia by eating a salt-free diet and drinking excessive water because he liked the feeling of dizziness due to hyponatremia will be presented.

2. Case Report

(In 2021, a 59-year-old male patient was brought to the emergency department with complaints of meaningless speech that started at night, disorientated movements, insomnia, restlessness, and confusion. In physical examination, the general condition is moderate, consciousness is confused, no orientation and cooperation, pupillary isochoric and light reflex: +/+, cranial nerve examination is normal, muscle strength is full (motor and sensory deficit), no lateralizing neurological deficit, cerebellar tests could not be evaluated, and no pathological reflex was observed. Breath sounds were decreased in bilateral lower zones, the abdominal examination was normal, and bilateral pretibial edema (+2/+2) was observed. Vital signs and ECG were within normal limits. There were hypertension, chronic obstructive pulmonary disease, hypothyroidism, and coronary artery disease in his medical history. He had a history of lumbar disc herniation operation (date unknown). Drugs used by the patient were: oral Lercanidipine 20 mg, oral Perindopril 5 mg, oral Levothyroxine sodium 125 mcg, oral Acetylsalicylic acid 100 mg, and oral Ferro Glycol Sulfate 100 mg, all the drugs were taken once daily.

Cranial computed tomography (CT) and diffusion-weighted magnetic resonance imaging (DWI MRI) results taken for central nervous system imaging were within normal limits. Sodium (Na): 111 mmol/L, Chloride (Cl): 72.30 in blood tests, and other laboratory values were within normal limits. Urine density in urinalysis was 1.013 (1.015–1.025). Hypervolemic hyponatremia was considered in the patient. Because the patient's symptoms were severe, 150 cc of 3% NaCl solution was infused for 20 minutes.

Afterward, a 0.5 m/kg/h infusion was started and continued for 6 hours. Levothyroxine dose was increased (oral 175 mcg once daily), control Na level was checked. The patient was transferred to the internal medicine clinic. Control values were measured as 112 (post first dose), -118 (6th hour), and -125 (day 2). The patient, whose symptoms improved, was discharged on the 3rd day.

This was a case of hyponatremia who came to the emergency department. When the medical history of the patient was examined, we encountered a long history. The events are listed below in chronological order.

In 2013, the patient developed the habit of eating ice. Hypochromic microcytic anemia was detected in routine controls (hemoglobin [Hb]: 11.2 g/dL, mean corpuscular volume: 77 fL, ferritin and serum iron binding capacity values could not be reached). An oral iron replacement was started because he had complaints of weakness, fatigue, and no significant bleeding findings.

The habit of eating ice continued until 2017. In routine controls, Hb and ferritin levels reached normal limits. Sodium levels have remained within normal limits until this date (134–135 mmol/L). A salt-free diet was recommended during the routine cardiology check-up due to hypertension. However, in the last month of the year, he was admitted to the emergency department with complaints of disoriented movements, restlessness, and confusion. Measured sodium value was 115 mmol/L. Treatment was started with the diagnosis of hypervolemic hyponatremia and he was hospitalized. At the discharge, he was told to add salt to his diet and not to eat ice. From this date on, his family followed the patient closely and prevented him from eating ice, but this time he began to drink excessive water and eat salt-free food. In the psychiatric evaluation, no obvious psychopathology was detected, but he didn't want to be followed up by psychiatrists.

In 2021: The period mentioned at the beginning of the article, when he admitted to us.

The family of the patient stated that after the first hospitalization of the patient due to hyponatremia, the confusion, drowsiness, and sleepiness he experienced at that time pleased the patient and he tried to experience the symptoms in question again. The patient enjoyed having these symptoms. For this purpose, the patient made a habit of eating a completely salt-free diet and consuming a large amount of water.

In 2023, it was observed that the sodium level of the patient occasionally decreased below 135 mmol/L during routine controls.

3. Discussion

Pagophagia is a symptom associated with iron deficiency. It is known that it is frequently observed in women with iron deficiency (11). Apart from this, it has rarely been associated with psychopathologies (12). The incidence of pagophagia is lower in men with the iron deficiency than in women (9,10). Electrolyte anomalies due to Pica have been reported, these mostly include cases of hypokalemia due to eating clay, resin, or Sodium polystyrene sulfonate (Kayexalate) (12,13). Hyponatremia was reported in one case (11). The patient discussed in this presentation is a rare case with a diagnosis of iron deficiency but without a previous psychopathological diagnosis, presenting with hyponatremia due to pagophagia.

Primary polydipsia is a common cause of hyponatremia with excessive water intake and polyurea. It may develop due to psychogenic, psychotic, dyspogenic, and iatrogenic causes (3). Patients often present to the hospital with symptoms such as anorexia, nausea, vomiting, fatigue, headache, muscle cramps altered mental status, agitation, seizures, and even coma due to hyponatremia (14). There have been cases (such as Bruce Lee's) suggesting that hyponatremia due to excess water intake may even cause sudden death. (15). In the case of the patient discussed in this study, hyponatremia due to excessive water intake and a salt-free diet is expected. However, the patient's persistent attempt to enter hyponatremia can be characterized as an unspecified psychiatric condition.

The syndrome of inappropriate antidiuretic hormone (SIADH) release can be considered to explain hyponatremia in this patient. Risk factors for SIADH include central nervous system pathologies (such as trauma, stroke, infections, masses), prior surgeries, medications (such as, carbamazepine, oxcarbazepine, chlorpropamide, cyclophosphamide, selective serotonin reuptake inhibitors, non-steroidal anti-inflammatory drugs [NSAIDs], opiates, interferons, methotrexate, vincristine, vinblastine, ciprofloxacin, haloperidol, imatinib, etc.), malignancies, pulmonary diseases (this patient has a history of chronic obstructive pulmonary disease), hormone deficiencies (this patient had hypothyroidism and was using Levothyroxine), human immunodeficiency virus (HIV) infection, and hereditary SIADH (16). However, the patient's urine density being lower than the normal (urine density was 1.013 [1.015–1.025]) reduces the likelihood of this possibility.

4. Conclusion

1. Polydipsia is an important cause of hyponatremia.

2. In the presence of polydipsia, it should be kept in mind that hyponatremia may develop if salt intake is restricted with medical advice.

3. Although pagophagia is considered to cause hyponatremia because it also causes excessive water intake, there are not enough cases reported.

4. It should be noted that people can enjoy everything and develop a habit/addiction to everything.

5. It may be more accurate to understand the causes of these behaviors rather than to give prohibitive recommendations for the behavioral changes seen in the patients.

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Availability of data and materials

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Informed consent

Written consent was obtained from the patient.

Human rights

Authors declare that human rights were respected according to Declaration of Helsinki.

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