ACUTE EFFECT OF A MUTI-INGREDIENT PRE-WORKOUT SUPPLEMENTATION ON POWER EXPRESSION THROUGH A HIGH-INTENSITY FUNCTIONAL TRAINING WORKOUT

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INTRODUCTION

The 'as many repetitions as possible' (AMRAP) circuit format is common in high-intensity functional training (HIFT) (8). Performance is dependent on sustaining the necessary power to complete each movement at a pace that also minimizes breaks due to fatigue (7), and this ability is thought to improve with training and HIFT experience.

Multi-ingredient pre-workout supplements contain several components known to improve energy availability to enhance force production and better sustain power (4 – 6, 11), particularly those containing caffeine (1, 5). However, pre-workout formulations are numerous and immensely variable, and only one study has examined the effect of one on CF performance (10). Outlaw and colleagues (2014) noted improved aerobic capacity, anaerobic power, and repeated HIFT workout performance after consuming a pre-workout supplement (extracts of pomegranate, tart cherry, green and black tea) for 6 weeks. However, the acute effects of supplementation have not been investigated in experienced HIFT trainees.

PURPOSE

To examine the acute effects of a pre-workout supplement on power expression and HIFT workout performance.

METHODS

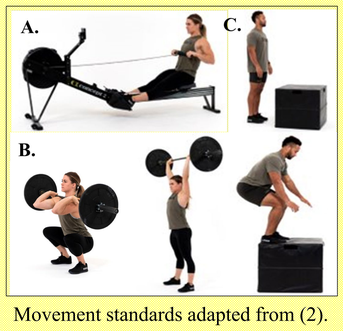
Men (n=7: 29±7 years, 173±9 cm, 83±17 kg) with HIFT experience (≥2 years) completed 4 fasted (2-3 hours) trials in cross-over design once per week over 4 consecutive weeks at their normal workout time.

Participants randomly consumed either supplement (S, Maximum Pre-workout Formula, Shifted, LLC, Eugene, OR – see Table 1) or a non-caloric placebo (P), rested 40 minutes, and then randomly completed either a 5- or 15-minute AMRAP.

The average, standard deviation (SD), and slope of each exercise's kinetics, measured within each round, were calculated across each minute of all four conditions.

Figure 1. Exercise kinetics measured during AMRAP workouts

Kinetics were measured during a **(A.)** 9-calorie rowing via the ergometer microcomputer, **(B)** six barbell thrusters at 95 lbs. (43.1 kg) via 3D camera (PERCH, Catalyft Labs, Inc, Cambridge, MA), and **(C)** three 24-in box jumps off a force plate (Accupower, AMTI, Watertown, MA).



Movement standards adapted from (2).

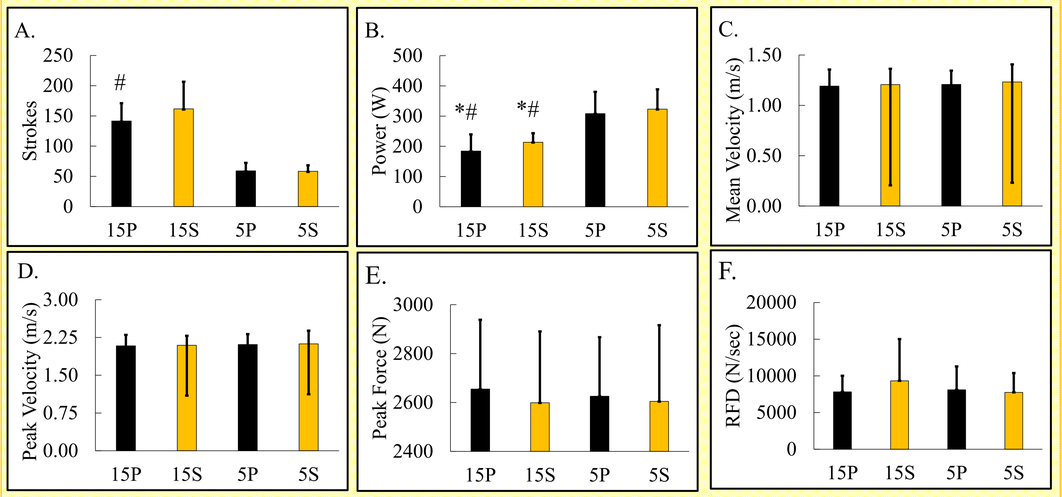
RESULTS

Table 1. Supplement ingredient list

Serving Size: 1 scoop (30 g)		
Ingredients	**Amount per serving**	**% DV**
Calories	5	
Total Carbohydrate	1 g	<1%*
Niacin (as Nicotinic Acid)	15 mg	94%
Vitamin B6 (as Pyridoxine HCl)	1 mg	59%
Vitamin B12 (as Methylcobalamin)	100 mcg	4167%
Iron	1 mg	6%
Magnesium (from Red Spinach Leaf Extract and Dimagnesium Malate)	9 mg	2%
Sodium (as Pink Himalayan Sea Salt)	40 mg	2%
Potassium (from Red Spinach Leaf Extract and Potassium Chloride)	248 mg	5%
L-Citrulline	8 g	**
Creatine Monohydrate	5 g	**
Taurine	3 g	**
Beta-Alanine (as CarnoSyn®)	2.5 g	**
Betaine Anhydrous	2.5 g	**
L-Tyrosine	2 g	**
Red Spinach Leaf Extract (as Oxystorm®)	1 g	**
Beet Root Extract	1 g	**
Alpha-GPC (Alpha-Glycerol Phosphoryl Choline 50%)	300 mg	**
Caffeine Blend Caffeine Anhydrous (250 mg) zimXR® Delayed Release Caffeine (50 mg)	300 mg	**
L-Theanine	150 mg	**
ElevATP® (Ancient Peat and Apple Fruit Extract)	150 mg	**
Pink Himalayan Sea Salt	100 mg	**
Rhodiola rosea (root) Extract	100 mg	**
Co-Enzyme Q10	25 mg	**
AstraGin® [Astargalus membranaceus (root) Extract & Panax notoginseng (root) Extract]	25 mg	**
BioPerine® (Black Pepper Fruit Extract)	5 mg	**

*Percent Daily Values (DV) are based on a 2,000-calorie diet
** Daily value not established
OTHER INGREDIENTS: Citric acid, Natural Flavor, Calcium Silicate, Malic Acid, Silicon Dioxide, Sucralose, Spirulina Powder

Figure 2. Trial and workout duration comparisons for average A) rowing strokes, B) rowing power, C) mean thruster velocity, D) peak thruster velocity, E) peak box jump force, and F) box jump RFD.



*=Significantly ($p < 0.05$) different from 5S; #=Significantly ($p < 0.05$) different from 5P.

Repeated measures analysis of variance with Greenhouse Geiser adjustments revealed expected differences between workout durations:

- Repetitions completed ($p < 0.001$) during 15-minute (P = 182 ± 27; S = 186 ± 19) and 5-minute bouts (P = 78 ± 8; S = 81 ± 7).
- Total rowing strokes ($p < 0.001$) during 15-minute (P = 142 ± 29; S = 162 ± 45) and 5-minute bouts (P = 59 ±13; S = 58 ± 10)
- Rowing power ($p = 0.009$; see Figure 2)

Average rowing strokes: Significantly ($p < 0.001$) different and more variable between 15P and 5P but not between S-trials (Table 2).
Slope of Peak Box Jump Force: Steeper ($p < 0.05$) during 5S compared to both 15-minute workouts (Table 2)

Table 2. Variability in exercise kinetics measured across minutes of each workout condition (mean ± SD)

	15P	15S	5P	5S
Rowing Strokes				
SD	2.9 ± 5.01#	3.79 ± 6.58	1.13 ± 0.54	0.94 ± 0.63
Slope	0.62 ± 1.3#	0.85 ± 1.25	0.57 ± 0.5	0.55 ± 0.47
Rowing Power (W)				
SD	62.8 ± 65.1	50.9 ± 33.2	64.8 ± 53	55.1 ± 41.4
Slope	-14.5 ± 17.1	-13.5 ± 11.7	-38.6 ± 43	-33.6 ± 35
Mean Thruster Velocity (m/s)				
SD	0.04 ± 0.02	0.04 ± 0.01	0.05 ± 0.02	0.06 ± 0.04
Slope	0.01 ± 0.01	0 ± 0.01	-0.02 ± 0.04	-0.03 ± 0.03
Peak Thruster Velocity (m/s)				
SD	0.06 ± 0.04	0.06 ± 0.01	0.09 ± 0.05	0.09 ± 0.06
Slope	-0.01 ± 0.02	0 ± 0.02	-0.05 ± 0.06	-0.05 ± 0.05
Peak Box Jump Force (N)				
SD	68.5 ± 31.4	93.2 ± 31.6	79.8 ± 39.4	99.9 ± 51.9
Slope	5.98 ± 13.3*	-13 ± 15.9*	-35 ± 42.9	-82.9 ± 39.5
Box Jump RFD (N/sec)				
SD	904 ± 530	1279 ± 1159	867 ± 585	1112 ± 937
Slope	49.1 ± 164	-38.2 ± 111	-306 ± 367	-850 ± 899

*=Significantly ($p < 0.05$) different from 5S; #=Significantly ($p < 0.05$) different from 5P

CONCLUSIONS

Strokes required to complete 9 calories of rowing were more consistent during S trials compared to P trials. Otherwise, no other benefits were observed from the supplement. This agrees with previous data (3) where the present pre-workout formula did not affect jump power, but contrasts others reporting improved performance with caffeine supplementation (1, 5, 10). It is possible that the standard caffeine dosage (300 mg regardless of body size) and limited sample size may explain the lack of agreement. The differences between trial durations for average strokes and rowing power were to be expected (7, 8).

PRACTICAL APPLICATIONS

Maintaining consistent power output across rounds in AMRAP-style workouts is a valid strategy for maximizing HIFT workout performance. The present study provides some evidence of the pre-workout supplement enhancing this ability, but until more data is collected, coaches and athletes should view these data as tentative.

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ACKNOWLEGEMENTS

THIS STUDY WAS FUNDED BY SHIFTED, LLC (EUGENE, OR).