# EFFECTS OF 28 DAYS OF TWO CREATINE NITRATE BASED DIETARY SUPPLEMENTS ON BENCH PRESS POWER IN RECREATIONALLY ACTIVE MALES

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## Abstract

**Background:** Athletes use ergogenic aids in an attempt to increase training-adaptations, which serves to enhance their performance during competition. Creatine monohydrate is one of the most studied ergogenic aids. Although many studies have reported the efficacy and effectiveness of creatine monohydrate supplement manufacturers continually introduce newer forms of creatine into the market place. The newer forms of creatine purport to be more effective than creatine monohydrate alone. However, there is little evidence to support the manufacturers' claim.

**Methods:** We examined 28d of randomly assigned (1) Placebo (PL), (2) Creatine monohydrate (CrM, 3 g), (3) creatine nitrate (CrN; 1 g CrM; 0.5 g N) and (4) CrN2X (2 g CrM; 1.0 g N) on bench press performance. Participants (N=48; 21±3 yrs) presented for fasting (12h) testing after abstaining from exercise and alcohol for 48h. Performance (reps at 70% of bench press 1 RM) was measured using Tendo Fitrodyne at 0 & 28d and analyzed by MANOVA or one-way ANOVA. Mean changes (95% CI) were reported.

**Results:** We previously reported (*FASEB J, 29(1):LB248, 2015*) that all treatment groups increased bench press repetitions after 28d of supplementation; however, total work (reps x weight lifted) during bench press was greater at 28d for CrN2X (294.6 lbs; 95% CI, 196, 393) vs. CrN (164.2 lbs; 95% CI, 25, 304) and PL (187.1 lbs; 95% CI, 37, 336, both P= 0.02). MANOVA univariate analysis of power data indicated a significant time effect with all power output variables (i.e., peak power [PP], average power [AP], and average velocity [AV]). No significant group by time effects were observed among groups. One-way ANOVA of the 3rd set of exercise performed to exhaustion revealed no significant differences among groups in changes from baseline after 28d of supplementation. However, pairwise comparison of 95% CI's revealed a significant difference in peak power and average power between CrN2X (522.8 W; 95% CI, 473.5, 572.2) and PL (422.9 W; 95% CI, 386.6, 499.1, P=0.037) and CrN2X (470.3 W; 95% CI 422.1, 518.5) and PL (386.1 W; 95% CI, 331.1, 441.0, P=0.025), respectively. Average power was also significantly different between CrN2X (470.3 W; 95% CI 422.1, 518.5) and CrN (384.0 W; 95% CI, 335.8, 432.2, P=0.014). Average velocity during bench press test was significantly different between CrN (0.629 m/s; 95% CI, 0.572, 0.686) and PL (0.525 m/s; 95%, 0.460, 0.590, P=0.02).

**Conclusion:** Results suggest some ergogenic value of consuming these types of creatine containing pre-workout supplements on bench press power adaptations during training in comparison to PL responses.

*Supported by Nutrabolt (Bryan, TX)*

## Statistical Analysis

Data were analyzed by MANOVA or one-way ANOVA, using IBM SPSS for windows version 22.0 software (Chicago, IL). Mean changes (95% CI) were reported.

## Rationale

Athletes use ergogenic aids in an attempt to increase training-adaptations, which serves to enhance their performance during competition. Creatine monohydrate is one of the most studied ergogenic aids on the market. Although many studies have reported the efficacy and effectiveness of creatine monohydrate supplement manufactures continually introduce newer forms of creatine into the marketplace. The newer forms of creatine purport to be more effective than creatine monohydrate alone. However, there is little evidence to support most claims.

## Methods & Procedures

**Participants**

- 48, apparently healthy recreationally active males (21sedentary women (21±3 yr) were recruited for this study.
- Participants were informed of experimental procedures and signed a consent statement in adherence with the human subject guidelines of Texas A&M University.
- Review of results from a standard medical exam and medical history was performed by a research RN for clearance to participate in the study.

**Testing Protocol**

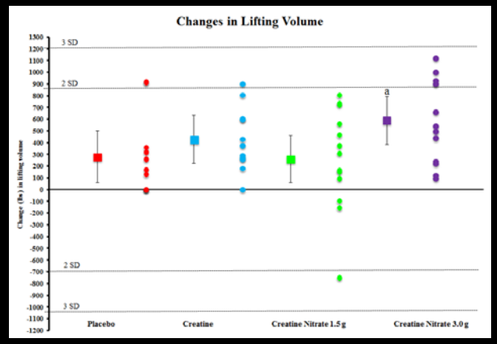
- Testing Session 1: Participants signed informed consent statement and completed physical exam. Performed 1 RM bench press test. The next testing session (baseline) occurred two weeks later.
- Testing Session 2: Muscle biopsy performed 24h prior to performance testing. Performance testing session measures included: 12h fasting blood sample, body composition (DXA), bench press test (3 sets of 10 reps @70% of 1RM, with total repetitions to failure on last set), and Wingate anaerobic sprint test (6 X 6 sprints with 30 second rest between sprints; 3 minute rest; then Wingate test). The next testing session occurred approximately one week later.
- Testing Session 3: Muscle biopsy performed, 12h hasting blood sample collected, and body composition (DXA) determined. The next testing session occurred three weeks later.
- Testing Session 4: Same procedures as testing session 2.

**Supplementation Protocol**

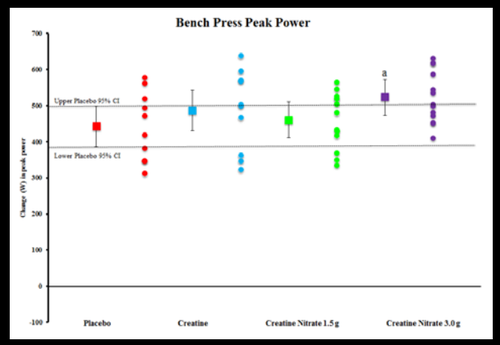
- Participants assigned to ingest: (1) Placebo (PL), (2) Creatine monohydrate (CrM; 3 g), (3) Creatine nitrate (CrN; 1 g CrM; 0.5 g N) and (4) Creatine nitrate 2X (CrN2X; 2 g CrM; 1.0 g N)
- Supplement was consumed with 8 oz. of water four times per day (at approximately 0800, 1200, 1600, 2000) on days one through seven. Then consumed supplement with 8 oz. one time per day for the remainder of the study (days eight through 28).

## Results

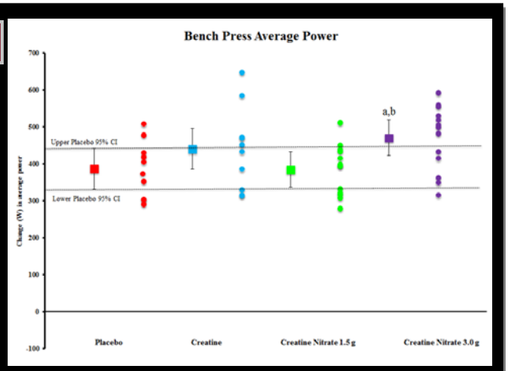
- Previously reported (*FASEB J, 29(1): LB248, 2015*) that all treatment groups increased bench press repetitions after 28d of supplementation; however, total work during bench press was greater at 28d for CrN2X (294.6 lbs; 95% CI, 196, 393) vs. CrN (164.2 lbs; 95% CI, 25, 304) and PL (187.1 lbs; 95% CI, 37, 336, both P= 0.02).
- MANOVA univariate analysis of power data indicated a significant time effect with all power output variables (i.e., peak power [PP], average power [AP], and average velocity [AV]). No significant group by time effects were observed among groups.
- One-way ANOVA of the 3rd set of exercise performed to exhaustion revealed no significant differences among groups in changes from baseline after 28d of supplementation.
- Pairwise comparison of 95% CI's revealed a significant difference in peak power and average power between CrN2X (522.8 W; 95% CI, 473.5, 572.2) and PL (422.9 W; 95% CI, 386.6, 499.1, P=0.037) and CrN2X (470.3 W; 95% CI 422.1, 518.5) and PL (386.1 W; 95% CI, 331.1, 441.0, P=0.025), respectively.
- Average power was also significantly different between CrN2X (470.3 W; 95% CI 422.1, 518.5) and CrN (384.0 W; 95% CI, 335.8, 432.2, P=0.014). Average velocity during bench press test was also significantly different between CrN (0.629 m/s; 95% CI, 0.572, 0.686) and PL (0.525 m/s; 95%, 0.460, 0.590, P=0.02).



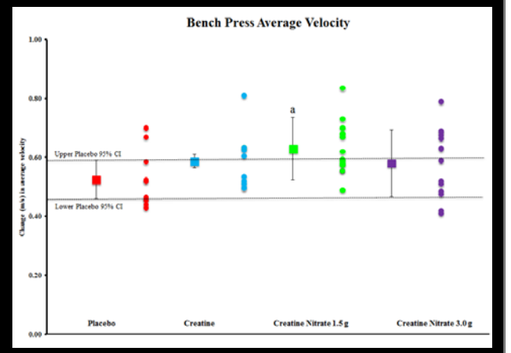

*Significantly different (p < 0.05) from PL and CrN 1.5 g (previously reported)




a = Significantly different (p < 0.05) from PL




a = Significantly different (p < 0.05) from PL
b = Significantly different (p<0.05) from creatine nitrate 1.5 g




a = Significantly different (p < 0.05) from PL

## Conclusion & Application

- Results suggest some ergogenic value of consuming these types of creatine containing pre-workout supplements on bench press power adaptations during training in comparison to PL responses.
- This type of supplement may lead to greater training-adaptations when combined with an appropriate resistance-training program.

## Acknowledgements & Disclosure

This study was supported by Nutrabolt (Bryan, TX). through a research grant provided to Texas A&M. Results do not constitute endorsement of the products studies. CP Earnest serves as a Research Director for Nutrabolt and is a Research Associate in the ESNL. RB Kreider serves as a university approved scientific advisor for Nutrabolt. PS Murano serves as quality assurance supervisor.