Case Report

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Severe Hypernatremia by Excessive Bamboo Salt Ingestion in Healthy Young Woman

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Severe hypernatremia is an important electrolyte disorder that has serious effects. The patient had no medical history. A. 20-year-old ingested bamboo salt for digestion and weight reduction according to the folk remedies posted on an internet website. She presented with vomiting and diarrhea over ten times per day. Her initial serum sodium concentration was 174 mEq/L. Her symptoms improved rapidly with hypotonic saline infusion. She recovered completely without any sequelae in three days. Severe hypernatremia in a normal young adult with clear consciousness and normal renal function has not been reported in Korea yet. So we report a case of severe hypernatremia by excessive bamboo salt inges- tion in healthy young woman.

Key Words: Hypernatremia, Folk remedies

Introduction

Most of the known hypernatremic cases are due to a loss of water rather than due to excessive salt intake. The toxicity of large amounts of salt have been known for a long time. It is reported that in ancient China, saturated salt solutions were used as a traditional suicide method. The causes of high salt intake induced hypernatremia were gastric lavage with high salt solution, excessive salt intake, intravenous infusion of hypertonic saline, forced salt intake in cases of child abuse or exorcism[1] and accidental sodium chloride ingestion due to inadvertent prepa ration of child food with salt instead of sugar[2]. Recently, a case of severe hypernatremia caused by excessive salt intake as folk remedies for 3 months in a patient with chronic kidney disease had been reported in Korea[3]. However, severe hypernatremia in a healthy young adult with clear consciousness and normal renal function had not been reported in Korea yet. We report a case of a healthy young woman with acute severe hypernatremia caused by excessive bamboo salt intakes as folk remedies.

Case Report

The patient was a 20-year-old previously healthy woman. She was a university student. Her height and body weight were 168.1 cm and 52.2 kg, respectively. She ingested bamboo salt (about 150 grams) in a day for the purpose of digestion and weight reduction. After that, she had more than ten episodes of vomiting and diarrhea for 2-3 hours. On arrival at our emergency department, vital signs were blood pressure of 128/81 mmHg, heart rate of 75 beat/min, respiration rate of 20/min, and body temperature of 37.3℃. Her consciousness was clear but she complained of generalized weakness. The complete blood counts showed hemoglobin 11.3 g/dL, WBC 10,000 cells/μL, and platelet 196,000/μL. The results of her blood

chemistry were as follows: Aspartate transaminase 11 IU/L, Alanine transaminase 9 IU/L, total protein 6.4 g/dL, albumin 4.5 g/dL, blood urea nitrogen 5.2 mg/dL, and creatinine 0.57 mg/dL. Serum osmolarity was 348 mosm/kg. Serum sodium, potassium and chloride were 174 mEql/L, 3.6 mEq/L and 135 mEq/L respectively. Urine sodium, potassium, chloride and osmolarity were 440 mEq/L, 125.7 mEq/L, 314 mEq/L and 841 mosm/kg, respectively. On arterial blood gas analysis, pH was 7.32, $PaCO_2$ 36 mmHg, bicarbonate 18.5 mEq/L, PaO_2 93 mmHg and O_2 saturation 97%. On the 1st day, total input and urine output was 3,700 ml and 2,100 ml, respectively. Her symptoms such as nausea, vomiting and diarrhea improved rapidly with 0.45% saline infusion and supportive care. On the 2nd day, her serum sodium concentration dropped to 152 mEq/L and urine output was 2,200 ml/ day. On the 3rd day, serum sodium concentration returned to normal range (Fig 1). She recovered completely without any sequelae in 3 days.

Discussion

Hypernatremia is characterized by a decrease in total body water relative to total body electrolyte contents resulting in the increase of sodium concentration of extracellular fluids. Recently, hypernatremia resulting from excessive sodium intake have been described after using salt as folk remedies for three months in a patient with chronic kidney disease in Korea[3].

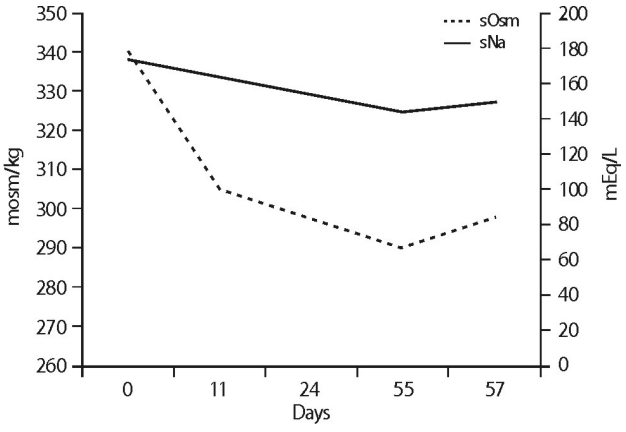

Fig. 1. Serial data of serum sodium level and osmolarity during clinical course. sOsm; serum osmolarity, sNa; serum sodium

In Korean fork remedies, bamboo salt was believed to have many beneficial effects on digestion, inflammation, detoxification and so on. Sohn et al. showed that bamboo salt had anti-plaque and anti-inflammatory effect on oral hygiene used as dentifrices[4]. Sea salt is stuffed into bamboo tubes, and the ends are plugged with mud; the assembly is roasted one or more times to make bamboo sat. So the main ingredient of bamboo salt is sodium chloride salt. And it is believed that the trace elements in the mud and bamboo are thought to make this form of salt healthier. However Yoo et al. reported that bamboo salt had no effects on the general pharmacology of central nervous systems and cardiovascular system[5]. So it is probably reasonable that bamboo salt maybe regarded as sodium chloride salt in the pharmacologic aspect.

The mortality of hypernatremia is very high. In general, doses greater than 1 g sodium chloride per kg body weight can lead to raised blood sodium concentration by 30 mmol/L[6-8]. Serum sodium levels above 160 mEq/L have been associated with a high mortality rate (9-35%) and neurological damage[9-11]. Moreover, extreme hypernatremia (>190 mEq/L) has a high mortality rate up to 62% for children[12].

Severe hypernatremia by excessive salt ingestion occurs acutely and have high mortality rate. Paut et al. report a survivor from extreme hypernatremia in accidental salt poisoning in an infant[13]. Ofran et al. described highest sodium plasma level of 255 mEq/L in a female with psychiatric disorder[7].

Acute hypernatremia should be treated with rapid rate of serum concentration of 1-2 mEq/L/h, whereas chronic hypernatremia should be treated with a slower rate of sodium concentration of 0.5 mEq/L/h. However, the overcorrection of hypernatremia might cause severe complications, because some acute hypernatremia can not be differentiated from chronic hypernatremia[14]. We administered hypotonic saline for just 2 days. The serum sodium concentration on admission day (174 mEq/L) decreased to 152 mEq/L within 1 day. But she recovered completely without any sequelae. We assume that her young age and healthy condition contributed to this favorable result[15].

In summary, we present here a case of severe hypernatremia by excessive bamboo salt ingestion in a healthy young woman with clear consciousness and completely recovered without any sequalae.

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