

Letter to the editor

Rhabdomyolysis from spinning exercise and ephedra-contained herbal medicine

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Dear editor,

Frequent participation in physical activity has a positive impact on individual physical and psychological well-being, and the effect of physical activity and exercise varies according to individual physical fitness level, the environment, and drug intake. Particularly, severe exercise that exceeds the individual physical fitness level may result in musculoskeletal injury or damage,¹ and rhabdomyolysis is a pathological condition of the musculoskeletal system that can be complicated by acute renal failure, compartment syndrome, and hepatitis.² People who fail to receive proper management for rhabdomyolysis may face life-threatening conditions, even death.³

Recent studies⁴ have reported on a number of cases that developed myopathy associated with herbal medicines containing Mahuang (*ephedra sinica*), suggesting the possibility that the increased activity of the sympathetic nervous system triggered by the ephedrine contained in ephedra and its derivative ephedra alkaloids may cause rhabdomyolysis as well as myopathy.⁵

The maximum dose for ephedra is usually recommended to be 32 mg/day.⁶ Although the exact dose of ephedra used in herbal drugs is unknown, we postulate that rhabdomyolysis may be induced by the herbal medicine. In 2004, the U.S. Food and Drug Administration banned ephedra-containing products due to numerous reports of adverse events.⁷ Nevertheless, the use of ephedra-containing products is still allowed in Asian countries, including China and Korea, so the adverse events of its use should be taken into consideration. To this end, this letter presents a case of a previously healthy female subject who developed rhabdomyolysis while exercising and using an herbal medicine containing ephedra that was marketed to accelerate fat loss.

The 29-year-old female subject (height = 165 cm, weight = 68 kg) did not have a remarkable history of disease or a family history of cardiovascular disease. The patient was performing a regular spinning exercise (Borg's scale 15: hard intensity) for weight loss after having taken an herbal medicine containing ephedra. The woman experienced an unusually severe pain in her thighs and produced dark urine 48 h after the exercise.

The first physical examination after being admitted to the emergency room revealed swelling in her thighs. A neurological examination and an electrocardiograph presented normal results. However, some test items in the blood (including electrolytes), biochemical examinations, and urinalysis revealed abnormal findings associated with rhabdomyolysis (Table 1). An examination of the blood chemistry revealed liver function test results consisting of 1728 IU/L in aspartate transaminase (AST) and 364 IU/L in alanine transaminase (ALT), indicating the presence of hepatitis.

The patient's c-reactive protein (CRP), a blood inflammatory marker, was high (1.94 mg/dL). The laboratory findings of creatinine and K⁺ were normal, but high levels of creatinine kinase (CK; 25,010 U/L), myoglobin (MB; 15,510.40 ng/mL), and CK-MB (206.9 ng/mL) indicated rhabdomyolysis. The

Table 1
 The results of abnormal test results in blood.

Test	Value	Reference
AST (IU/L)	1728	15–41
ALT (IU/L)	364	4–43
MB (ng/mL)	15,510.40	14.30–65.81
CK (U/L)	25,010	50–200
CK-MB (ng/mL)	206.9	0.6–6.3
CRP (mg/dL)	1.94	0–0.75
LDH (IU/L)	7370	263–450

Abbreviations: AST = aspartate transaminase; ALT = alanine transaminase; MB = myoglobin; CK = creatine kinase; CRP = c-reactive protein; LDH = lactate dehydrogenase.

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patient had a lactate dehydrogenase (LDH) level of 7370 IU/L, which was 10 times higher than normal. The LDH level is an indicator of muscular injury. Re-test results 4 days after admission revealed a normal CRP level but abnormal results in terms of liver function and blood (AST = 1193 IU/L, ALT = 468 IU/L, CK = 14,615 U/L, MB = 231.60 ng/mL; and CK-MB = 27.30 ng/mL).

This case highlights the risk of developing rhabdomyolysis, even during regular exercise, if herbal drugs containing ephedra are consumed. In order to exercise more safely, special attention should be taken in people consuming ephedra during physical activity. We plan to further investigate the mechanism of ephedra-induced rhabdomyolysis.

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Authors' contributions

HR and DJS conceived of and designed the study; DJS and JK contributed to the writing of the manuscript; HSK and HC evaluated the patient. All authors have read and approved the

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Competing interests

None of the authors declare competing financial interests.

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