CONSUMING A PURPORTED ATP-ENHANCING SUBSTANCE WITH CAFFEINE INCREASES LOWER BODY STRENGTH, POWER, AND HYPERTROPHY VERSUS PLACEBO IN TRAINED MEN

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ABSTRACT

Various ergogenic substances aim to improve measures of strength, power and muscle hypertrophy in athletic populations. A novel ingredient, consisting of ancient peat and apple extracts, may enhance cellular ATP production and thereby improve these measures. Purpose: To examine the effects on performance and muscle hypertrophy of a purported ATP-enhancing substance combined with extended release caffeine, caffeine anhydrous, and B-vitamins (AES) versus placebo (PLA) after 12 weeks periodized resistance training. Methods: 21 resistance-trained males (mean ± SD; 27.2 ± 5.6 y; 173.5 ± 5.7 cm; 82.8 ± 12.0 kg) participated in this randomized, double-blind, placebo controlled study. Subjects consumed 1 serving (1.5 mL) daily of either AES (n=10), containing 150 mg of a proprietary blend of ancient peat and apple extracts, 180 mg of a blend of extended release caffeine and caffeine anhydrous, and 38 mg B-vitamins, or visually identical PLA (n=11) 45 minutes before training on workout days and at a similar time of day on non-workout days. Subjects participated in supervised daily undulating periodized resistance training 3 days per week for 8 weeks followed by 2 weeks each of overreach and taper phases. Measures of upper and lower body power (bench press power, vertical jump) and maximal strength (bench press, deadlift, back squat 1RM), as well as ultrasound-determined cross-sectional area (CSA) of the rectus femoris and muscle thickness (MT) of the vastus lateralis and vastus intermedius were collected at weeks 0, 4, 8, 10, and 12. A repeated measures ANOVA was used to determine all group, time, and group by time interactions. Results: Significant group by time interactions ($p < 0.05$) were present for squat 1RM (PLA: +15.8 kg; AES: +28.0 kg), vertical jump peak power (PLA: +192.9 W; AES +401.9 W), and peak velocity (PLA: +0.15 m/s; AES: +0.45 m/s) from pre to post supplementation. Significant group by time effects ($p < 0.05$) were observed for total strength (squat 1RM + bench 1RM + deadlift 1RM), in which there were no effects from pre to post, yet AES increased to a greater extent than PLA from weeks 4 to 10 (PLA: +2.1 kg, AES: +22.3 kg), weeks 4 to 12 (PLA: +11.0 kg, AES: +37.3 kg), and weeks 8 to 12 (PLA: +3.4 kg, AES: +18.3 kg). Significant group by time interactions ($p < 0.05$) were observed for CSA (PLA: -0.08 cm2; AES: +1.07 cm2) and MT (PLA: +0.05 cm; AES: +0.49 cm) from pre to post supplementation. No significant group by time interactions were observed for bench press power or 1RM ($p > 0.05$). Conclusions: The present findings suggest that AES may improve lower body strength and power adaptations and increase muscle hypertrophy within the context of a periodized 12-week resistance training program. PRACTICAL APPLICATIONS: Athletes and recreationally active populations may benefit from supplementation with the product used in this investigation, particularly if they seek to augment increases in lower body strength, power, and hypertrophy while participating in a structured resistance training program.

BACKGROUND

Adenosine-5'-triphosphate (ATP) and ATP metabolites are involved in a myriad of biological processes including cardiac function, neurotransmission, blood flow, and muscle contraction [1, 2], and it is strongly suggested that increased ATP levels correlate with improved health and performance [3, 4]. Previously, Reyes-Izquierdo and colleagues [5] determined that a 150mg dose of a blend of ancient peat and apple extracts significantly increased blood ATP compared to placebo. Previous reports on the performance effects of indirect ATP supplementation are lacking, however there are a multitude of studies concerning the ergogenic effects of caffeine supplementation [6]. Therefore, the purpose of the present study was to determine the effects of a putative ATP-enhancing supplement containing a proprietary blend of ancient peat and apple extracts and extended release caffeine on athletic performance and muscle hypertrophy in resistance trained men.

METHODS

21 resistance-trained males (mean ± SD; 27.2 ± 5.6 y; 173.5 ± 5.7 cm; 82.8 ± 12.0 kg) participated in this randomized, double-blind, placebo controlled study. Each subject was required to be capable of lifting at least 1.5x their bodyweight in the barbell back squat and deadlift, and 1x bodyweight in the barbell bench press at the onset of the study. Subjects consumed 1 serving (1.5 mL) daily of either a putative ATP-enhancing supplement (AES, n=10), containing 150 mg of a proprietary blend of ancient peat and apple extracts (ElevATP™, FutureCeuticals Inc., Momence, IL), 180 mg of a blend of extended release caffeine (PurEnergy™, Chromadex Inc., Irvine, CA) and caffeine anhydrous, and 38 mg B-vitamins, or visually identical placebo (PLA, n=11) 45 minutes before training on workout days and at a similar time of day on non-workout days. Subjects participated in supervised daily undulating periodized resistance training 3 days per week for 8 weeks followed by 2 weeks each of overreach and taper phases. Measures of upper and lower body power (bench press power, vertical jump) using a linear force transducer (weightlifting analyzer, TENDO Sport Machines, Slovak Republic) and maximal strength (bench press, deadlift, and back squat 1RM), as well as ultrasound-determined cross-sectional area (CSA) of the rectus femoris and combined muscle thickness (MT) of the vastus lateralis and vastus intermedius were collected at weeks 0, 4, 8, 10, and 12. A repeated-measures ANOVA was used to determine all group, time, and group by time interactions. Independent t-tests were conducted on the delta values between time points. Alpha was predetermined at $p < 0.05$ level of significance.

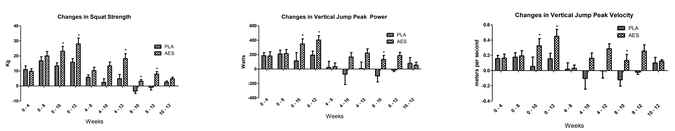
Weeks 1-8							
Monday		Wednesday		Friday			
Hypertrophy, 60-80%		*Power, 40-60%*		*Strength, 85-100%*			
Squat	3x8-12	Squat	3x2-5	Squat	3x1-5		
Bench Press	3x8-12	Bench Press	3x2-5	Bench Press	3x1-5		
Deadlift	3x8-12	Deadlift	3x2-5	Deadlift	3x1-5		
		Hypertrophy, 60-80%					
Incline Press	3x8-12	Bent Over Row	4x8-12	1-Shoulder Press	3x1-5		
Power Squat	3x8-12			2-Pulldown	3x1-5		
		Pulldown	3x8-12				
1-Hammer Curl	3x8-12						
		14cm DB row	3x8-12				
2-Leg Press	3x8-12						
1-Leg Extension	3x8-12	Shoulder Press	4x8-12	Wingate	4-10x6-30s		
2-Leg Curl	3x8-12						
2-Incline Curl	3x8-12	1-Side Raise	3x8-12				
2-Tricep Extension	3x8-12	2-Bicep Curl	3x8-12				

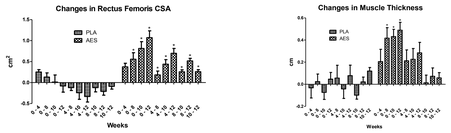
Weeks 9-10 (over reach phase)									
Monday		Tuesday		Wednesday		Thursday		Friday	
Hypertrophy, 60-80%		*Hypertrophy, 60-80%*		*Hypertrophy, 60-80%*		*Hypertrophy, 60-80%*		*Strength, 85-100% Jump*	
Squat	3x8-12	Front Squat	3x8-12	Squat	3x8-12	Front Squat	3x8-12	Squat	3x1-3
		Close Grip Bench	3x8-12			Close Grip Bench	3x8-12		
Bench Press	3x8-12			Bench Press	3x8-12			Bench Press	3x1-3
		DB Leg Deadlift	3x8-12			DB Leg Deadlift	3x8-12		
Deadlift	3x8-12			Deadlift	3x8-12			Deadlift	3x1-3
T-Bar Row	3x8-12	T-Bar Row	3x8-12	T-Bar Row	3x8-12	T-Bar Row	3x8-12		
		Machine Shoulder Press	3x8-12	Shoulder Press	3x8-12	Machine Shoulder Press	3x8-12		
1-Pulldown	3x8-12	1-Pulldown	3x8-12	1-Pulldown	3x8-12	1-Pulldown	3x8-12		
2-Dips	3x8-12	2-Machine	3x8-12	2-Dips	3x8-12	2-Machine	3x8-12	Wingate	testing
		1-Preacher Curl	3x8-12			1-Preacher Curl	3x8-12		
1-Bicep Curl	3x8-12			1-Bicep Curl	3x8-12				
2-Tricep Extension	3x8-12	2-Tricep Extension	3x8-12	2-Tricep Extension	3x8-12	2-Tricep Extension	3x8-12		

Week 11					
Monday		Wednesday		Friday	
Power, 40%		*Power, 50%*		*Strength, 85%*	
Squat	3x5	Squat	3x4	Squat	2x2
Bench Press	3x5	Bench Press	3x4	Bench Press	2x2
Deadlift	3x5	Deadlift	3x4	Deadlift	2x2
Week 12					
Monday		Wednesday		Friday	
Power, 40%		*PAT, 85% & 40%*		*PAT, 50% & 50%*	
Squat	3x5	Squat 85%	1x5	Squat 50%	1x1
Bench Press	3x5	Bench Press 85%	1x5	Bench Press 50%	2x4
		Bench Press 40%		Bench Press 50%	
Deadlift	3x5	85%	1x5	50%	1x1
		Bench Press 40%		Bench Press 50%	
			3x5	50%	2x4
		Deadlift 85%	1x5	Deadlift 50%	1x2
		Deadlift 40%	3x5	Deadlift 50%	2x4

RESULTS

Significant ($p < 0.05$) group by time interactions were present for squat 1RM (PLA: +15.8 kg; AES: +28.0 kg), vertical jump peak power (PLA: +192.9 W; AES +401.9 W), and peak velocity (PLA: +0.15 m/s; AES: +0.45 m/s) from pre to post supplementation. Significant group by time effects ($p < 0.05$) were observed for total strength (squat 1RM + bench 1RM + deadlift 1RM), in which there were no effects from pre to post, yet AES increased to a greater extent than PLA from weeks 4 to 10 (PLA: +2.1 kg, AES: +22.3 kg), weeks 4 to 12 (PLA: +11.0 kg, AES: +37.3 kg), and weeks 8 to 12 (PLA: +3.4 kg, AES: +18.3 kg). Significant group by time interactions ($p < 0.01$) were observed for CSA (PLA: -0.08 cm2; AES: +1.07 cm2) and MT (PLA: +0.05 cm; AES: +0.49 cm) from pre to post supplementation. No significant group by time interactions were observed for bench press power or 1RM ($p > 0.05$).





* Significantly different from PLA ($p < 0.05$)

CONCLUSIONS

The present findings suggest that AES may improve lower body strength and power adaptations and increase muscle hypertrophy within the context of a periodized 12-week resistance training program.

PRACTICAL APPLICATIONS

Athletes and recreationally active populations may benefit from supplementation with the product used in this investigation, particularly if they seek to augment increases in lower body strength, power, and hypertrophy while participating in a structured resistance training program.

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