CASE REPORT

Licorice Root Resulting in Admission to the Intensive Care Unit

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INTRODUCTION

Patients commonly use herbal and food supplements and may often assume that a product is safe because it is "natural"; however, many of these products are just as dangerous as any prescription drug. This case report describes the admission of a patient to the intensive care unit after consumption of a food supplement containing licorice root (*Glycyrrhiza* sp.).

The purpose of this report is to illustrate that commonly overlooked items in medication histories, such as food supplements, may lead to life-threatening complications. Detailed history-taking and investigation of herbal products identified in a medication history is essential to good pharmaceutical care.

CASE REPORT

A 51-year-old man was admitted to the intensive care unit because of significant weakness that prevented him from standing up; he was also experiencing nausea and vomiting and a decrease in appetite. The initial serum potassium concentration was 1.7 mmol/L (normal range 3.5 to 5.0 mmol/L), and blood pressure was 198/118 mm Hg. The medical history included a hereditary ataxic condition that had been present for 11 years and hypertension that had been present and controlled for 3 years. Medications on admission were hydrochlorothiazide 25 mg daily, ranitidine 150 mg twice daily, orphenadrine citrate 100 mg daily, and acetaminophen as needed. In addition, the patient had been taking approximately 30 mL of a herbal supplement called Intra (Lifestyles Canada, Vaughan, Ontario) 3 times daily for the previous 3 months as a general promoter of health. The product label listed numerous herbal ingredients, including Siberian ginseng extract (*Eleutherococcus senticosus*), licorice root extract (presented on the label as *Glcyrrhiza* sp.), pipsissewa extract (*Chimaphila umbrellata*), juniper berry extract (*Juniperus communis*), ginger root extract (*Zingiber officinale*), and fruit juices. Other ingredients, as listed on the label, were deionized water, white grape and/or pear juice, high-fructose glucose, corn syrup, aloe vera gel (*Aloe barbadensis*), cellulose gum, potassium sorbate, astragalus root extract (*Astragalus membranaceus*), reishi mushroom extract (*Ganoderma lucidum*), Chinese pearl barley extract (*Coix lacyrma-jobi*), schisandra berry extract (*Schisandra chinensis*), rose hip extract (*Rosa* sp.), chicory root extract (*Cichorium intybus*), dandelion root extract (*Taraxacum officinale*), German chamomile extract (*Chamomilla recutita*), alfalfa herb extract (*Medicago sativa*), cascara bark extract (*Rhamnus purshiana*), fenugreek seed extract (*Trigonella doenum-graecum*), bee pollen (*Apis Pollenus*), celery seed extract (*Apium graveolens*), sarsaparilla extract (*Smilax* sp.), passion flower extract (*Passiflora incarnata*), thyme extract (*Thymus vulgarius*), capsicum fruit extract (*Capsicum* sp.), and tartaric acid. The label described the product as "a food supplement concentrate of fruit juice and botanical extracts".

The patient was treated with oral and IV potassium chloride, and his serum potassium increased to 3.6 mmol/L over 3 days. His blood pressure peaked at 215/125 mm Hg the day after admission. His hypertension was initially managed with enalapril and labetalol administered intravenously. Two days after admission, spironolactone was added to help decrease blood pressure and increase potassium. The patient's weakness improved slowly, and he was transferred to a

general ward 3 days later and then discharged after a total hospital stay of 7 days.

The patient did not receive the food supplement while in hospital and was counselled to discontinue using it after discharge; a follow-up phone call 1 week after discharge confirmed that he had done so.

DISCUSSION

Licorice and its derivatives lead to a syndrome mimicking primary aldosteronism.[1] The syndrome involves accentuation of hypertension accompanied by hypokalemia, together with suppression of the renin-aldosterone system.[2] For example, two patients who had been receiving glycyrrhizin, a licorice derivative, daily for 1.5 to 6 months for the treatment of hepatic dysfunction presented with paralysis associated with hypertension and hypokalemia.[2]

Two components of licorice, glycyrrhizic acid and glycyrrhetinic acid, competitively inhibit 11ß-hydroxysteroid dehydrogenase, which catalyzes the interconversion of the active C_{21} steroids cortisol and corticosterone to their inactive metabolites.[3] The *in vitro* affinity of cortisol for the mineralocorticoid receptor is identical with that of aldosterone, and cortisol is a strong agonist at this receptor.[4,5] If cortisol inactivation is prevented by the licorice root components, glycyrrhizic acid and glycyrrhetinic acid, excess mineralocorticoid activity results.[6]

In the case reported here, the time course from initiation of the herbal product and the occurrence of symptoms was similar to that for pseudoaldosteronsim caused by licorice derivatives.[2] Ideally, plasma aldosterone and renin activity and their response to administration of adrenocorticotropic hormone would have been tested in this patient, but because the patient was being treated in a small community health centre, it was anticipated that the results would not be available soon enough to affect care. Therefore, the tests were not requested.

Patients should use caution in taking herbal and food supplements, and those with chronic conditions such as hypertension should exercise extra vigilance. The admission of this patient to the intensive care unit might have been avoided if the patient had received appropriate education regarding the use of such products. Consultation with community pharmacists or physicians before use of herbal supplements would allow closer monitoring and potential avoidance of serious adverse effects. Community pharmacies must also maintain current, accurate, evidence-based references in the area of herbal and "natural" medicines to assist patients in self-medication choices.

References

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