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Thyroid Storm Caused by a Chinese Herb Contaminated with Thyroid Hormones

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Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Conflict of interest: None declared

Patient: **Male, 70**
Final Diagnosis: **Thyroid storm**
Symptoms: **Atrial fibrillation • confusion • hyperthermia • tachycardia**
Medication: —
Clinical Procedure: **Intubation • cardioversion**
Specialty: **Critical Care Medicine**





Objective: **Adverse events of drug therapy**

Background: We report a case of thyroid storm caused by consuming a Chinese herb contaminated with thyroid hormones.
Case Report: A 70-year-old man presented to an emergency department after 2 days of nausea, vomiting, and weakness. Three days previously, he had started taking Cordyceps powder and “Flower Man Sang Hung” as recommended by his Chinese physician. Following admission, the patient deteriorated and was eventually diagnosed with thyroid storm complicated by rapid atrial fibrillation requiring cardioversion, intubation, and intensive care admission. The analysis of the Chinese herb “Flower Man Sang Hung” was positive for levothyroxine. The patient was extubated 11 days after admission and discharged to a rehabilitation centre after 17 days of hospitalization. The Chinese medicine physician was informed of the events.

Conclusions: Herbal products can be the source of illness, medication interactions, and contamination. Awareness should be raised among Chinese medicine physicians, allopathic physicians, and their patients. Clinicians should also have a low threshold of suspicion to seek laboratory analysis of suspect substances when the cause of the clinical presentation is unclear.

MeSH Keywords: **Herb-Drug Interactions • Thyroid Hormones • Thyrotoxicosis**

Full-text PDF: <http://www.amjcaserep.com/abstract/index/idArt/892305>

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Background

Toxic element contamination of traditional Chinese medicine products is well known, notably with lead, mercury, arsenic, copper, cadmium, and thallium [1]. Thyroid tissue found in Chinese weight loss herbal products has also recently been described [2,3]. We report a case of contamination of an herbal product with thyroid hormones.

Case Report

A 70-year-old man (68 kg) presented to the emergency department of a Canadian academic centre after 2 days of nausea, vomiting, and weakness. The patient was known to have hypothyroidism, asthma, and prostate cancer with lumbar metastasis. His cancer was diagnosed ten years ago and treated with a radical prostatectomy and radiotherapy. One month previously, he had also been started on a study trial medication (TAK-700 400 mg PO BID vs. placebo). His other medications included levothyroxine 0.025 mg PO daily, prednisone, zopiclone, leuprolide, salbutamol, ciclesonide, and montelukast. The patient was a non-smoker and an occasional drinker (4 drinks/week). He reported no contact with sick people, no travel, and no consumption of suspect food. He denied any other change in his medication in the past year, but mentioned starting new herbal medications 3 days before – Cordyceps powder and “Flower Man Sang Hung” – as recommended by his Chinese physician.

On arrival in the emergency department, the patient was tachycardic (120 bpm) and hyperthermic (38.8°C), but had a normal respiratory rate (16/min) and a saturation of 95% on room air. His first recorded blood pressure was within the normal range (117/74 mmHg), but transiently decreased to 84/50 mmHg one hour later, which was corrected by the administration of 1.5L of crystalloids. The ECG at arrival showed a new-onset atrial fibrillation. His blood work was relevant for slightly increased liver enzymes with ALP 93 U/L (normal <100 U/L), AST 133 U/L (normal <35 U/L), and ALT 105 U/L (normal <36 U/L), but a normal bilirubin; thrombocytopenia with platelets decreased to $81 \times 10^9/L$ (normal $130\text{--}400 \times 10^9/L$) and hyponatremia with a sodium decreased to 124 mmol/L (normal 135–145 mmol/L).

The patient was admitted to the ward with a diagnosis of gastro-enteritis with hypovolemic hyponatremia. The thrombocytopenia was attributed to the consumption of Chinese herbs, which were held, along with all his home medication. A septic and hemolysis work-up were performed, but did not reveal any abnormality. The hyponatremia was corrected over the next 2 days. However, the night between the second and third day of admission, the patient became agitated and developed stable rapid atrial fibrillation (190–200 bpm) refractory to 3 doses

of metoprolol 5 mg IV and 1 dose of diltiazem 10 mg IV. The patient was empirically treated for ethanol withdrawal with lorazepam and thiamine and for sepsis with ceftriaxone. The thyroid profile drawn the morning of the second day of admission revealed a TSH of 0.02 mIU/L (normal 0.4–5.0 mIU/L), a free T3 of 5.5 pmol/L (normal 3.5–6.5 pmol/L), and a free T4 of 35.7 pmol/L (normal 8.5–15.2 pmol/L).

The patient was transferred to the critical care unit with a diagnosis of thyroid storm complicated by rapid atrial fibrillation. His heart rate was still 160–170 bpm with a blood pressure of 123/64 mmHg and a saturation of 98% on room air. Unfortunately, the patient deteriorated, his labored breathing increased, and he became more somnolent. He was intubated with 2 mg of midazolam, 30 mg of propofol, and 100 mg of succinylcholine. He was then cardioverted successfully. A heparin infusion was started and the antibiotic regimen was changed to piperacillin-tazobactam. A first dose of hydrocortisone 100 mg IV was given, followed by 50 mg IV every 6 h. The patient was maintained in sinus rhythm with metoprolol 25 mg NG BID.

On the third day of admission, a cardiac ultrasound revealed a normal cardiac function and an abdominal ultrasound revealed no abnormality. The endocrinologist suggested to continue metoprolol and hydrocortisone to inhibit the conversion of T4 to T3, but did not add propylthiouracil (PTU) because the patient had a history of long-term exogenous thyroid hormone use and was likely to have an atrophic thyroid. Given the sequence of events, the patient’s Chinese herbs or experimental study drug were suspected as being the cause of the thyroid storm. The 2 types of pills were sent to the laboratory for analysis. The pills were crushed to a fine powder, mixed with diluent to dissolve thyroxine, and centrifuged. The clear diluent supernatant was analyzed for free thyroxine on the DxI600 (Beckman Coulter). The research team providing the study drug was contacted to determine if the patient was receiving a placebo or TAK-700 (Orteronel), an androgen synthesis inhibitor and a CYP17 inhibitor with higher specificity for C17-20 lyase inhibition.

The analysis of the Chinese herb “Flower Man Sang Hung” was positive for thyroxine. The Cordyceps powder, known to have an effect on the anti-H9N2 monoclonal antibody to enhance immune function and alleviate fatigue, was negative for thyroid hormones. The research group mentioned that TAK-700 vs. placebo was unlikely to cause the patient’s symptoms. The Chinese medicine physician was contacted. As the products had been purchased at a Chinese apothecary known to sell unregulated products, no public health intervention was possible. The patient and his partner were also informed. They consented to this case report, for which we received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

The patient's hemodynamics, liver function, kidney function, and rhabdomyolysis improved over the following days. A thyroid scan 16 days after admission was compatible with thyroiditis. The patient was extubated 11 days after admission and discharged to a rehabilitation centre after 17 days of hospitalization. The Chinese herbs were discontinued and therapeutic levothyroxine restarted at 0.050 mg PO daily. The thyroid profile at discharge and at 1-month follow up was back to normal values. The patient did not report other episodes of palpitations or atrial fibrillation.

Discussion

This case report is an example of Chinese herb contamination with thyroid hormones causing thyroid storm. All the patient's blood, urine, sputum, stool cultures, and viral hepatitis work-up were negative. A carcinoid syndrome was also considered, but the 24-h urine collection of 5-HIAA (serotonin metabolite) was within the normal range.

Pharmacists report concurrent natural health product and prescription medication use in 39.7% of their clients [4]. In 2003, a study among patients with prostate cancer documented that almost a third (29.8%) of them were using natural health products such as vitamin E, saw palmetto, and selenium [5]. Most

herbal medicines fall outside the regulatory framework and evidence is generally lacking on their safety, efficacy, or standards of manufacture and control [6]. Some products may affect cytochrome P450 activity [7] and others can be contaminated [1]. In our case, the Chinese product, named Flower Man Sang Hung, was certainly contaminated. However, it is still unclear if this substance, Cordyceps, or the study drug could have also modified the metabolism of the levothyroxine the patient was taking. It is also possible that those substances have a direct effect on hormone regulation, notably the Orteronel.

Conclusions

Nevertheless, awareness should be raised among Chinese medicine physicians and their patients, especially when more than 1 substance with unknown adverse effects or interactions profile are taken together. Moreover, allopathic physicians must be aware of all herbal supplements that patients are taking in order to avoid such cases. An online survey of patients with breast cancer revealed that 70% of participants did not think their oncologist took time to discuss complementary and alternative medicine [7]. Clinicians should have a low threshold of suspicion to send suspected substances to the laboratory for analysis when the cause of the clinical presentation is unclear.

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