Changes in event-related potentials and reaction time of female long-distance runners following various durations of acute running exercises

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Purpose: To investigate the effects of the acute exercise on cognitive processing in the CNS, some recent studies have focused on the P3 of event-related brainpotentials (ERP). In this study, the influence following various durations of the acute exercises on the P3 component of the ERPs and reaction time were investigated.

Methods: Nine healthy female long-distance runners performed a modified flanker task during a controlled condition (no exercise) and after the 10, 30, and 60 minutes treadmill running exercises in counterbalanced order on different days. The exercise intensity was established using a heart rate monitor, Borg's rating of perceived exertion (RPE) scale, and running speed. The task difficulty was manipulated using the flanker task comprised of incongruent and neutral trials. The measures of task performance and the P3 component of an event-related brain potential were collected.

Results and Discussion: The RT in the incongruent tasks were longer than in the neutral trials, and the error rate was higher at every condition respectively, while the P3 latency was not affected by the flanker task. The P3 amplitude, the P3 latency and reaction time were not significantly different among the four conditions by the differences of exercise duration. The results suggested the facilitative effects of exercise in the long-distance runners might prove valid with a more prolonged exercise.

Relationship between menstrual cycle and strength of fatigue during hiking

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Purpose: The purpose of this study was to determine effects of differences in menstrual cycle on heart rate, strength of fatigue, and body pain during hiking.

Method: Subjects comprised 6 women with regular menstrual cycles. Subjects hiked a mountain 2 times once during the follicular phase (F condition) and then during the luteal phase (L condition). The altitude of the mountain was (397 m) Subjects drank water freely at rest points. The hemoglobin (Hb) concentration, weight, heart rate, rate of perceived exertion (RPE), strength of fatigue (VAS, visual analogue scale), and both lower and upper limb pain (VAS) were measured. Hb concentration and weight were measured before the start of the hike. Heart rate and RPE were measured before the start of the hike, halfway during the hike, and at the end of the hike when participants reached the top of the mountain. Strength of fatigue and body pain was measured before and after hiking.

Results and Discussion: We observed no significant difference in weight between the F and L conditions. Hb values less than the standard values were noted in 3 subjects in the F condition and 1 in the L condition. On average, the weight for subjects in the L condition was higher than that of subjects in the F condition (p < 0.05). Because quantity of involuntary water loss in the L condition is less than F condition, subjects in L condition retained more water than those in the F condition. There were no significant differences in strength of fatigue and body pain scores between the F and L conditions. Before hiking, strength of fatigue for 5 of 6 people in the L condition was higher than that in the F condition. A previous study reported that weight gain during the L condition is a usual complaint before menstruation. These results suggest that weight gain during the L condition affected the subjects’ strength of fatigue before hiking.