EFFECT OF A MULTI-INGREDIENT PREWORKOUT SUPPLEMENT ON COGNITIVE FUNCTION AND PERCEPTIONS OF READINESS TO PERFORM

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Abstract

This study examined the short-term effects of ingesting preworkout supplements (PWS) and PWS at 1.5 times recommended dose (PWS150) on cognitive function and perceptions of readiness to perform. Sixteen recreationally active men (21.56 ± 2.11 yr, 20.51 ± 7.64% fat, 27.28 ± 4.25 kg/m2) participated in a double-blind, crossover, randomized and placebo-controlled manner. Supplements were (1) a dextrose placebo (PLA); (2) a PWS supplement containing 1.6g β-alanine, 1.0g arginine, 1.0g creatine nitrate, 250mg ascorbic acid, 150mg N-acetyl tyrosine, 150mg caffeine, 5mg tetramethyluric acid or (3) PWS at ~150% dosage (PWS150) of the base formula for seven days. In the supplementation week, participants performed a Stroop-Color cognitive function test (CFT) and rated perceptions of readiness to perform on a visual analogue scale (RTP-VAS). Participants repeated the experiment after a one week washout period. The CFT results indicate a significant interaction between groups for the Word test ($p = 0.04$). There was a Time effect between groups for the Word test ($p = 0.001$), Color test ($p = 0.002$), and Word-Color test ($p = 0.001$). A change from baseline was seen in CFT ($p < 0.05$). We observed an improvement in Word count in supplement groups at day three: PWS (6.56 counts, 95% CI, 1.99, 11.13), PWS150 (4.75 counts, 95% CI, 0.17, 9.32), not PLA (3.06 counts, 95% CI, -1.50, 7.63); at day five for supplement groups: PWS (6.56 counts, 95% CI, 1.99, 11.13), PWS150 (4.75 counts, 95% CI, 0.17, 9.32), not PLA (3.06 counts, 95% CI, -1.50, 7.63); at day seven for supplement groups: PWS (6.12 counts, 95% CI, 0.23, 12.01), PWS150 (13.06 counts, 95% CI, 7.17, 18.94), not PLA (1.81 counts, 95% CI, -4.07, 7.69); For Color recognition, improvements were seen in PWS150 and PLA groups at day seven: PWS150 (8.12 counts, 95% CI, 3.89, 12.35), PLA (4.25 counts, 95% CI, 0.02, 8.47), not the PWS group (1.93 counts, 95% CI, -2.29, 6.16). For the Word-Color assessment, the improvement was seen only in PWS150 at day five: PWS150 (4.87 counts, 95% CI, 0.22, 9.52), not PWS (1.81 counts, 95% CI, -2.83, 6.46), and PLA groups (1.68 counts, 95% CI, -2.96, 6.33); and at day seven for PWS150 and PLA groups: PWS150 (4.87 counts, 95% CI, 0.22, 9.52), PLA (1.81 counts, 95% CI, -4.07, 7.69); not PWS (3.06 counts, 95% CI, -2.46, 8.58). No significant changes from baseline were observed between groups regarding perceived readiness to perform ($p > 0.05$). These data indicate that ingesting a PWS results in improvement in indices of CFT. Furthermore, a dose-dependent difference was also observed, as PWS150 showed a higher impact on cognitive performance compared to PWS.

Rationale

It is well-known that ingesting caffeinated supplements leads to dose-dependent increased energetic arousal. Caffeine may also have facilitatory effects on cognitive function. For this reason, there has been numerous energy drinks and PWS developed over recent years that have been marketed to athletes. The larger improvement of performance in fatigued subjects confirms that caffeine is a mild stimulant. At low doses, caffeine improves hedonic tone and reduces anxiety, while at high doses there is an increase in tense arousal, including anxiety, nervousness, and jitteriness. Caffeine improves concentration and help to focus mainly by eliminating distractors. In mood ratings, arousal state, i.e., changes in alertness, reaction time and attention have often been included.

Experimental Design

Subjects

- Apparently healthy and recreationally active males (N=16; 22±2 y) were recruited for this study.
- Subjects were informed of experimental procedures and singed a consent statement in adherence with the human subject guidelines of Texas A&M University.
- A standard medical exam and review of subject medical exam and review of subject medical history was performed by a research nurse for clearance to participate in the study.

Testing Protocol

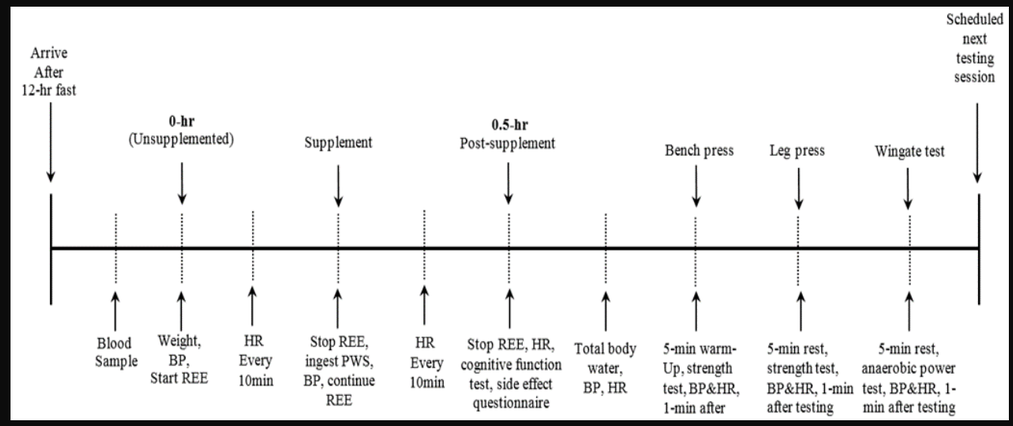
- Throughout the familiarization session, subjects completed a physical exam, medical history form, and signed the informed consent statement.
- Subjects were asked to refrain from exercise, caffeine and use of over-the-counter stimulants for 48-hours prior to baseline and follow-up testing sessions.
- At baseline and follow-up testing sessions, subjects consumed their respective supplements in a randomized, double-blind, counter-balanced manner interspersed by a 7 day washout period.
- Participants performed a CFT and RTP-VAS on days one, three, five, and seven.
- On testing days, they did CFT and RTP-VAS 30min following supplementation.
- On days three and five, they referred to the lab to only perform CFT and RTP-VAS.

Experimental Design

- Participants repeated the experiment after a week washout period with alternate supplements in a randomized and counterbalanced manner.
- All measurements throughout the study were obtained by lab personnel.
- Self-reported 4-day dietary records were recorded 1-wk prior to each lab visit.
- All supplements and the placebo were provided by Nutrabolt Company.

Supplementation Protocol

- On testing days, ingesting followed after 30min REE measurement.
- During non-testing days, participants ingested PWS in 2 forms: during workout days, they ingested the supplement prior to their workout; during non-workout days, they ingested that around noon.
- Placebo, PWS, and PWS150



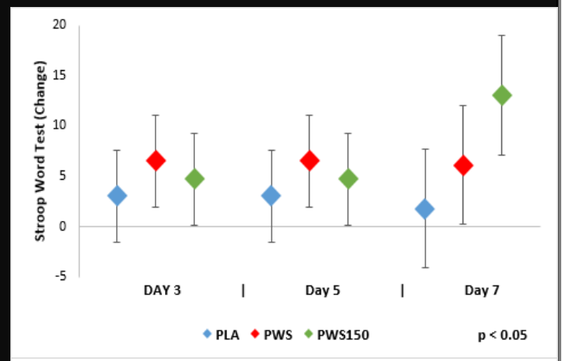
Results

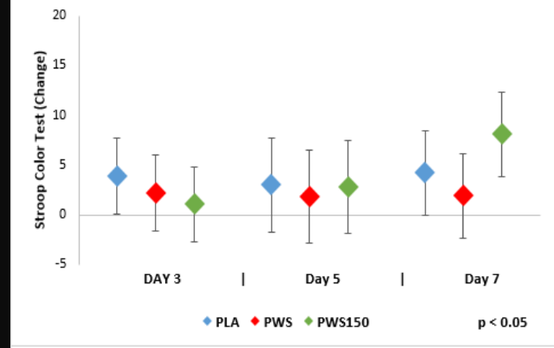
- There was a significant interaction between groups for the Word test ($p = 0.04$).
- There was a Time effect between groups for the Word test ($p = 0.001$), Color test ($p = 0.002$), and Word-Color test ($p = 0.001$).
- A change from baseline was seen in cognitive function ($p < 0.05$).
- We observed an improvement in Word count in supplement groups at day three: PWS (6.56 counts, 95% CI, 1.99, 11.13), PWS150 (4.75 counts, 95% CI, 0.17, 9.32), not PLA (3.06 counts, 95% CI, -1.50, 7.63); at day five for supplement groups: PWS (6.56 counts, 95% CI, 1.99, 11.13), PWS150 (4.75 counts, 95% CI, 0.17, 9.32), not PLA (3.06 counts, 95% CI, -1.50, 7.63); at day seven for supplement groups: PWS (6.12 counts, 95% CI, 0.23, 12.01), PWS150 (13.06 counts, 95% CI, 7.17, 18.94), not PLA (1.81 counts, 95% CI, -4.07, 7.69);
- For Color recognition, improvements were seen in PWS150 and PLA groups at day seven: PWS150 (8.12 counts, 95% CI, 3.89, 12.35), PLA (4.25 counts, 95% CI, 0.02, 8.47), not the PWS group (1.93 counts, 95% CI, -2.29, 6.16).
- For the Word-Color assessment, the improvement was seen in PWS150 at day five: PWS150 (4.87 counts, 95% CI, 0.22, 9.52), not PWS (1.81 counts, 95% CI, -2.83, 6.46), and PLA (1.68 counts, 95% CI, -2.96, 6.33); at day seven for PWS150 and PLA groups: PWS150 (4.87 counts, 95% CI, 0.22, 9.52), PLA (1.81 counts, 95% CI, -4.07, 7.69); not PWS (3.06 counts, 95% CI, -2.46, 8.58).

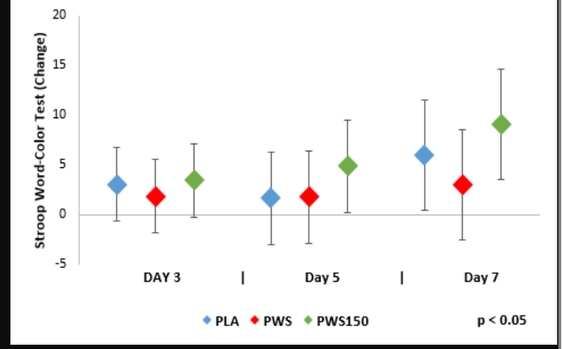
Conclusion

These data indicate that ingesting a PWS results in a significant improvement in measured indices of cognitive function test compared to placebo. Furthermore, a significant dose-dependent difference was also observed, as PWS150 showed a higher impact on cognitive performance compared to PWS.

Figures







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