

Letter to the Editor (Case report)

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Cannabidiol (CBD) oil toxicity mimicking extraglandular complications of Sjögren's syndrome

Key message

- Cannabidiol oil may cause an acute hyperadrenergic reaction mimicking extraglandular features of Sjögren's syndrome (SS).

DEAR EDITOR, The use of cannabidiol (CBD) oil is increasing, despite a lack of controlled trial data on its efficacy and safety [1]. We describe a case of a woman with SS who developed an acute hyperadrenergic stress reaction mimicking extraglandular manifestations of SS, which resolved upon cessation of CBD oil.

A 39-year-old Caucasian female with a 2-year history of keratoconjunctivitis sicca and xerostomia symptoms presented to the emergency department with palpitations, chest pain, dizziness and diaphoresis. She reported using half a drop (0.5 ml) of 45 mg/dl CBD oil for insomnia 5 h before symptom onset. She had never used CBD in the past. Her substernal chest discomfort was described as 'sharp' and worsened with inspiration. On physical examination, her blood pressure measured 139/97 mmHg, pulse was 134 beats/min and room air oxygen saturation 100%. No cardiac rubs were auscultated. There was a mild decrease in salivary pooling, with no parotid gland swelling or lymphadenopathy. ECG revealed narrow complex tachycardia. Serial troponins were negative. External electrical cardioversion was not successful, and she was treated with i.v. adenosine, amiodarone and esmolol. Laboratory studies were significant for hypokalaemia, metabolic acidosis and profound hypophosphataemia (Table 1).

Owing to persistent pleuritic chest discomfort, she underwent chest computed tomography (CT) angiography, which demonstrated no evidence of pulmonary embolism. Continued chest pain refractory to intravenous (i.v.) nitroglycerine prompted invasive coronary angiography, which revealed non-obstructed coronary arteries with an incidentally noted mid-left anterior descending artery intramuscular bridge. Her chest discomfort was ascribed to pericardial inflammation, probably attributable to CBD toxicity. Treatment with i.v. fluids, including 3 liters of normal saline, 200 mEq i.v. potassium, 2 g i.v. magnesium and 24 mmol i.v. phosphorus, was administered, with resolution of symptoms within 36 hours. One week after hospital discharge, the metabolic acidosis and electrolyte disturbances resolved completely. A diagnosis was made of CBD oil-mediated transient partial

distal renal tubular acidosis and coronary vasospasm owing to a hyperadrenergic state in the setting of underlying SS. Her symptoms gradually resolved with supportive medical care. The incident was reported to the Georgia Poison Control Center, and the patient was advised never to use CBD oil again.

In the USA, CBD oil is not federally regulated, and there are no assurances of the purity or doses of cannabidiol contained in an individual product [2]. Reported side-effects of CBD oil include agitation, coma, toxic psychosis, seizures, bradycardia, tachycardia, hypotension, syncope, rhabdomyolysis, respiratory depression and acute kidney injury [1].

The *Cannabis sativa* plant contains both tetrahydrocannabinol and CBD; CBD does not have euphoria-inducing properties [3]. Absorption of CBD has a rapid peak plasma concentration 0.5–0.6 h, after oral intake with a median of 5 h [4]. These pharmacokinetic properties are supportive of CBD oil causing the symptoms in our patient, because symptom onset occurred 5 h after ingestion. Cannabidiol oil is widely used for insomnia (as in our patient), stress, nausea and chronic pain relief, although it is not approved by the U.S. Food and Drug Administration for any of these conditions [1–3].

Extraglandular manifestations in SS are common. In the kidney, this can manifest as tubulointerstitial nephritis or type 1 (distal) or type 2 (proximal) renal tubular acidosis [5]. Type 1 renal tubular acidosis is suggested by a non-anion gap metabolic acidosis, with an abnormally elevated urine pH and hypokalaemia [6]. On presentation, this patient had profound electrolyte abnormalities suggestive of extraglandular/renal SS. However, her abnormalities dissipated rapidly with resolution of her hyperadrenergic state. We hypothesize that her hypokalaemia was a result of intracellular redistribution resulting from excess catecholamines. Likewise, her hypophosphataemia was also a result of intracellular redistribution associated with acute hyperventilation and metabolic alkalosis [7]. Her initial metabolic acidosis was secondary to lactic acidosis from her relative hypotension and severe tachycardia. Chronic hypokalaemia (<3 mmol/l) and distal (type 1) renal tubular acidosis associated with tubular interstitial nephritis have been reported in patients with SS. The profound acute hypokalaemia and metabolic acidosis, in the absence of any prior history of this, suggests that an underlying chronic renal tubular acidosis secondary to SS was not present in our patient. We suspect that the CBD oil caused acute renal wasting of potassium and magnesium in the tubules, which led to the initial acidosis. Hypomagnesaemia and acidosis both led to worsening of hypokalaemia. Pericarditis, as occurred in our patient, is a rare complication of SS [8] and might have been triggered by CBD ingestion.

TABLE 1 Summary of laboratory results

Laboratory test	Value (normal range)
Serum	
Sodium, mEq/l	140 (132–146)
Potassium, mEq/l	2.9 (3.5–5.5)
Chloride, mEq/l	105 (99–109)
Bicarbonate, mEq/l	15 (20–31)
Blood urea nitrogen, mg/dl	11 (9–23)
Creatinine, mg/dl	0.7 (0.6–1.6)
Glucose, mg/dl	126 (74–106)
Calcium, mg/dl	8.9 (8.7–10.4)
Phosphorus, mg/dl	<1 (2.4–5.1)
Magnesium, mg/dl	1.9 (1.3–2.7)
Albumin, g/dl	4.0 (3.2–4.8)
Lactic acid, mmol/l	3.3 (0.5–2.2)
Venous blood gas	
pH	7.46
Partial pressure of CO ₂ , mmHg	22
Urinalysis	
pH	6.65
Protein	Negative
Urinary sodium, mEq/l	79
Urinary potassium, mEq/l	10
Urinary chloride, mEq/l	87
Urine osmolality, mosmol/kg water	215

To our knowledge, this represents the first case report of a CBD-mediated profound hyperadrenergic state that resulted in metabolic and cardiac abnormalities mimicking extraglandular manifestations of SS. Considering the escalating use of CBD oil, clinicians should be aware of potentially significant hyperadrenergic side-effects associated with its use.

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Data availability statement

The data underlying this article cannot be shared publicly because this is a case report, and the privacy of the individual must be protected. Non-identifiable data will be shared on reasonable request to the corresponding author.

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