Mid Atlantic Regional Chapter
of the
American College of Sports Medicine

Annual Scientific Meeting, November 4th- 5th, 2017
Conference Proceedings
International Journal of Exercise Science, Issue 9, Volume 6

Effects of Fatigue Induced by Intermittent Running on Muscular Strength, Power, and Glycogen Content

Regina K. Stump, Erin Pletcher, Chris Connaboy, Katelyn F. Allison, Mita Lovalekar, Matthew E. Darnell, Takashi Nagai. University of Pittsburgh, Pittsburgh, Pennsylvania

A majority of ACL injuries in female soccer players occur in the presence of fatigue. Reductions in lower extremity muscular strength and power due to fatigue can predispose female athletes to a higher risk of ACL injuries. Decreases in muscle glycogen content have also been reported after soccer play. PURPOSE: To investigate the relationship between muscle glycogen content with knee strength and power in the presence of fatigue. METHODS: Seventeen female subjects participated in the study (age: 21.5±2.9yrs). Before and after an intermittent running protocol, subjects completed testing including maximal isokinetic knee flexion and extension muscular strength normalized to their body weight (%BW), a depth-jump onto a force plate to measure reactive strength index (RSI), and ultrasound-based muscle glycogen content of six lower limb muscle groups. Paired t-tests or Wilcoxon signed- rank tests compared strength, RSI, and muscle glycogen content pre- and post-fatigue. Correlation analyses examined the relationships between the baseline muscle glycogen level and the changes (post/pre-fatigue values) in muscle glycogen content with the changes in muscular strength and power. Significance was set at $p<0.05$ a priori. RESULTS: After the fatigue protocol, knee flexion strength [(129.1±22.7 pre-fatigue; 115.9±25.7 post-fatigue)($p=<0.001$)] knee extension strength [(231.9±28.5 pre-fatigue; 218.8±39.6, post-fatigue)($p=0.016$)] and the flexion/extension strength ratio [(55.8±8.5 pre-fatigue; 53.4±10.2 post-fatigue)($p=0.039$)] were significantly decreased while RSI was significantly increased [(0.671 ± 0.236 pre-fatigue; 0.749 ± 0.276 post-fatigue)($p=0.006$). There were no significant differences in muscle glycogen content pre- to post-fatigue protocol. There were no significant correlations ($p>0.05$) other than the baseline vastus medialis muscle glycogen content being significantly correlated to the changes in knee flexion strength [($r=-0.616$)($p=0.008$)] and knee extension strength [($r=-0.603$)($p=0.010$)]. CONCLUSIONS: The current running protocol that simulated soccer play caused fatigue as revealed by significant decreases in lower limb strength. Methodological considerations should be explored further to understand the relationship between glycogen to performance parameters.

Statement Disclosure: Funding provided by Freddie H. Fu Graduate Research Award