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The Relationship Between Academic Stress and Skeletal Muscle Performance

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(No relationships reported)

Student athletes are required to perform both in the classroom and on the field; balancing these commitments can be stressful. It is common to question the burden of athletic demands on student scholarship. However, the inverse is seldom asked: how do scholastic stresses affect athletic performance?
PURPOSE: To test the effect of psychological stress on skeletal muscle performance in college students.
METHODS: We enrolled 23 recreationally active students (10 men, 13 women) from a D1 university. Skeletal muscle function was assessed via quadriceps extension and hamstring flexion using a Cybex HUMAC NORM dynamometer. Psychological stress was measured with the Cohen Perceived Stress Scale. Subjects were evaluated at two time points: a high stress period (exams) and a low stress period (no exams). A history of injury excluded subjects from participation; nightly sleep, history of exercise, and recent exercise were controlled. Independent variables were stress, sex, age, weight, BMI, academic load, and participation in organized sports (club or intramural). Dependent variables were peak torque (ft/lb) and time to achieve peak torque (sec). Differences in muscle performance between high and low stress periods were assessed with t-tests. Linear regressions analyzed the effect of psychological stress on muscle performance.
RESULTS: Subjects were 20.2 ± 1.1 years old, had peak flexor torque of 87.4 ± 19.7 ft/lb (achieved in 0.58 ± 0.12 sec), and peak extensor torque of 145.2 ± 37.5 ft/lb (achieved in 0.58 ± 0.15 sec). T-tests found no differences between low and high stress periods in peak torque or time to achieve peak torque ($p>0.090$). Linear regression found increases in psychological stress to correlate with improvements in the overall rate of force development ($p=0.004$). The effect was strongest with flexors: for each point that stress increased, time to achieve peak torque was 2.4% faster ($p=0.002$).
CONCLUSION: Despite a small sample size, these findings suggest psychological stress may enhance force development. A possible mechanism could be sympathetically-mediated potentiation of calcium release. While academic stress presents many challenges for student-athletes, it does not appear to be detrimental to muscular performance.

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Effect of Cleat Position during Cycling on Running Performance in Elite Triathlete

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PURPOSE: To evaluate the effect of cycle shoes cleat position during cycling on subsequent running time in simulated duathlon in elite triathletes.
METHODS: Nine male national team caliber triathletes (25.9±2.4 yrs, 69.1±4.4 kg, 176.1±3.7 cm) participated in two occasions of simulated duathlon. In each occasion, they cycled 20 km on a fixed bicycle immediately followed by running 5 km on a treadmill. During cycling, they wore cycle shoes of either traditional cleat position (TCP) or middle cleat position (MCP, approximately 5 cm behind of TCP). During cycling and running, they changed and controlled the speed as well as the cycle gear combinations. The testing order was balanced. They were asked to perform their best. During the exercises, distance, time, speed, the transit time, and heart rate (HR) were recorded. The distance of running was divided into three phases; as 0-2, 2-4, and 4-5 km, and the time record was compared.
RESULTS: The total time record of the exercises excluding the transit was 3126±137 in TCP and 3096±103 sec in MCP ($p>0.05$). The cycling time was 1956±69 in TCP and 1967±54 sec in MCP ($p>0.05$). The running time was 1170±88 in TCP and 1129±66 sec in MCP ($p>0.05$). The running time was faster in MCP than TCP by 5.4% at the phase of 0-2 km (460±24 in MCP vs. 486±40 sec in TCP, $p<0.05$), but not at 2-4 km (447±25 in MCP vs. 462±37 sec in TCP, $p>0.05$). The average HR was 166.7±8.8 in MCP and 165.5±7.0 bpm in TCP during cycling, and 175.3±11.6 in MCP and 175.4±8.1 bpm in TCP during running. No differences were found in HR during the exercises.
CONCLUSION: The cleat position did not change the total time record of simulated duathlon in elite triathlete. However, the time record of early stage of running following cycling was faster when they cycled with the shoes of middle cleat position. It appears that cleat position during cycling have some influence on muscle recruitment during running in trained elite triathletes.

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Electrolytes Drink Increases Performance During Repeated Exhaustive Exercise Tests

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PURPOSE: To investigated the effects of electrolyte drink on subsequent exhaustive exercises, 14 male-university students voluntarily participated. They were healthy and passed medical screening and physical exam prior to three exercise tests of at least 1 week apart.
METHODS: Two consecutive exhaustive exercise tests, with 2 hours recovery period in between, were done within a day. After the first exhaustive exercise, subject was randomly intervened by drank one of the followings fluids: a) water (WT), b) placebo (PLA, only sucrose 7%, dextrose 4%) and sports drink (SD, NaCl 0.13%, KCl 0.03%, sucrose 7%, dextrose 4%). During 2 hrs recovery period, the amount of energy drink given was divided into 3 parts: first at 50%body weight (BW) at immediately after finished glycogen depletion, then at two sessions of 25%BW at 30 minutes and 60 minutes respectively Exhaustive exercise testing was conducted on cycle ergometer. This study was approved by Mahidol University IRB. Statistical analysis was done using two-ways repeated ANOVA at $p < 0.05$.
RESULTS: Increasing in most of cardiorespiratory variables (heart rates, stroke volumes, cardiac outputs, end-diastolic volumes, total peripheral resistance, breathing frequencies, tidal volumes, minute ventilations, maximum oxygen consumptions and carbon dioxide productions) are not significantly different among the groups with an exception of ejection fraction where SD was higher than WT ($p<0.05$). Estimations of substrate utilizations revealed that fat oxidation was higher in WT ($p<0.05$) where carbohydrate oxidations in PL and SD were higher than WT ($p<0.05$). On the second exhaustive exercise, SD had significantly higher time to exhaustion and work done than WT and PLA ($p<0.05$).
CONCLUSION: In addition to carbohydrate alone, sports drink-containing electrolytes found to increase endurance performance on the subsequent exercise. The presence of these electrolytes are found to enhance carbohydrate absorption in human gastrointestinal tract and may possibly act as co-enzymes in metabolic pathways.
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