International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Febriani et al. Int J Reprod Contracept Obstet Gynecol. 2024 May;13(5):1298-1300
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20241084

Case Report

The effect of hypokalemia in pregnancy on fetal heart rate

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Received: 01 March 2024
Accepted: 01 April 2024

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ABSTRACT

Hypokalemic myopathy can cause anything from weakness and numbness to total paralysis. The cause could be acquired or congenital. It is distinguished by low potassium levels (<3.5 meq/L) and severe muscle weakness. We present a case of 30-year-old multigravida at 31 weeks of gestation with malnourished condition, who came with acute onset of weakness of both legs. She was diagnosed to have hypokalemic paralysis with potassium levels of 1.5 meq/L. The medical profile remitted promptly on intravenous potassium replacement. Pregnancy was continued till 37 weeks with oral potassium supplements and regular monitoring of serum potassium levels.

Keywords: Fetal heart rate, Pregnancy, Bradycardia

INTRODUCTION

Even while general muscular weakness and fatigue are relatively common during pregnancy, women in the reproductive age range may experience these symptoms; hyper- or hypokalemia may be the cause. The distribution of water in the body matched the distribution of potassium [k+].[1] The distribution of total body water was determined to be divided into two significant compartments: one third of extracellular [ke], the main extracellular cation, and two thirds of intracellular [ki]. The body's typical k+ concentration was calculated to be between 3.5 and 5.0 mmol/l. 2% of the total potassium in the body is posted as ke, yet even a slight change in extracellular potassium can have a significant effect on membrane potential and the ki/ke ratio.[2,3]

Potassium is necessary for maintaining mineral and water balance throughout the body. Elevated amounts can also cause muscle difficulties throughout the body and interfere with other minerals' absorption in the body. It may also have an impact on the heart's capacity for healthy function. Potassium imbalances are prevalent and can lead to neuromuscular dysfunction and potentially fatal heart problems. The most common electrolyte abnormalities are hypokalemia and hyperkalemia, which are brought on by changes in k+ intake, changed excretion, or transcellular shift.[4]

The advantage of a regulated environment during a crucial stage of growth and development is provided to the fetus during pregnancy. The homeostatic mechanism is primarily responsible for providing control. These studies mostly focus on the consequences of deficits in potassium and sodium. Diets low in potassium cause hypokalemia, which manifests towards the end of pregnancy. There have been numerous reports of pregnant women developing hypokalemia as a result of ongoing vomiting and malnutrition.[5]

CASE REPORT

A 30 years old multiparous woman presents to the emergency unit at 31 weeks gestation complaining of weakness and fatigue. She also complained of nausea (+) vomiting (+) >10 times. She said that during pregnancy her appetite decreased because she often felt nauseous. She also admitted that she had lost 2 kg of weight during

pregnancy. She is not known to have any past medical history. Her vitals are stable with a blood pressure of 115/60 mmHg and a pulse of 98 beats per minute. She is eupneic at rest. Her heart, lungs, and abdomen examinations are all normal, and she denies any muscle pain but their muscle weakness score at 4 (active movements against gravity with some resistance).

Preliminary blood workup shows sodium 137 mmol/L, potassium 1.5 mmol/L, creatinine 0.82 mg/dL, and normal complete blood count. The patient is referred for a consultation in internist where an extended blood workup including electrolytes. Potassium (120 mmol per day divided as 3 doses of oral potassium chloride supplements are initiated with electrolyte follow-up once a day. At day two of admission, intravenous potassium is administered to the patient because the potassium level remains at 1.7 mmol/L despite given a large dose of oral supplement. Precautions are taken to ensure that her potassium level is above 2.5 mmol/L. An evaluation in obstetrician is asked to assess the baby for any abnormalities mainly fetal heart rate. On the first day of treatment, the fetal heart rate showed 102 x/minute, resulting in a diagnosis of fetal bradycardia. After intravenous potassium was administered, the fetal heart rate improved to a rate of 110 x/minute. She also said that the weakness in both legs had decreased. An electrolyte follow-up is done at five days after admission and shows a serum potassium level of 3.3 mmol/L.

Outcomes

It is rare to experience hypokalemic paralysis during pregnancy. Acute muscle weakness linked to low potassium levels is how it presents itself. Pregnancy linked to paralysis is considered high-risk and needs to be handled carefully. A woman who exhibits severe weakness or paralysis episodes may be at danger for cardiac, pulmonary, and muscle issues. Such a patient will need to be closely monitored and given educated treatment. A comprehensive assessment of the heart is necessary. If during labor and delivery an episode of weakness or paralysis occurs, the medical team has to be ready to address it appropriately.[3,6]

Hypokalemia can have a variety of etiologies, from acquired to congenital. To diagnose congenital abnormalities, a thorough review of the patient's past medical history, including the age at which the condition first appeared and any triggers such as weakening episodes, exercise afterward, high carbohydrate intake, or excessive salt intake, may be beneficial. Families with a history of this kind are ruled out, including Anderson Tawill Syndrome, Thyrotoxic Periodic Paralysis, and Familial Hypokalemic Periodic Paralysis (FHPP). The woman in this scenario does not report any past events of this type of paralysis. ECGs, T3, T4, TSH levels, and ictal potassium readings are a few tests that can assist distinguish between these diseases.[7]

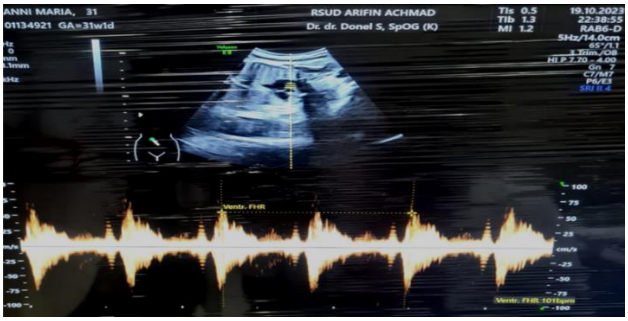

Figure 1: Fetal heart rate pattern at ultrasonography examination.

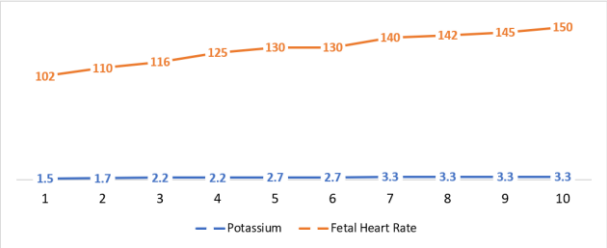

Figure 2: Fetal heart rate pattern assosiated with potassium level.

Pregnancy should be the time to diagnose these diseases, as there have been reports of FHPP getting worse during pregnancy. With the exception of hypokalemia, the woman's electrolyte profile was normal. It was determined that Bartter's syndrome, Gittleman syndrome, and disorders similar to it were not present because the renin-angiotensin aldosterone axis and the urine calcium levels were both normal. Renal function tests were normal and did not point to proximal or distal renal tubular acidosis. There was also no metabolic acidosis. This woman had no history of pica, which would have indicated the consumption of any odd chemical. There are case reports of hypokalemic paralysis after a glucose test, however this woman does not have any such triggers. The only precipitating factors noted was malnutrition and persistent nauseous.[8]

Due to increased fetal demand for potassium and dilution during pregnancy, the clinical symptoms of pregnant women with hypokalemia may be aggravated. Deterioration of fatigue and dizziness have been reported in previous literature. Literature on fetal heart abnormalities and umbilical artery had not been reported. However, in this case it was found that hypokalemia was accompanied by fetal bradycardia. These symptoms improve with administration of potassium chloride.[4]

The management of hypokalemia entirely depends on the etiology. As mentioned, a hypokalemic cellular redistribution will respond well to the withdrawal of the causative agent and/or a small amount of potassium supplement. Gastrointestinal loss of potassium also responds to the treatment of the underlying cause and oral or intravenous potassium supplementation. If

gastrointestinal loss is chronic, whole-body potassium reserves can be largely depleted. Such a large depletion needs larger total amount of potassium supplement that can take a long time to correct. In case of renal loss of potassium, nutritional advice and potassium supplementation are the cornerstones of the treatment. Large doses of oral or intravenous potassium are needed, with regular measurement of the serum potassium level.[6]

CONCLUSION

In this case, potassium levels can affect pregnancy. Fetal bradycardia is not necessarily fetal distress. Getting enough potassium during pregnancy is important because it helps maintain the balance of fluids and electrolytes in body's cells and systems. A wide variety of foods contain this important mineral - especially fresh fruits and vegetables.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Febriani, Nofiandi R. The effect of hypokalemia in pregnancy on fetal heart rate. Int J Reprod Contracept Obstet Gynecol 2024;13:1298-300.