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Case Report

Homeopathic High Magnesium Muscle Cramp Treatment Causing Renal Dysfunction

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Abstract

Herbal medications are often perceived as safe since they are believed to be sourced from natural sources and are sought after for various health conditions, including muscle cramps. While some herbal medicines may provide relief, it is crucial to exercise caution and be aware of their potential side effects, including the risk of exacerbating renal failure when they contain high magnesium levels. This is a case of a 76-year-old woman who experienced renal failure after consuming herbal medication rich in magnesium to alleviate muscle cramps.

Keywords: Acute renal failure, hyper magnesium, muscle cramps

Introduction

Herbal medicines have been extensively utilized since ancient times and continue to gain traction, even in the face of modern healthcare advancements. While they have enjoyed significant popularity in Asia and Africa, their usage is now rapidly expanding in developed nations like the United States of America, the United Kingdom, and other European countries. However, industrialized societies often opt for the terms 'Alternative' or 'Complementary' Medicines (CAM) to describe these remedies rather than specifically referring to them as herbal or traditional medicines [1].

Many countries often introduce herbal medicines to the market without mandatory safety evaluations. These countries also lack effective regulatory mechanisms for manufacturing practices and quality standards. Consequently, these herbal products are easily accessible to consumers without prescription, and the potential risks associated with inferior quality are often overlooked. The use of herbal medicines is expanding rapidly, representing around 40% of healthcare services in China and with significant usage rates in countries like Australia, Canada, the USA, Belgium, and France. Despite patients' positive perception and satisfaction with herbal remedies' effectiveness compared to conventional medicines, the safety of herbal remedies remains a major concern[2].

Certain herbal medications, particularly those used for muscle cramps, may contain high magnesium levels as a critical component. Magnesium is known to relax muscles and is commonly used to alleviate muscle cramps and spasms. However, excessive magnesium consumption, whether from herbal medications or other sources, can lead to hypermagnesemia and contribute to renal failure. When herbal medications with high magnesium content are ingested, the excess magnesium can overload the kidneys' ability to excrete it efficiently. As a result, the magnesium concentration in the blood rises, potentially leading to hypermagnesemia. Over time, this can cause damage to the renal tubules. While herbal medications are often used for their perceived natural benefits, it is essential to exercise caution when using them[3].

Case Presentation

A 76-year-old female with a past medical history of lumbar stenosis with three laminectomies and cord decompression procedures, hypertension, hyperlipidemia, and breast cancer in remission was admitted to the hospital for intractable muscle cramps and ambulatory dysfunction. At home, she takes alendronate, atorvastatin, Biotin, cyclobenzaprine, dextromethorphan, docusate sodium, esomeprazole, naproxen, ramipril, triamterene-hydrochlorothiazide. She stated that her back pain is exacerbated by walking and exercise and improves on rest. She denies exertional leg pain. She also admitted

recently cramping and leg spasms not associated with exercise. She recently purchased an over-the-counter supplement advertised on TV for muscle pain and cramp relief the week before and insisted on taking it while in the hospital.

The vital signs on admission were within normal limits. The physical exam was significant only for dry mucous membranes left mastectomy and multiple scars on the lower back with equal strength. The neurology exam was negative for weakness or paresthesia in her lower extremities. During the hospitalization, she began having loose stools and a significant decrease in po intake of food and fluid. Her labs on admission were normal, but her Creatinine gradually increased after admission (Table 1). She did not have any changes in medication except for the naturopathic medication for leg cramps which she admitted to taking eight pills daily of a high magnesium-containing agent.

On a physical exam, the patient had poor skin turgor and dry mucus membranes and was dropping her blood pressure. The blood pressure medications and naproxen were held, the patient was hydrated with normal saline, and the magnesium product was stopped. The hypermagnesemia decreased renal potassium excretion and induced hyperkalemia. In addition, hypermagnesemia. The symptoms and the renal function improved with stopping the medication and volume resuscitation.

Diagnostic studies

Labs:

Date	Na	K	Cl	BUN	Cr	eGFR	Ca	Mg	PO4
01/13/23	132(L)	3.5	101	13	0.84	72	8.6	2.5	3.9
01/16/23	136	4.9	106	22	0.96	61	8.7	2.9(H)	3.4
01/18//23	134(L)	4.6	108(H)	26	0.94	63	8.2(L)	3.0(H)	-
01/23/23	134(L)	5.6(H)	106	39	1.34(H)	41(L)	9.8	3.29	4.6(H)
01/24/23	133(L)	5.6(H)	109(H)	47	1.61(H)	33(L)	8.9	2.9(H)	-
01/24/23	134(L)	5.2(H)	106	46	1.80(H)	29(L)	8.3(L)		

Discussion

This is a case of a patient with cramps and chronic back pain who began taking large doses of a homeopathic medication for leg cramps containing magnesium. She subsequently began to experience loose stool and decreased PO intake. She was diagnosed with acute renal insufficiency, with her creatinine rising from a baseline of 0.84 to 1.8 with a rise in her serum magnesium level to 3.2. The hypermagnesemia induces bowel hypomotility causing poor appetite and less po intake. The poor intake, exacerbated by hypermagnesemia, in combination with decreased perfusion and high levels of magnesium intake, caused a synergy.

Excessive dietary magnesium poses no health risk to healthy individuals as the kidneys eliminate excess amounts in urine. However, high doses of magnesium from supplements or medications often cause diarrhea, accompanied by nausea and abdominal cramping. Diarrhea is commonly associated with forms of magnesium, such as carbonate, chloride, gluconate, and oxide, due to their unabsorbed salts' osmotic activity in the intestine and colon, stimulating gastric motility. Very large doses of magnesium-containing laxatives and antacids (typically over 5,000 mg/day) have been linked to magnesium toxicity, including fatal hypermagnesemia in a 28-month-old boy and an elderly man. The risk of magnesium toxicity increases with impaired renal function or kidney failure, as the ability to remove excess magnesium is reduced or lost [4].

Muscle contraction is a calcium-dependent process. Before a muscle fiber contracts, calcium enters the cytoplasm from the extracellular matrix and binds to troponin C, allowing a conformational change. Magnesium is a calcium antagonist as it binds to Ca-binding sites in the muscle, allowing the muscle to relax; conversely, hypomagnesemia results in greater availability of free Ca-binding sites and cytoplasmic Ca - causing involuntary, forceful muscle contractions known as muscle cramps [5]. Two randomized control studies out of Ukraine and Thailand have shown that increasing magnesium uptake can help relieve pregnancy-induced leg and muscle cramps [6]. It is an effective, safe treatment for nocturnal leg cramps [7]. However, smaller studies suggest that magnesium oxide is not significantly better than a placebo for the older population. The rationale for using magnesium in most Homeopathic medicine is the assumption that magnesium deficiency may predispose to muscle cramps. Thus, magnesium supplements are often recommended to prevent cramps [8].

Hypermagnesemia is most common among individuals with chronic or acute kidney disease because, in a healthy individual, the kidneys can maintain the normal levels of magnesium within the body. The kidney can maintain normal physiological magnesium levels until the creatinine clearance rate drops below 20 ml/min. Only about 10% of filtered Mg is reabsorbed in the proximal convoluted tubule, while the majority is reabsorbed in the ascending loop of Henle [9]. Normal serum magnesium levels fall between 1.82 and 2.30 mg/dL [10]. Mild hypermagnesemia can present asymptomatically or with few symptoms, such as nausea, dizziness, weakness, and confusion. Moderate hypermagnesemia presents with more symptoms, including bladder paralysis, headache, constipation, hypotension, bradycardia, blurred vision, and decreased reflexes. Severe hypermagnesemia present with flaccid paralysis, bradypnea, worsening bradycardia, and hypotension, lethargy, prolonged PR interval, and atrioventricular block. Patients with severe hypermagnesemia may fall into a coma or cardiorespiratory arrest [9].

Hypermagnesemia does not require treatment if it only slightly increases in levels and the patient shows no symptoms while having normal kidney function. However, in more severe cases, treatment involves administering calcium gluconate or chloride at 1 gram over 2-5 minutes, with repeat doses every 5 minutes and intravenous saline. Loop diuretics may be used in more severe cases, closely monitoring the patient's serum electrolytes. When patients experience symptoms due to severe hypermagnesemia, hemodialysis can be performed[10,11].

Conclusion

This case of homeopathic medication-induced hypermagnesemia leading to renal failure highlights the need for caution when using alternative therapies. Patients and healthcare professionals should be aware of the potential risks associated with these remedies and foster open communication regarding their use. Ensuring quality control, recognizing individual variability, and relying on evidence-based decision-making are vital steps in safeguarding patient safety when considering alternative therapies.

A case report documenting a situation where homeopathic medication resulted in hypermagnesemia leading to renal failure highlights the importance of exercising caution when using alternative therapies. This report emphasizes the need for awareness and vigilance regarding the potential adverse effects of seemingly harmless or natural remedies.

References:

1. Alkhamaiseh, S. I., & Aljofan, M. (2020). Prevalence of use and reported side effects of herbal medicine among adults in Saudi Arabia. Complementary therapies in medicine, 48, 102255. https://doi.org/10.1016/j.ctim.2019.102255 PMid:31987234
2. Ekor M. (2014). The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. Frontiers in pharmacology, 4, 177. https://doi.org/10.3389/fphar.2013.00177 PMid:24454289 PMCid:PMC3887317
3. Yamaguchi H, Shimada H, Yoshita K, Tsubata Y, Ikarashi K, Morioka T, Saito N, Sakai S, Narita I. Severe hypermagnesemia induced by magnesium oxide ingestion: a case series. CEN Case Rep. 2019 Feb;8(1):31-37. https://doi.org/10.1007/s13730-018-0359-5 . Epub 2018 Aug 22. PMID: 30136128; PMCID: PMC6361089.
4. Magnesium. (n.d.). Nih.gov. Retrieved June 12, 2023, from https://ods.od.nih.gov/factsheets/Magnesium-HealthProfessional/
5. Mathew, A. A., & Panonnummal, R. (2021, July 2). 'magnesium'-the master cation-as a drug-possibilities and evidences - biometals. SpringerLink. https://link.springer.com/article/10.1007/s10534-021-00328-7 PMid:34213669 PMCid:PMC8249833
6. Supakatisant, C., & Phupong, V. (2012). Oral magnesium for relief in pregnancy-induced leg cramps: a randomized controlled trial. Maternal & Child Nutrition, 11(2), 139–145. https://doi.org/10.1111/j.1740-8709.2012.00440.x PMid:22909270 PMCid:PMC6860204
7. Barna, O., Lohoida, P., Holovchenko, Y., Bazylevych, A., Velychko, V., Hovbakh, I., Bula, L., & Shechter, M. (2021). A randomized, double-blind, placebo-controlled, multicenter study assessing the efficacy of magnesium oxide monohydrate in the treatment of nocturnal leg cramps. Nutrition Journal, 20(1). https://doi.org/10.1186/s12937-021-00747-9 PMid:34719399 PMCid:PMC8559389
8. Roguin Maor, N., Alperin, M., Shturman, E., Khairaldeen, H., Friedman, M., Karkabi, K., & Milman, U. (2017). Effect of magnesium oxide supplementation on nocturnal leg cramps. JAMA Internal Medicine, 177(5), 617–623. https://doi.org/10.1001/jamainternmed.2016.9261 PMid:28241153 PMCid:PMC5818780
9. Razzaque, M. (2018). Magnesium: are we consuming enough? nutrients, 10(12), 1863. https://doi.org/10.3390/nu10121863 PMid:30513803 PMCid:PMC6316205
10. Cascella M, Vaqar S. Hypermagnesemia. [Updated 2022 Nov 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK549811/
11. Kraft MD, Btaiche IF, Sacks GS, Kudsk KA. Treatment of electrolyte disorders in adult patients in the intensive care unit. Am J Health Syst Pharm. 2005 Aug 15;62(16):1663-82. https://doi.org/10.2146/ajhp040300 . PMID: 16085929.