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# The combined effects of a pre-workout supplement and three weeks of high-intensity interval training on critical velocity, anaerobic running capacity, training volume, and body composition in men and women

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## Background

A randomized, single-blinded, placebo-controlled, parallel design study was used to examine the effects of a pre-workout supplement combined with three weeks of high-intensity interval training (HIIT) on aerobic and anaerobic running performance, training volume, and body composition.

## Methods

Twenty-five well-trained recreational athletes (mean ± SD age = 21 ± 2 yrs; stature = 172 ± 9 cm; body mass = 66 ± 12 kg, $VO_2$max = 48 ± 9 ml · kg$^{-1}$ · min$^{-1}$, percent body fat = 19 ± 7%) were assigned to either the active supplement (n = 12) or placebo (PL, n = 11) group. The active supplement (Game Time®, GT, Corr-Jensen Laboratories Inc., Aurora, CO) was 18 g of powder, 40 kcals, and consisted of a proprietary blend including whey protein, cordyceps sinensis, arginine, creatine, citrulline, ginseng, and caffeine. The PL was also 18 g of power, 40 kcals, and consisted of only maltodextrin, natural and artificial flavors and colors. Thirty minutes prior to all testing and training sessions, participants consumed their respective supplements mixed with 8–10 oz of water. Both groups participated in a three week HIIT program three days per week, and testing was conducted before and after the training. Cardiovascular fitness ($VO_2$max) was assessed using closed circuit spirometry (Parvo Medics TrueOne® 2400 Metabolic Measurement System, Sandy, UT) during graded exercise tests on a treadmill (Woodway, Pro Series, Waukesha, WI). Also, four high-speed runs to exhaustion were conducted at 110, 105, 100, and 90% of the treadmill velocity recorded during $VO_2$max, and the distances achieved were plotted over the times-to-exhaustion. Linear regression was used to determine the slopes (critical velocity, CV) and Y-intercepts (anaerobic running capacity, ARC) of these relationships to assess aerobic and anaerobic performances, respectively. Training volumes were tracked by summing the distances achieved during each training session for each subject. Percent body fat (%BF) and fat-free mass (FFM) were assessed with air-displacement plethysmography (BOD POD®, Life Measurement, Inc., Concord, CA).

## Results

$VO_2$max increased significantly by 10.5% ($p = 0.039$) from pre- (3.38 L · min$^{-1}$) to post-training (3.73 L · min$^{-1}$) for the GT group, whereas the PL group did not change (3.08 to 3.17 L · min$^{-1}$; $p = 0.161$). CV also increased significantly ($p = 0.006$) for the GT group by 2.8%, while the PL group did not change ($p = 0.257$; 1.8% increase). ARC

increased (p = 0.036) for the PL group by 19.7%, and for the GT group by 9.9% (p = 0.061). Training volume was 11.6% higher for the GT versus PL group (p = 0.032). %BF decreased from 19.3% to 16.1% (p = 0.170) for the GT group and decreased from 18.0% to 16.8% in the PL group (p = 0.044). FFM increased significantly from 55.9 kg to 57.4 kg (p = 0.035) for the GT group, while FFM decreased from 53.4 kg to 53.1 kg (p = 0.320) in the PL group. There were no changes (p > 0.05) in any of the blood safety measures (glucose, HDL, and LDL).

## Conclusion

These results supported the safety of GT and demonstrated improvements in $VO_2$max, critical velocity, and lean tissue mass when GT is combined with HIIT. Three weeks of HIIT alone also augmented anaerobic running performance and body composition.

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