

## Safety of herbal medicine in treatment of weight loss

Jamshid Najafian<sup>(1)</sup>, Morteza Abdar-Esfahani<sup>(2)</sup>,  
Morteza Arab-Momeni<sup>(3)</sup>, Afshan Akhavan-Tabib<sup>(4)</sup>

### Case Report

#### Abstract

**BACKGROUND:** Obesity is a common health problem in both developed and developing countries. There are many unconventional therapies, including herbal medicine, to treat this condition. Some people believe that herbal medicines are safe. This case and review is about adverse complication of treating obesity with some herbal medicine.

**CASE REPORT:** A 19 year old male with sever obesity (120 kg) used green tea (15 cups of green tea per day) and an intensive dietary regimen to lose weight. He lost 30 kg after 2 months. At that time, one day after usual exercise he suddenly lost consciousness due to left ventricular fibrillation.

**CONCLUSION:** Use of herbal medicine for weight reduction is not always safe. Moreover, for some herbal medicine the risk is sufficient to shift the risk–benefit balance against the use that medicine.

**Keywords:** Herbal Medicine, Sudden Death, Complication, Obesity

*Date of submission:* 7 Sep 2013, *Date of acceptance:* 20 Nov 2013

#### Introduction

Obesity remains a global health problem.<sup>1</sup> When conventional medicine fails to treat conditions such as obesity, many people seek unconventional therapies, including herbal medicine, thinking they have no adverse events. This article is a case report about use of green tea and severe dietary restriction to treat obesity that leads to ventricular fibrillation and cardiac arrest.

#### Case Report

The case reported in this essay is an aborted sudden cardiac death due to intensive dietary regimen and green tea. A 19 year old male was admitted to Alzahra Hospital of Isfahan University of Medical Sciences in an unconscious state. He had been rejected in an employment exam because of sever obesity 3 months earlier (weight = 120 kg). At that time he had begun an intense dietary regimen.

The dietary regimen consisted of 15 cups of

green tea and 10 spoons of rice daily. After 2 months his weight was reduced to 90 kg and he was employed in the police force. His training course began, 14 days later, 1 hour after daily exercise he suddenly lost consciousness and his pulse was not palpable. Cardiopulmonary resuscitation was begun and he was transferred to the nearest hospital, where ventricular fibrillation was detected by electrocardiography and his heart was defibrillated, the rhythm changed to sinus rhythm and the patient was stabilized. Then, 5 hours later, he had an attack of tonic-clonic seizure which was controlled by midazolam. The patient was transferred to intensive care unit (ICU) of Alzahra Hospital, and cardiology and neurological consultations were done.

In primary evaluation brain computed tomography (CT) scan was normal and no space-occupying lesion was detected. In echocardiography, ejection fraction (EF) was 25%, global hypokinesia was seen in electrocardiogram (ECG), and the QT interval was

1- Assistant Professor, Isfahan Cardiovascular Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

2- Associate Professor, Isfahan Cardiovascular Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

3- Resident, Hypertension Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

4- Researcher Assistant, Cardiac Rehabilitation Research Center, Isfahan Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

Correspondence to: Afshan Akhavan-Tabib, Email: afshan.akhavantabib@gmail.com

prolonged with no ST and T changes.

Blood chemistry revealed the following data: creatinine = 1.4; sodium = 143; potassium = 3.4; calcium = 8.8; magnesium = 1.1; white blood cell = 10100; hemoglobin = 12; platelets = 240000; aspartate aminotransferase (AST) = 251; alanine aminotransferase (ALT) = 203; lactic dehydrogenase (LDH) = 840; and troponin I = 0.1.

Infusion of magnesium sulfate was begun (8g/day) and continued for the following 5 days.

In the first 5 days, he had episodes of tonic colonic seizures that were controlled by diazepam, levotyrosin, and levodopa. On the 5<sup>th</sup> day serum magnesium level reached 2.1 mg/dl; therefore, magnesium infusion was replaced by oral magnesium 800 mg/day. At this time the patient was stabilized, serum electrolyte were corrected, and the seizures were controlled, but the patient was still unconscious [Glasgow Coma Scale (GCS) = 7]. On the 7<sup>th</sup> day echocardiography was repeated. EF was 55% with no wall motion abnormality. After 2 weeks the patient's GCS had not changed; therefore, cerebrolysin infusion 50 cc/day was initiated and continued until the 15<sup>th</sup> day, when the patient's level of consciousness was increased. On the 4<sup>th</sup> week the patient was in a vegetation state.

## Discussion

In MEDLINE database search we could find only one case report about severe dietary regimen and weight reduction that leads to sudden cardiac death, this case was a 16-year-old girl who had sudden cardiorespiratory arrest at school. She had attempted weight loss using a low-carbohydrate/high-protein, calorie-restricted dietary regimen.<sup>2</sup>

In our patient, severe dietary regimen was simultaneous with the use of a large amount of green tea, a herbal remedy that is relatively safe for weight loss and also for the heart.<sup>3,4</sup>

In this case, two mechanisms could be proposed as the cause of long QT interval and ventricular fibrillation. First, severe diet caused magnesium deficiency that induced prolonged QT interval and increased the risk of ventricular arrhythmia. Second, the green tea that was used by this patient may have been mixed with other herbal substances that contained synephrine; this adrenergic component of drug increases sympathetic stimulation, which together with magnesium deficiency could have caused ventricular arrhythmia.

It must be considered that the patient had used a large amount of green tea that may have caused significant sympathetic stimulation enough to induce cardiac arrhythmia.

### Green tea

Green tea is brewed from the unfermented dried leaves of the plant *camellia sinensis*.<sup>5</sup> Like other natural products, the leaves of this plant contain an array of phytochemicals that vary in concentration by the harvest season, age of the plant, climate, environmental conditions, and processing conditions.<sup>5-7</sup>

Early mechanistic work suggested that green tea may increase energy expenditure. The relationship between green tea and caffeine or other substances, and thermogenesis is, at present, unclear.<sup>3,7</sup> Other possible anti-obesity mechanisms include increased fat oxidation, decreased appetite, and disrupted nutrient absorption.<sup>8,9</sup>

Green tea may be an innovative therapeutic candidate to prevent the occurrence, maintenance, and recurrence of atrial fibrillation. On the other hand, inhibition of inflammation, modulation of oxidative stress, targeting tissue fibrosis, and favorable effects on cardiac function and arrhythmias are mechanisms of green tea.<sup>4,8</sup>

Borchardt and Huber provided evidence that green tea inhibits catechol O-methyltransferase (COMT), the enzyme that degrades norepinephrine (NE), thus prolonging the action of sympathetically-released NE in the synaptic cleft.<sup>9</sup> It must be considered that consumption of a large amount of green tea may have a significant effect on sympathetic activity.<sup>10</sup> There is no report about the adverse effect of green tea on cardiac function and rhythm. Several reports have been published in the medical literature describing patients presenting with marked liver toxicity in the form of acute hepatitis attributable to the consumption of supplements containing green tea extracts. The reported toxicity of green tea extract, although sporadic, was deemed important enough that both French and Spanish authorities had the green tea extract Exolise removed from their markets in 2003.<sup>11-18</sup>

### Synephrine

Synephrine is 'the active component' of plants and dietary supplements used in weight loss. Synephrine acts on several adrenergic and serotonergic receptors and its activity on trace-amine-associated receptors has long been discussed.<sup>19,20</sup> Adverse cardiac events, including hypertension, tachyarrhythmia, variant angina, cardiac arrest, QT prolongation, ventricular fibrillation, myocardial infarction, and sudden death,

have been the most common adverse effects associated with synephrine intake.<sup>21,22</sup>

### Hydroxycut

Hydroxycut is a multicomponent herbal, dietary weight loss supplement devoid of sympathomimetic amines. There is a case report of an obese 63-year-old Caucasian female with a 2-day history of symptomatic paroxysmal atrial fibrillation (AF) with rapid ventricular response following a 2-week course of therapy with hydroxycut. Epigallocatechin (EGCG), a principal ingredient in the hydroxycut preparation is the suspected causative component. Given the serious risks associated with AF, patients at risk of developing AF should avoid dietary supplements containing EGCG until more information on the adverse effects of EGCG is known.<sup>22</sup>

### Ephedra plus caffeine

Multicomponent dietary supplement containing ephedra and caffeine (DSEC) was widely used for weight loss and energy enhancement. There are reports of intractable ventricular fibrillation caused by this drug.<sup>23</sup> The Food and Drug Administration (FDA) banned the sale of DSEC in 2004, because of side effects such as cardiotoxicity.<sup>15</sup> The direct cardiotoxicity of ephedra, synergistic effect of caffeine and ephedra, and hypokalemia may cause refractory ventricular arrhythmia.<sup>11,23</sup>

### Ephedra sinica

Based on 50 randomized and non-randomized trials, the most rigorous safety assessment to date concludes that herbal ephedra and ephedrine-containing food supplements are associated with an increased risk of heart palpitation, and psychiatric, autonomic, and gastrointestinal adverse events.<sup>24</sup>

For herbal ephedra and ephedrine-containing food supplements an increased risk of psychiatric, autonomic or gastrointestinal adverse events and heart palpitations has been reported.<sup>11-18</sup>

### Paullinia cupana

Guarana is prepared from the seeds of *Paullinia cupana* and is indigenous to the Amazon basin.<sup>25</sup> Guarana contains relatively large amounts of caffeine and is reported to increase the speed of gastric emptying. A number of adverse events are reported with use of guarana, such as irritability, heart palpitations, anxiety, and other central nervous system events.<sup>26</sup>

### Pausinystalia yohimbe

Yohimbe (*Pausinystalia yohimbe*) is a tall evergreen tree, which is native to Central Africa. Yohimbine, an alpha-2 receptor antagonist, is the main active constituent of the ground bark of *Pausinystalia yohimbe*. The adverse events reported with the use

of yohimbine are well documented and include hypertension, anxiety, and agitation.<sup>27</sup> For an herbal preparation of yohimbe, one case report of severe acute headache and hypertension is reported.<sup>27</sup>

### Conclusion

Severe and rapid weight loss is not safe and herbal drugs that are used for weight loss may directly or indirectly induce dangerous and fatal conditions for overweight patients. Some articles reported risks that were sufficient to shift the risk-benefit balance against the use of most of the reviewed herbal weight-loss supplements.

### Conflict of Interests

Authors have no conflict of interests.

### References

1. Popkin BM. Recent dynamics suggest selected countries catching up to US obesity. *Am J Clin Nutr* 2010; 91(1): 284S-8S.
2. Stevens A, Robinson DP, Turpin J, Groshong T, Tobias JD. Sudden cardiac death of an adolescent during dieting. *South Med J* 2002; 95(9): 1047-9.
3. Westertep-Plantenga MS, Lejeune MP, Kovacs EM. Body weight loss and weight maintenance in relation to habitual caffeine intake and green tea supplementation. *Obes Res* 2005; 13(7): 1195-204.
4. Zeng X, Li Q, Zhang M, Wang W, Tan X. Green tea may be benefit to the therapy of atrial fibrillation. *J Cell Biochem* 2011; 112(7): 1709-12.
5. Liu JP, Zhang M, Wang WY, Grimsgaard S. Chinese herbal medicines for type 2 diabetes mellitus. *Cochrane Database Syst Rev* 2004; (3): CD003642.
6. Westertep-Plantenga MS. Green tea catechins, caffeine and body-weight regulation. *Physiol Behav* 2010; 100(1): 42-6.
7. Rains TM, Agarwal S, Maki KC. Antiobesity effects of green tea catechins: a mechanistic review. *J Nutr Biochem* 2011; 22(1): 1-7.
8. Hill JO, Wyatt HR, Reed GW, Peters JC. Obesity and the environment: where do we go from here? *Science* 2003; 299(5608): 853-5.
9. Borchardt RT, Huber JA. Catechol O-methyltransferase. 5. Structure-activity relationships for inhibition by flavonoids. *J Med Chem* 1975; 18(1): 120-2.
10. Brown WJ, Williams L, Ford JH, Ball K, Dobson AJ. Identifying the energy gap: magnitude and determinants of 5-year weight gain in midage women. *Obes Res* 2005; 13(8): 1431-41.
11. Peyrin-Biroulet L, Petitpain N, Kalt P, Ancel D, Petit-Laurent F, Trechot P, et al. Probable hepatotoxicity from epigallocatecol gallate used for

- phytotherapy. *Gastroenterol Clin Biol* 2004; 28(4): 404-6.
12. Abu el Wafa Y, Benavente FA, Talavera FA, Perez Ramos MA, Ramos-Clemente JI. Acute hepatitis induced by *Camellia sinensis* (green tea). *An Med Interna* 2005; 22(6): 298.
  13. Duenas SC, Fabregas PS, Durandez R. Hepatotoxicity due to *Camellia sinensis*. *Med Clin (Barc)* 2004; 122(17): 677-8.
  14. Garcia-Moran S, Saez-Royuela F, Gento E, Lopez MA, Arias L. Acute hepatitis associated with *Camellia thea* and *Orthosiphon stamineus* ingestion. *Gastroenterol Hepatol* 2004; 27(9): 559-60.
  15. Pedros C, Cereza G, Garcia N, Laporte JR. Liver toxicity of *Camellia sinensis* dried etanolic extract]. *Med Clin (Barc)* 2003; 121(15): 598-9.
  16. Bonkovsky HL. Hepatotoxicity associated with supplements containing Chinese green tea (*Camellia sinensis*). *Ann Intern Med* 2006; 144(1): 68-71.
  17. Molinari M, Watt KD, Kruszyna T, Nelson R, Walsh M, Huang WY, et al. Acute liver failure induced by green tea extracts: case report and review of the literature. *Liver Transpl* 2006; 12(12): 1892-5.
  18. Shekelle PG, Hardy ML, Morton SC, Maglione M, Mojica WA, Suttrop MJ, et al. Efficacy and safety of ephedra and ephedrine for weight loss and athletic performance: a meta-analysis. *JAMA* 2003; 289(12): 1537-45.
  19. Surawicz B, Waller BF. The enigma of sudden cardiac death related to dieting. *Can J Cardiol* 1995; 11(3): 228-31.
  20. Rossato LG, Costa VM, Limberger RP, Bastos ML, Remiao F. Synephrine: from trace concentrations to massive consumption in weight-loss. *Food Chem Toxicol* 2011; 49(1): 8-16.
  21. Karth A, Holoshitz N, Kavinsky CJ, Trohman R, McBride BF. A case report of atrial fibrillation potentially induced by hydroxycut: a multicomponent dietary weight loss supplement devoid of sympathomimetic amines. *J Pharm Pract* 2010; 23(3): 245-9.
  22. Takeuchi S, Homma M, Inoue J, Kato H, Murata K, Ogasawara T. Case of intractable ventricular fibrillation by a multicomponent dietary supplement containing ephedra and caffeine overdose. *Chudoku Kenkyu* 2007; 20(3): 269-71.
  23. Vial T, Bernard G, Lewden B, Dumortier J, Descotes J. Acute hepatitis due to Exolise, a *Camellia sinensis*-derived drug. *Gastroenterol Clin Biol* 2003; 27(12): 1166-7.
  24. Capasso F, Gaginella TS, Grandolini G, Izzo AA. *Phytotherapy: A Quick Reference to Herbal Medicine*. Berlin, Germany: Springer; 2003.
  25. Haller CA, Benowitz NL. Adverse cardiovascular and central nervous system events associated with dietary supplements containing ephedra alkaloids. *N Engl J Med* 2000; 343(25): 1833-8.
  26. Ernst E, Pittler MH. Yohimbine for erectile dysfunction: a systematic review and meta-analysis of randomized clinical trials. *J Urol* 1998; 159(2): 433-6.
  27. de Smet PA, Smeets OS. Potential risks of health food products containing yohimbe extracts. *BMJ* 1994; 309(6959): 958.

**How to cite this article:** Najafian J, Abdar-Esfahani M, Arab-Momeni M, Akhavan-Tabib A. **Safety of herbal medicine for weight loss.** *ARYA Atheroscler* 2014; 10(1): 55-8.