The effect of creatine monohydrate supplementation on post exercise 24 hour blood pressure in healthy, young adults

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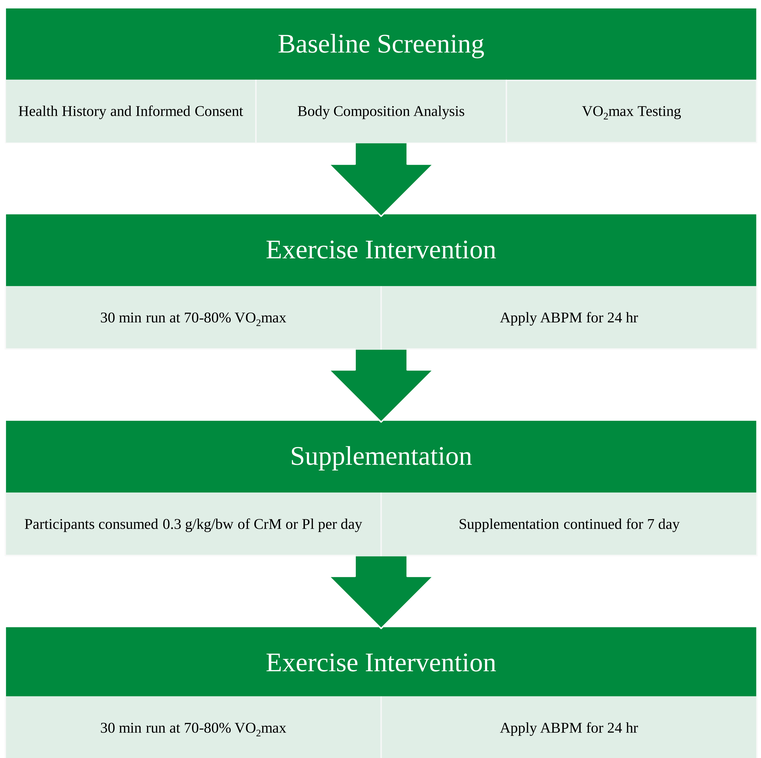
ABSTRACT

PURPOSE: The purpose of the study was to investigate the effects of creatine monohydrate (CrM) supplementation on post exercise 24 hr ambulatory blood pressure (BP) in healthy, young adults. **METHODS:** Participants were 10 males (21 ± 1.2 year) and 4 females (20.3 ± 0.47 year), with VO_2max values of 53.53 ± 4.6 ml/kg/min and 47.7 ± 2.9 ml/kg/min, respectively. Participants were divided into two groups: placebo (Pl) supplementation and CrM supplementation (CrS). Subjects attended a pre-supplementation (pre-s) and post-supplementation (post-s) exercise intervention that consisted of a 30 min run on a treadmill at 70-80% of VO_2max. Between the exercise interventions, participants consumed 0.3 g/kg of body weight/day of CrM or Pl supplement for 7 days. Following each exercise intervention, participants wore an ambulatory blood pressure monitor (ABPM) for 24 hr to collect blood pressure data. **RESULTS:** No significant time by condition interactions were found for systolic blood pressure, diastolic blood pressure, pulse pressure, mean arterial pressure, central systolic blood pressure, or central diastolic blood pressure. **CONCLUSION:** CrS has no noteworthy effect on BP in healthy, young adults. Different supplementation protocols may cause different results. More research into the effect of creatine on the cardiovascular system is needed.

INTRODUCTION

Creatine phosphate (CP) is one of the most basic energy stores found in skeletal muscle and is naturally formed in the body during protein metabolism (Kenney, Wilmore, & Costill, 2017). Increasing the level of CP stored in the body using creatine monohydrate (CrM) supplementation has been shown to increase muscular strength, hypertrophy, and power (Peeters, Lantz, & Mayhew, 1999). CrM supplementation (CrS) improves microvascular density and reactivity at the capillary level (De Moraes, Van Bavel, De Moraes, & Tibirica, 2014). Increases in microvascular density are associated with improved blood pressures due to the increase in overall cross sectional area of the blood vessels (Mourab, De Guetz, Debabby, & Levy, 2007). While the relationship between CrS and muscular strength and hypertrophy is well established, the effect of CrM on cardiovascular health is still not thoroughly understood. The purpose of the present study was to examine the effects of CrS on ambulatory blood pressure (ABP) in order to gain a better understanding of how creatine affects the cardiovascular system.

METHODS



RESULTS

Table 1.

Descriptive Statistics of Participants

Variable	Sex	*Mean*	*SD*
Age (year)	Male	20.8	1.2
	Female	20.5	0.5
Height (cm)	Male	182.6	5.0
	Female	168.3	7.7
Weight (kg)	Male	85.8	10.7
	Female	72.1	12.2
Body fat (%)	Male	12.4	4.8
	Female	29.8	5.9

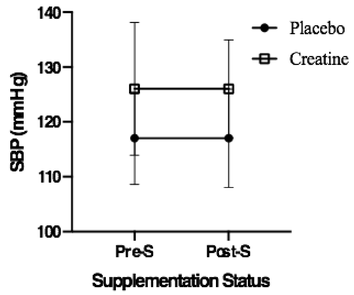


Figure 1. **SBP change after PS or CrS**

No significant time x condition difference was found in systolic blood pressure (SBP) with placebo supplementation (PS) (117 ± 8.38 mmHg pre-s vs 117 ± 8.94 mmHg post-s) or CrS (126 ± 12.07 mmHg pre-s vs 126 ± 8.91 mmHg post-s).

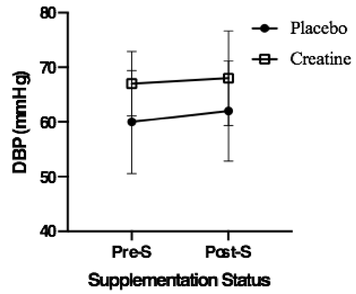


Figure 2. **DBP change after PS or CrS**

No significant time x condition difference was found in diastolic blood pressure (DBP) with PS (60 ± 2.97 mmHg pre-s vs 62 ± 3.37 mmHg post-s) or CrS (67 ± 2.97 mmHg pre-s vs 68 ± 3.37 mmHg post-s).

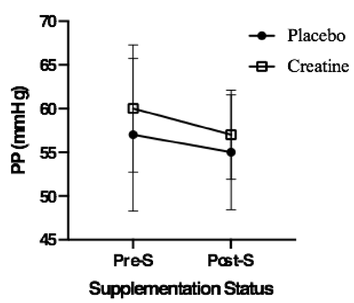


Figure 3. **PP change after PS or CrS**

No significant time x condition difference was found in pulse pressure (PP) with PS (57 ± 8.71 mmHg pre-s vs 55 ± 6.58 mmHg post-s) or CrS (60 ± 7.28 mmHg pre-s vs 57 ± 5.09 mmHg post-s).

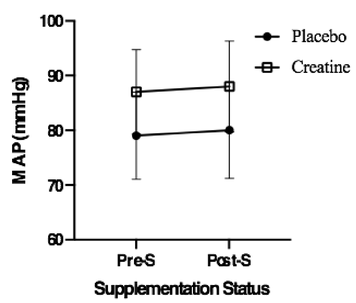


Figure 4. **MAP change after PS or CrS**

No significant time x condition difference was found in mean arterial pressure (MAP) with PS (79 ± 7.95 mmHg pre-s vs 80 ± 8.78 mmHg post-s) or CrS (86.57 ± 7.76 mmHg pre-s vs 88 ± 8.30 mmHg post-s).

RESULTS (Cont.)

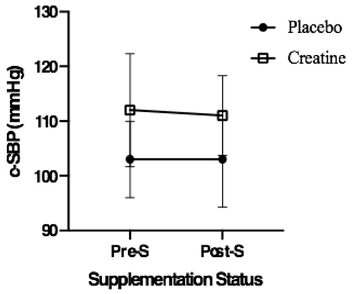


Figure 5. **c-SBP change after PS or CrS**

No significant time x condition difference was found in central systolic blood pressure (c-SBP) with PS (103 ± 6.99 mmHg pre-s vs 103 ± 8.75 mmHg post-s) or CrS (112 ± 10.33 mmHg pre-s vs 111 ± 7.31 mmHg post-s).

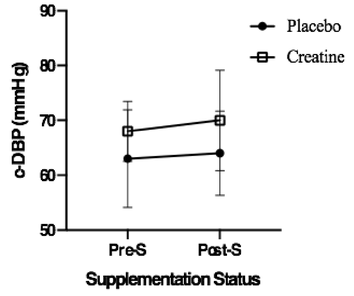


Figure 6. **c-DBP change after PS or CrS**

No significant time x condition difference was found in central diastolic blood pressure (c-DBP) with PS (63 ± 8.90 mmHg pre-s vs 64 ± 7.67 mmHg post-s) or CrS (68 ± 5.48 mmHg pre-s vs 70 ± 9.15 mmHg post-s).

CONCLUSION

There was no significant difference in SBP, DBP, PP, MAP, c-SBP, or c-DBP between CrM and Pl groups. De Moreas et al. (2014) reported that CrS lowered MAP after a one-week period. Creatine increases angiogenesis and creates greater microvascular density at the capillary level; researchers speculated that data to be the cause of the decrease in MAP (De Moraes et al., 2014).

Other researchers have reported no effects on BP due to CrS (Mihic, Macdonald, McKenzie, & Tarnopolsky, 2000). Mihic et al. (2000) speculated that BP would increase following CrS due to the increase of total body mass (TBM). Increased TBM is a well-established effect of CrS (Mihic et al., 2000). TBM is associated with water retention; the increase in BP is speculated to be produced by an increase in cardiac preload if the fluid enters the intravascular space (Coresh et al. 2001).

More research into the effect of creatine on the cardiovascular system is needed. Understanding the physiological mechanisms that link creatine and angiogenesis may lead to the need for testing different supplementation protocols. If there is a consistent increase in angiogenesis, there is a possibility that an increased dosage or supplementation period could elicit a significant change in BP that was not shown in the current study.

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