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Abstract

Background

A number of nutritional strategies have been developed to optimize nutrient delivery for recreational and competitive athletes prior to, during, and post exercise, and many nutritional interventions were used by coaches, trainers, and athletes over the various sport fields. Current literatures have reported a combination of creatine, beta alanine, caffeine, and amino acid as effective supplements for improving performance. Additionally, consuming carbohydrate (CHO) and protein (PRO) beverage in the hours prior to the events is one of methods for maximizing glycogen stores and potentially influencing its utilization during exercise. As a result, a number of pre-workout supplements have been developed to increase energy availability, promote vasodilation, and/or positively affect exercise capacity. Some studies regarding pre-workout supplement ingestion have reported enhanced performance, shorten reaction time, improved strength and power, and delayed fatigue. Our previous study have also shown pre-workout supplement ingestion prior to exercise promoted modest thermogenic response, enhanced perceptions of readiness to perform and cognitive function. The purpose of this study was to examine the effects of ingesting a pre-workout dietary supplement with and without synephrine for 8 weeks on muscular strength, anaerobic power, and body composition.

Methods

In a double-blind, crossover, randomized and placebo-controlled manner; 78 apparently healthy and recreationally active men (21.76±3.59 yr, 15.29±6.19% fat, 25.60±4.03 kg/m²) were recruited for the study participation. Participants then were stratified in a randomized and counterbalanced manner a dextrose flavored placebo (P); a pre-workout supplement (PWS) containing 3.0 g of beta alanine, 2.0 g of creatine nitrate, 2.0 g of arginine AKG, 300 mg of N-acetyl tyrosine, 270 mg of caffeine, 15 mg of Mucuna pruriens; or, the PWS with 20 mg of synephrine (PWS+S). At baseline testing (0 week), body composition was measured by dual-energy X-ray absorptiometry (DXA). Muscular strength was measured by one repetition maximum test (1RM) for the leg press (LP) and the bench press (BP). Participants had 3 sets warm-up; 50% 1RM to 1st set, 70% 1RM to 2nd set, and 90% 1RM to 3rd set, and then 1RM was measured to the both test (LP & BP). Participants had 2 minutes rest between at each set, and then following 5 minutes rest of strength test, participants had a 30sec Wingate test to measure peak power (PP), mean power (MP), and total work (TW). The 30s Wingate test was performed with a computerized cycle ergometer; 1 minute warm-up and 30 second all-out pedaling with breaking torque 0.75 Nm. Participants repeated the experiment at 4 weeks and 8 weeks. We used a GLM covaried for respective baseline measures to assess changes in performance and body composition at weeks 4 and 8. Data are presented as mean ± SD and mean change ± 95% CI when appropriate.

Results

We observed a significant increase in LP 1RM at 4 weeks for PWS (61.83 kg; 24.96, 98.75) and PWS+S (44.89 kg; 8.3, 81.5) and 8 weeks for PWS (79.23 kg; 39.9, 118.5), PWS+S (89.53 kg; 50.6, 128.5) and PLA (43.28 kg, 4.1, 82.4). Similar patterns in BP 1RM were noted at 4 weeks for PWS (6.94 kg; 0.6, 13.3), PWS+S (8.17 kg; 1.9, 14.5) and 8 weeks for PWS (14.35 kg; 8.1, 20.6), PWS+S (13.83 kg; 7.6, 20.0) and PLA (7.18 kg; 1.0, 13.4). We observed a significant increase in PP for PWS+S and PLA was observed at week 4; however, no significant differences was observed at 8 weeks, between group differences throughout the study or an additive benefit from including synephrine.

Conclusion

Ingesting a PWS containing beta alanine, creatine nitrate, arginine AKG, N-Acetyl Tyrosine, caffeine, and Mucuna pruriens increased LP and BP 1RM at 4 week and 8 week in comparison to a placebo. Results indicate that the pre-workout supplement can promote strength and anaerobic power over the 8 weeks; however, it did not show body composition change.

Rationale

Among active young and athletes, multi-ingredient pre-workout supplements are extremely popular [1, 2], and a number of nutritional strategies have been developed to optimize nutrition delivery prior to exercise [3, 4]. Synephrine is widely used in dietary supplements for sports performance, and it also extensively consumed in various juices and foods derived Citrus species [5]. In a 60 days double-blind and placebo-controlled study, adverse effects of Citrus aurantium were not found [6].

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Methods & Procedures

- A double-blind, crossover, randomized and placebo-controlled manner
- 78 apparently healthy and recreationally active men and women (21.76±3.59 yr, 15.29±6.19% fat, 25.60±4.03 kg/m²)

Supplements

- Placebo (P): a dextrose flavored
- Pre-workout (PWS): 3.0 g beta alanine, 2 g creatine nitrate, 2 g arginine AKG, 300 mg of N-acetyl tyrosine, 270 mg caffeine, 15 mg of Mucuna pruriens
- Pre-workout with synephrine (PWS+S): PWS with 20 mg of synephrine
- At baseline (0 week), body composition, LP and BP 1RM, and anaerobic power (30s Wingate) were measured, and then at 4 week and 8 week, all tests were repeated.

Statistical Analysis

- We used a GLM covaried for respective baseline measures to assess changes in performance and body composition at weeks 4 and 8.
- Data are presented as mean ± SD and mean change ± 95% CI when appropriate.

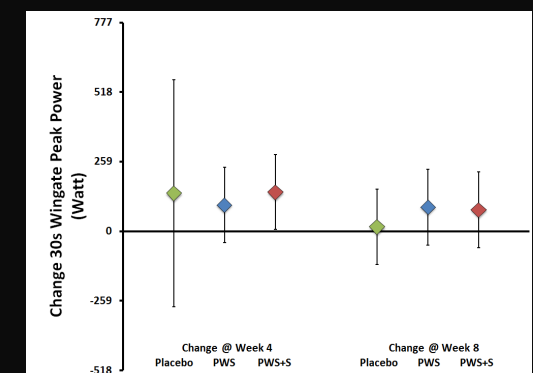
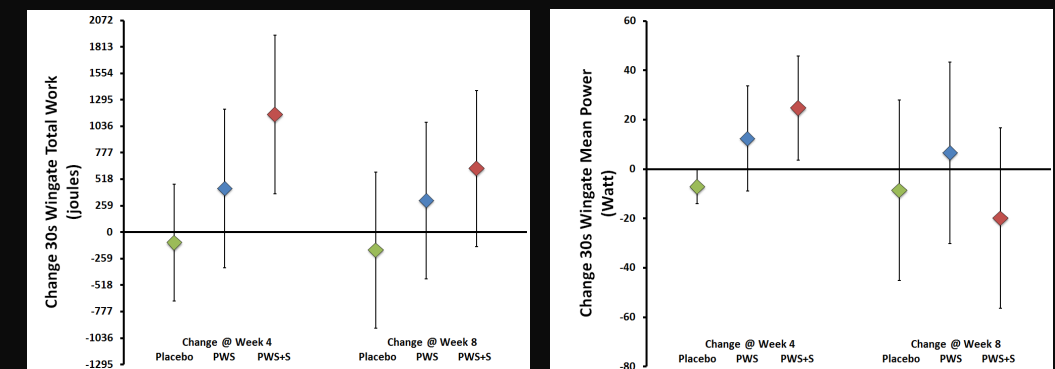
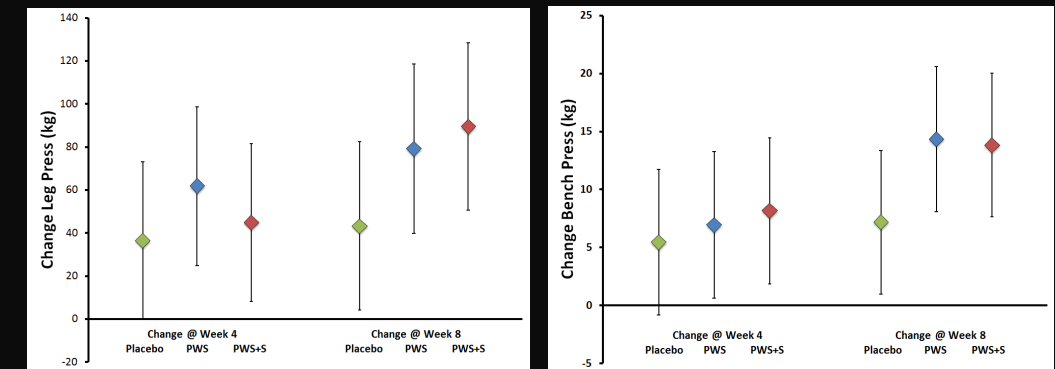
Results

- Statistical analysis revealed a significant increase in LP 1RM at 4 weeks for PWS (61.83 kg; 24.96, 98.75) and PWS+S (44.89 kg; 8.3, 81.5) and 8 weeks for PWS (79.23 kg; 39.9, 118.5), PWS+S (89.53 kg; 50.6, 128.5) and PLA (43.28 kg, 4.1, 82.4).
- Similar patterns in BP 1RM were noted at 4 weeks for PWS (6.94 kg; 0.6, 13.3), PWS+S (8.17 kg; 1.9, 14.5) and 8 weeks for PWS (14.35 kg; 8.1, 20.6), PWS+S (13.83 kg; 7.6, 20.0) and PLA (7.18 kg; 1.0, 13.4).
- A significant increase in PP for PWS+S and PLA was observed at week 4; however, no significant differences was observed at 8 weeks, between group differences throughout the study or an additive benefit from including synephrine.

Conclusion

- Ingesting a PWS containing beta alanine, creatine nitrate, arginine AKG, N-Acetyl Tyrosine, caffeine, and Mucuna pruriens increased LP and BP 1RM at 4 week and 8 week in comparison to a placebo.
- Results indicate that the pre-workout supplement can promote strength and anaerobic power over the 8 weeks; however, it did not show body composition change.

Figures



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