A Novel, ATP-Enhancing Supplement Improves Strength, Power, and Body Composition Following a 12 Week Periodized Resistance Training Program

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Background

Adenosine 5'-triphosphate (ATP) is primarily known as a cellular source of energy. Increased ATP levels have the potential to enhance athletic performance, and one novel supplement has been reported to enhance mitochondrial ATP production.

Purpose

Therefore, the purpose of this investigation was to determine the effects of this supplement on body composition and athletic performance when used in conjunction with 12 weeks of supervised, periodized resistance training.

Methods

25 healthy, resistance-trained, male subjects (27.7±4.8y; 176.0±6.5cm; 83.2±12.1kg) completed this study. Subjects supplemented once daily with either 1 serving (150mg) of a proprietary blend of ancient peat and apple extracts (TRT) or an equal-volume, visually-identical placebo (PLA) 45 minutes prior to training or at the same time of day on rest days. Supervised resistance training consisted of 8 weeks of daily undulating periodized training followed by a 2 week overreach and a 2 week taper phase. Body composition was analyzed using dual emissions x-ray absorptiometry (DEXA), ultrasound, and bio-electric impedance analysis (BIA). Strength was determined using 1-repitition-maximum (1RM) testing in the barbell back squat, bench press (BP), and deadlift exercises. Power was determined using a linear force transducer during BP at 30% 1RM and vertical jump (VJ) tests as well as a 30s Wingate test. Measurements were conducted at weeks 0, 4, 8, 10, and 12.

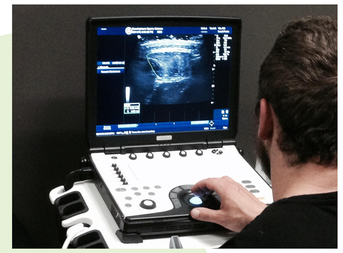
Variable	Group	Pre	Week 4	Week 8	Week 10	Post	p
Squat 1RM (kg)	PLA	142.8±22.9	153.7±27.1	159.5±25.4	156.1±22.4	158.6±20.9	0.001
	TRT	136.4±25.5	144.6±25.8	152.1±26.9	152.6±28.5‡	156.5±27.7*†	
Bench Press 1RM (kg)	PLA	121.5±21.7	127.9±18.1	129.1±18.0	127.5±15.9	131.4±15.0	0.68
	TRT	107.5±17.8	111.4±17.9	116.1±17.5	116.6±17.6	118.9±17.6	
Deadlift 1RM (kg)	PLA	174.4±28.3	187.0±26.1	187.6±26.2	187.6±26.2	189.6±24.6	0.008
	TRT	158.1±25.3	167.2±21.8	176.1±18.8‡	178.8±20.0‡	183.6±19.1*†‡	
Total Strength (kg)	PLA	438.6±66.3	468.6±65.3	476.2±63.9	470.7±54.9	479.6±52.1	0.009
	TRT	401.9±59.1	423.2±57.0	444.3±54.7‡	448.0±57.7‡	458.9±55.6*†	
BP Peak Power (W)	PLA	679.5±123.4	734.2±105.8	748.4±96.3	744.0±85.8	754.5±103.1	0.91
	TRT	636.9±99.4	671.5±106.2	697.5±104.1	708.3±113.8	705.7±109.9	
BP Peak Velocity (m/s)	PLA	1.94±0.17	1.92±0.17	1.95±0.16	1.95±0.18	1.98±0.15	0.13
	TRT	2.01±0.16	2.02±0.11	2.04±0.10	2.02±0.12	2.01±0.14	
VJ Height (in)	PLA	23.2±3.1	24.3±3.1	24.0±2.9	23.8±3.2	24.5±3.5	0.18
	TRT	24.5±2.8	24.8±2.7	24.9±2.9	25.3±2.7	25.7±2.6	
VJ PP (W)	PLA	2743.1±445.6	2928.6±503.0	2951.8±431.3	2856.6±363.8	2936.0±412.1	0.04
	TRT	2821.0±552.8	2947.4±561.0	2918.4±483.1	3050.6±494.7‡	3074.8±567.8‡	
VJ PV (m/s)	PLA	3.30±0.28	3.45±0.31	3.47±0.28	3.35±0.40	3.45±0.32	0.002
	TRT	3.44±0.28	3.52±0.23	3.46±0.18	3.58±0.22‡	3.54±0.23	
WAnT Peak Power (W)	PLA	1028.8±198.1	972.5±181.9	979.8±172.5	933.4±187.8	985.3±241.5	0.060
	TRT	1089.6±171.1	1055.5±166.2	1066.8±131.4	1099.8±192.0	1092.3±233.1	
WAnT Average Power (W)	PLA	703.5±77.2	687.9±83.9	705.2±108.8	692.1±103.4	685.9±116.0	0.22
	TRT	730.4±87.1	699.7±97.2	740.6±85.5	747.3±90.0	748.1±114.8	
WAnT Watt:Mass	PLA	8.3±0.7	8.0±0.6	8.2±0.9	8.0±1.2	7.6±0.9	0.054
	TRT	8.8±1.2	8.3±1.2	8.7±1.0	8.9±1.0	9.0±1.5	
WAnT Average Speed (km/h)	PLA	58.3±2.4	57.8±2.7	58.2±4.0	57.9±3.9	57.7±3.8	0.32
	TRT	59.1±2.8	57.2±4.8	59.4±2.7	59.2±3.0	59.6±3.4	

* indicates significant change vs PLA from pre
† indicates significant change vs PLA from week 4
‡ indicates significant change vs PLA from week 8
Φ indicates different from PLA at corresponding time point

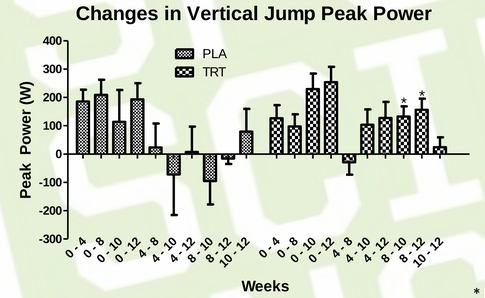
Results

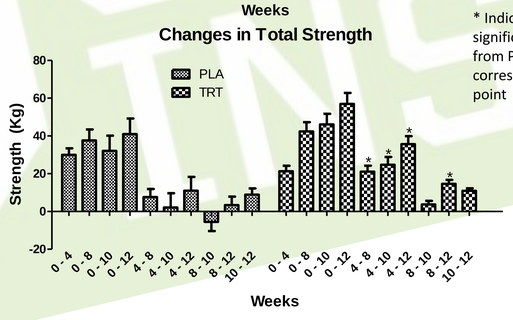
A group x time interaction ($p<0.05$) was present for cross-sectional area (CSA) of the rectus femoris, muscle thickness (MT) of the vastus lateralis and vastus intermedius, squat and deadlift 1RM, and VJ peak power (PP) and velocity (PV). CSA increased to a greater extent in TRT versus PLA from pre to post (TRT: +0.91; PLA: +0.11cm^2); MT increased to a greater extent in TRT versus PLA from pre to post (TRT: +0.46; PLA: +0.05cm); squat 1RM increased in TRT versus PLA from pre to post (TRT: +20.1; PLA: +15.8kg) as did deadlift 1RM (TRT: +25.4; PLA: +15.2kg); and VJ PV increased in TRT versus PLA from pre to week 10 (TRT: +0.15; PLA: +0.05m/s) as did VJ PP (TRT: +229.6; PLA: +113.5W) which also increased from pre to post (TRT: +253.8; PLA: +192.9W). No significant interactions were observed for DEXA or BIA-determined lean body mass, fat mass, or percent body fat, BP PP or PV, BP 1RM, or Wingate-determined PP, average power, watt:mass, or average speed, yet Wingate PP ($p=0.059$) and watt:mass ($p=0.054$) tended to favor the TRT group.

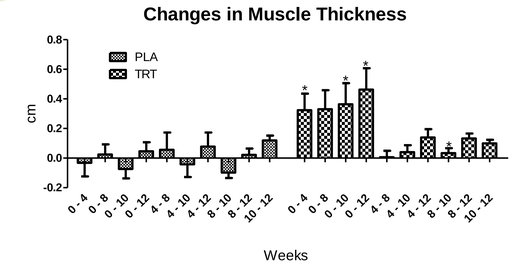
Variable	Group	Pre	Week 4	Week 8	Week 10	Post	p
CSA (cm^2)	PLA	3.60±1.57	3.85±1.49	3.73±1.32	3.61±1.27	3.52±1.39	<0.001
	TRT	4.07±1.52	4.24±1.4	4.52±1.41*	4.66±1.50*	4.99±1.63*	
MT (cm)	PLA	5.50±0.72	5.47±0.50	5.53±0.74	5.43±0.66	5.55±0.68	0.001
	TRT	5.25±0.73	5.58±0.63	5.58±0.68	5.62±0.65*	5.71±0.68*	
FT (cm)	PLA	0.52±0.20	0.49±0.19	0.53±0.19	0.48±0.18	0.53±0.16	0.83
	TRT	0.40±0.39	0.43±0.45	0.46±0.47	0.39±0.33	0.45±0.41	
LST (kg)	PLA	65.3±8.1	65.2±6.5	65.7±6.6	66.2±6.8	65.5±6.9	0.75
	TRT	67.4±6.2	68.0±6.2	68.4±6.0	69.3±6.2	67.8±5.4	
FM (kg)	PLA	16.7±5.6	18.6±6.3	18.4±6.6	18.5±6.9	18.5±6.5	0.47
	TRT	13.4±10.3	14.2±9.8	14.5±9.6	14.6±10.1	15.1±9.8	
BF%	PLA	20.1±5.4	21.8±5.5	21.4±5.8	21.3±5.9	21.6±5.7	0.37
	TRT	15.5±8.0	16.3±7.5	16.5±7.4	16.3±7.4	17.2±7.7	
Body Weight (kg)	PLA	83.7±10.5	86.3±10.6	86.1±11.5	87.3±12.1	86.4±11.7	1.00
	TRT	82.8±13.6	85.2±13.6	85.2±14.0	85.9±13.8	85.3±13.5	
R Leg LST (kg)	PLA	10.6±1.7	10.9±1.9	10.9±1.5	11.2±1.7	10.9±1.3	0.39
	TRT	11.3±1.1	11.5±1.2	11.7±1.1	11.6±1.2	11.5±1.1	
L Leg LST (kg)	PLA	10.5±1.5	10.8±1.7	10.8±1.4	11.1±1.6	10.7±1.1	0.35
	TRT	11.1±1.1	11.3±1.2	11.4±1.1	11.4±1.0	11.3±0.9	
R Arm LST (kg)	PLA	4.7±0.6	4.5±0.5	4.3±0.5	4.2±0.5	4.1±0.5	0.84
	TRT	4.8±0.7	4.6±0.7	4.3±0.5	4.4±0.6	4.2±0.7	
L Arm LST (kg)	PLA	4.5±0.5	4.5±0.4	4.1±0.5	4.0±0.4	4.0±0.5	0.61
	TRT	4.5±0.7	4.4±0.7	4.0±0.5	4.1±0.6	4.1±0.7	
Trunk LST (kg)	PLA	30.8±4.3	30.2±2.9	31.2±3.4	31.5±3.5	31.6±4.6	0.27
	TRT	31.3±3.2	31.8±3.5	32.5±3.9	33.7±4.2	30.4±8.4	



* Indicates significantly different from PLA at the corresponding time point







Conclusions

Supplementing with the tested proprietary blend of ancient peat and apple extracts while participating in periodized resistance training may enhance body composition and performance adaptations. Additionally, the supplement may protect against the performance decrements associated with overreaching. A lack of effect for upper body performance and whole-body muscle measurements suggest the performance benefits of supplementation may be due to increased muscle hypertrophy of the lower body, which is more likely due to training than a localized effect of the supplement.

Practical Applications

This proprietary blend of ancient peat and apple extracts may be used by athletes to enhance strength, power, and muscular hypertrophy adaptations to resistance exercise. The supplement can also be used during training camps or other periods of intense, high-volume exercise to prevent symptoms of overreaching, such as reduced power output.

References

- Wilson, J. M., Joy, J. M., Lowery, R. P., Roberts, M. D., Lockwood, C. M., Manninen, A. H., ... & Rathmacher, J. A. (2013). Effects of oral adenosine-5'-triphosphate supplementation on athletic performance, skeletal muscle hypertrophy and recovery in resistance-trained men. *Nutr Metab (Lond), 10*(1), 57.
- Rathmacher, J. A., Fuller Jr, J. C., Baier, S. M., Abumrad, N. N., Angus, H. F., & Sharp, R. L. (2012). Adenosine-5'-triphosphate (ATP) supplementation improves low peak muscle torque and torque fatigue during repeated high intensity exercise sets. *Journal of the International Society of Sports Nutrition*, *9*(1), 48.
- Jordan, A. N., Jurca, R. A. D. I. M., Abraham, E. H., Salikhova, A. N. N. A., Mann, J. K., Morss, G. M., ... & Earnest, C. P. (2004). Effects of oral ATP supplementation on anaerobic power and muscular strength. *Medicine and science in sports and exercise*, *36*(6), 983-990.

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