Severe intoxication after chronic abuse of liquorice: a case report

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BACKGROUND: Liquorice, derived from the root of Glycyrrhiza glabra plant, can be found in many foods and is available in various forms. It’s a popular sweetener added to soft drinks, snacks and herbal medicines. The popular belief considers liquorice as an healthy, natural substance without side effects: it leads to a liberal consumption, which can occasionally be hazardous.

OBJECTIVE: To describe a clinical case characterised by a story of hidden liquorice abuse, severe hypokalemia, renal and cardiac toxicity and muscular paralysis. The patient required intensive care management. Blood quantification of glycyrrhetic acid was performed.

CASE REPORT: A 55 year-old woman (42 kg body weight) presented to the ED for:
• nausea
• abdominal pain
• vomiting
• apyretic
• drowsy

BP 130/110 mmHg with normal HR and oxygen saturation in room air.
ABG: PH 7.2, HCO₃⁻1.2 mmol/L, PCO₂ 31mmHg, PO₂ 94mmHg, BE -14.7mmol/L, K⁺ 1.2 mmol/L.

Biochemical parameters at admission and during the hospitalization underline:
• metabolic acidosis
• mild rhabdomyolysis
• pancreatitis and renal failure

No renal or adrenal abnormalities on abdominal echography

The neurological clinical manifestations rapidly worsened and a state of unconsciousness linked to tremors and muscle paralysis appeared. The woman was transferred to the Intensive Care Unit (ICU) and needed oro-tracheal intubation and ventilatory support. A severe bilateral weakness of the proximal and distal muscles of all 4 limbs (symmetric flaccid paralysis) was present at neurological examination.

At this time, her brother referred an assumption of herbal products as laxative since 1993. In fact, the patient had taken 2 tablespoons of liquorice powder once a day for months. The patient in the past have also assumed diuretics, caffeine, metformin and appetite suppressant drugs such as amphetamine-like.

Specific treatments: potassium supplementation and CVVHDF were started.

The complete clinical resolution of neurological complications was registered 18 days later.

The instrumental investigations and quantitative determination of glycyrrhetic acid in the blood (65 ng/mL) confirmed to the diagnosis of liquorice abuse.

CONCLUSION: Liquorice causes hypokalemia by the inhibition of the renal enzyme 11 β-hydroxysteroid dehydrogenase, which is responsible for renal conversion of cortisol to locally inactive cortisone. This inhibition leads to the activation of renal mineralocorticoid receptors determined by cortisol, resulting in a state of apparent mineralocorticoid excess (1,2). Chronic assumption of liquorice can cause symptoms similar to those of mineralocorticoid excess (hypertension, sodium retention, hypokalemia), metabolic alkalosis and suppression of the renin-angiotensin system (3,4,5). Liquorice intoxication can cause hypertension and metabolic, electrolyte and neurological disturbances which can be confirmatory of a liquorice induced hypermineralocorticoidism.

Table 1. Key laboratory analysis in liquorice abuse intoxication

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ED</th>
<th>5° day</th>
<th>6° day</th>
<th>7° day</th>
<th>8° day</th>
<th>Normal values</th>
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<tbody>
<tr>
<td>creatinine</td>
<td>2.4</td>
<td>2</td>
<td>1.5</td>
<td>1.1</td>
<td>0.9</td>
<td>0.4-1.2 mg/dL</td>
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<tr>
<td>AST</td>
<td>763</td>
<td>-</td>
<td>784</td>
<td>1099</td>
<td>1364</td>
<td>25-125 U/L</td>
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<tr>
<td>lipase</td>
<td>810</td>
<td>-</td>
<td>987</td>
<td>1347</td>
<td>1423</td>
<td>6.78 U/L</td>
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<tr>
<td>Na⁺</td>
<td>135</td>
<td>145</td>
<td>158</td>
<td>159</td>
<td>161</td>
<td>136-146 mmol/L</td>
</tr>
<tr>
<td>K⁺</td>
<td>2.1</td>
<td>1.4</td>
<td>3.5</td>
<td>3.6</td>
<td>3.6</td>
<td>3.5-5.5 mmol/L</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>116</td>
<td>126</td>
<td>132</td>
<td>134</td>
<td>134</td>
<td>98-100 mEq/L</td>
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<tr>
<td>P</td>
<td>-</td>
<td>1.2</td>
<td>1.6</td>
<td>1.8</td>
<td>2.5</td>
<td>2.5-4.5 mEq/L</td>
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<td>prolactin</td>
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<td>-</td>
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<td>renin</td>
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<td>11.7</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>aldosterone</td>
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<td>4.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.2-22 ng/dL</td>
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References: