

Seven Days of High and Low Dose Creatine Nitrate Supplementation I: Hepatorenal, Glucose, and Muscle Enzyme Function

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Abstract

Background Creatine and nitrates are popular dietary supplements. While both have been examined in singularity, little is known regarding their co-ingestion relative to performance, side effects and safety. The purpose of this study was to examine the safety and efficacy of a creatine nitrate dietary supplement.

Methods In a double-blind, crossover, randomized and placebo-controlled manner; 28 apparently healthy and recreationally active men and women (18 men, 10 women, 21.6±3.7 yr, 20.4±10.6% fat, 24.7±2.9 kg/m²) ingested daily supplements for 7-d consisting of a dextrose flavored placebo (PLA); a low dose of creatine nitrate (Low, 3g) and a high dose of creatine nitrate (High, 6g). Participants repeated the experiment with the alternate supplements randomly with a 7 day washout period between each. Participants had each blood donation after 8+ hours fasting on days 1, 2, 6, and 7 for each supplement. Data were analyzed by repeated measure 4 x 3 MANOVA with Time and Group as factors using Greenhouse-Geisser as appropriate and are presented as mean±SD or mean change from baseline ± 95% CI.

Results Significant time effects (p<0.001) were observed for blood urea nitrogen (BUN), alkaline phosphatase (ALP), LDL cholesterol (LDL), triglycerides (TRI), and glucose (GLU) (p<.01). Significant group x time interactions were found for creatinine (p<.05). No significant differences for time, group, or interactions were found for aspartate amino transferase, and alanine amino transferase, for total cholesterol, HDL cholesterol, creatine kinase, and lactate dehydrogenase (p>0.05). Respective blood values at Day1, Day2, Day6, and Day7 are: BUN (5.07±1.29, 5.00±1.47, 5.29±1.42, 5.26±1.49 mmol/L) with Day2 lower than days 6 & 7, ALP (80.43±22.19, 77.85±20.14, 81.10±21.35, 79.60±20.77 U/L) with Day2 lower than days 1 & 6, LDL (2.61±1.32, 2.53±1.17, 2.29±0.96, 2.35±0.96 mmol/L) with Day6 lower than days 1, 2, & 7, TRI (0.88±0.39, 0.81±0.31, 0.91±0.42, 0.83±0.33 mmol/L) with Day2 lower than days 1 & 6, GLU (5.05±0.48, 4.89±0.40, 4.96±0.54, 5.03±0.44 mmol/L) with Day2 lower than days 1&7, and mean changes for CRE (Day2 PLA: 1.60, 95% CI -2.00, 5.18, Day2 Low: -1.67, 95% CI -5.26, 1.92, Day2 High: 4.25, 95% CI 0.66, 7.84, Day6 PLA: -0.53, 95% CI -5.38, 4.33, Day6 Low: -3.37, 95% CI 8.22, 1.49, Day6 High: 7.58, 95% CI 2.72, 12.43, Day7 PLA: -1.13, 95% CI -5.32, 3.05, Day7 Low: -5.83, 95% CI -10.01, -1.65, Day7 High: 4.45, 95% CI 0.27, 8.64 μmol/L). Creatinine was found to be higher at Day2 for High compared Low and at Day6 and Day7 for High vs Low & PLA, creatinine increased over time for group High compared to PLA and Low, which did not change.

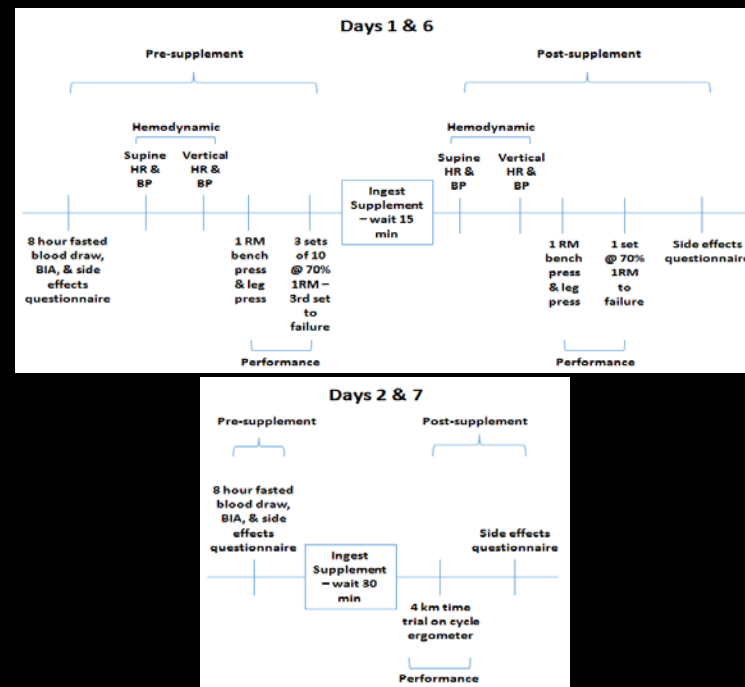
Conclusion Ingesting a creatine nitrate supplement demonstrated minor time x group interaction differences in CRE. However, these changes did not exceed normal clinical limits. This and the results observed for other clinical markers associated with hepatorenal and muscle enzyme function demonstrate that creatine nitrate appears to be safe when ingested for seven days.

Background

Creatine and nitrate supplements, individually, have been found to be both effective and safe dietary supplements. Few research studies have examined the effects of taking creatine and nitrates simultaneously. This study was designed to examine the safety and efficacy of a high and low dose creatine nitrate supplement taken over a seven day period.

Methods

- 28 apparently healthy and recreationally active men and women (18 men, 10 women, 21.6±3.7 yr, 20.4±10.6% fat, 24.7±2.9 kg/m²) participated in this study
- The first blood donation occurred after ~8 hours of fasting
- Participants ingested a supplement containing 3 g of creatine nitrate(Low), 6 g of creatine nitrate (High), or a flavored dextrose placebo (PLA) for 7 days with 7 days washout between each different supplement
- A variety of tests were conducted including heart rate, blood pressure, 1RM on bench press & leg press, and a 4 km time trial test. The study protocol is as follows:



- Blood samples were analyzed on a COBAS c111 for the following:
 - blood urea nitrogen (BUN) & creatinine
 - alkaline phosphatase (ALP), aspartate amino transferase (ALT), & alanine amino transferase (AST)
 - creatine kinase (CK) & lactate dehydrogenase (LDH)
 - total cholesterol (CHOL), HDL cholesterol (HDL), LDL cholesterol (LDL), & triglyceride (TRI)
 - glucose (GLU)

Statistical Analyses

Data were analyzed by MANOVA, using IBM SPSS for Windows version 22.0 software (Chicago, IL). Data are presented as changes from baseline as mean change; 95% confidence interval

Results

- Wilks' Lambda time (p<0.01) and time x group (p<0.01) interaction for BUN and Creatinine were found, but no group effects (p>0.05)
 - Greenhouse-Geisser univariate analysis revealed significant changes over time (p<0.01) for BUN and time x group interactions (p<0.05) for Creatinine
 - Significant changes x time between group High and groups Low and PLA were found for Creatinine
- Wilks' Lambda analysis revealed a significant time effect (p<0.01) for ALP, ALT, and AST, with no group or time x group interactions (p>0.05)
 - Greenhouse-Geisser univariate analysis revealed significant changes over time (p<0.01) for ALP
- Wilks' Lambda analysis revealed no significant time, group, or time x group effects (p>0.05) for CK and LDH
- Wilks' Lambda time (p<0.01), but no group or time x group effects (p>0.05) for CHOL, HDL, LDL, and TRI were discovered
 - Greenhouse-Geisser univariate analysis revealed significant changes over time (p<0.01) for LDL and TRI
- Significant time effects (p<0.01) for GLU were found, with no group or time x group interactions

Conclusions & Applications

- These findings demonstrated 6 g per day of creatine nitrate can induce changes in creatinine compared to 3 g and a placebo.
- These changes remained within normal limits
- No other differences between groups were found
- Further research is needed to verify safety with chronic usage

Acknowledgements & Disclosures

www.exerciseandsportnutritionlab.com

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Figures represent mean Δ with 95% confidence interval. *Indicates significant differences between lines

