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Effects of a multivitamin/mineral supplement on subjective energy ratings and substrate metabolism during demanding exercise and cognitive tasks

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Abstract

Introduction

Vitamins and minerals play an essential role within many cellular processes including energy production and metabolism. Biochemical changes and heightened metabolic demands lead to increases in the requirement for certain micronutrients alongside higher excretion of micronutrients through waste products, such as sweat and urine. Previously, supplementation with a multivitamin/mineral (MVM) for ≥ 28 days resulted in improvements to cognition and subjective state. Shifts in metabolism have also been demonstrated during cognitively demanding tasks following MVM in females, both acutely and following 8-week supplementation, suggesting that enhanced recovery is possible following MVM supplementation. The current study aimed to assess these effects further in males and females using metabolically challenging exercise and cognitive tasks.

Materials and Methods

This randomised, placebo-controlled, parallel groups study investigated the effects of a MVM complex in 82 healthy young (18–35y) exercisers. Subjective ratings and substrate metabolism were assessed during 30 minutes each of increasingly effortful incremental exercise and demanding cognitive tasks. Assessments took place on acute study days following a single dose (Day 1) of MVM, containing 3 times recommended daily allowance of water-soluble vitamins plus CoQ10, and following 4-week supplementation (Day 28).

Results

Energy expenditure (EE) was increased during cognitive tasks following MVM across Day 1 and Day 28, with greater effects in males. In males, MVM also increased carbohydrate oxidation and EE during exercise across Day 1 and Day 28. In females, mental tiredness was lower during exercise; increases in physical tiredness following 30 minutes of exercise were attenuated; and stress ratings following cognitive tasks were reduced following MVM. In males, MVM only lowered mental tiredness following 10 minutes of exercise. Those receiving MVM also reported lower ratings of perceived exertion following 10 minutes of exercise. These effects were apparent irrespective of day, but effects on mental tiredness were greater on Day 28. Ferritin levels were also higher on Day 28 in those receiving MVM.

Discussion

These findings extend on existing knowledge, demonstrating increased carbohydrate oxidation and EE in males following MVM supplementation for the first time. Importantly, they show modulation of EE and subjective tiredness following a single dose, providing further evidence for acute effects of MVM. Differential effects in men and women suggest that whilst males expend more energy, females may conserve their energy but report lower tiredness instead, demonstrating that sex may play an important role in the effects of MVM on energy metabolism and should be considered in future research.

Conflict of Interest

F.D, C.F.H-R, D.O.K, E.J.S and P.A.J have received funding from multivitamin/mineral manufacturers, including Bayer Healthcare