The Effect of Short-Term Creatine Monohydrate Supplementation on Exercise Performance and Recovery Throughout the Menstrual Cycle

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INTRODUCTION

Evidence suggests exercise performance and recovery can vary throughout the menstrual cycle[1]. Creatine supplementation has been shown to improve anaerobic performance and recovery; however, to date these outcomes have not been explored in females[2,3,4]. Creatine kinase fluctuates as estrogen concentrations change[5], supporting a potential for greater impact of creatine supplementation on females throughout different menstrual phases.

PURPOSE

To investigate the change in power related performance outcomes and recovery during a maximal anaerobic repeated sprint test after creatine monohydrate (CrM) loading throughout the menstrual cycle

PARTICIPANTS

Table 1. Mean ± Standard deviation of participant demographics

Supplement Group	Age (yrs)	Height (cm)	Weight (kg)
CrM (n=14)	25.9 ± 7.2	164.3 ± 6.0	65.9 ± 9.0
PL (n=15)	24.7 ± 4.5	167.5 ± 4.7	63.6 ± 11.2

Naturally cycling: CrM (n=10), PL (n=7)
Intrauterine Device: CrM (n=1), PL (n=5)
Monophasic Oral Contraceptive: CrM (n=3), PL (n=3)

PRACTICAL APPLICATION

Creatine supplementation may be most optimal in the luteal phase to counteract possible performance decrements

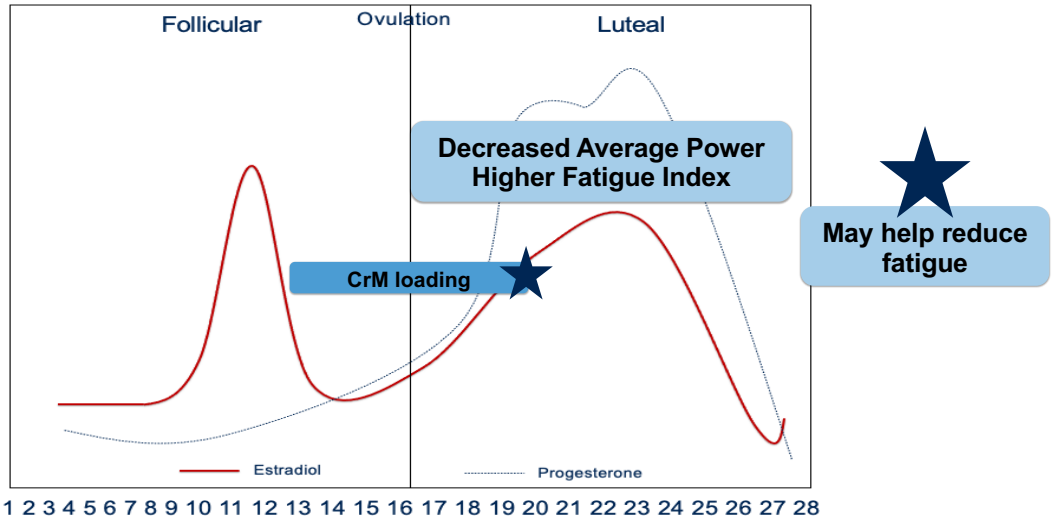

Figure 4. Idealized menstrual cycle modified to demonstrate potential benefits of CrM loading in different phases of the menstrual cycle.

METHODS

Measurements were conducted 5 times – baseline familiarization, followed by a pre- and post-supplementation visit in randomized phase order of follicular (FP) and luteal (LP) phases, with a minimum of a 4-week washout between supplementation treatments.

Creatine Supplementation: Participants were randomized to a CrM or a non-caloric placebo (PL) group (4 × 5 g for 5 days).

Repeated sprint cycling test: Participants completed a sprint test consisting of 10 six second maximal sprints with 30 seconds of rest on a friction-loaded cycle ergometer with resistance adjusted to 65 g/kg of body mass

CONCLUSION

While no significant differences were seen between phase and treatment, mean improvements in AP and FI were seen post-supplementation in the LP in the CrM group compared to the PL group. Both groups displayed greater PP in the LP regardless of supplement, however the CrM supported a greater increase in PP.

REFERENCES

[1] Gualano B, Roschel H, Lancha AH, Brightbill CE, Rawson ES. In sickness and in health: The widespread application of creatine supplementation. *Amino Acids*. 2012;43(2):519-529 **[2]** Bird SP. Creatine supplementation and exercise performance: A brief review. J Sport Sci Med. 2003;2(4):123-132. **[3]** Cooke WH, Grandjean PW, Barnes WS. Effect of oral creatine supplementation on power output and fatigue during bicycle ergometry. J Appl Physiol. 1995;78(2):670-673. **[4]** Rawson ES, Gunn B, Clarkson PM. The Effects of Creatine Supplementation on Exercise-Induced Muscle Damage. J Strength Cond Res. 2001;15(2):178-184 **[5]** Smith-Ryan AE, Cabre HE, Eckerson JM, Candow DG. Creatine supplementation in women's health: A lifespan perspective. Nutrients. 2021;13(3):1-17.

RESULTS

Table 2. Mean ± Standard Error for Total Average Power, Fatigue Index, Peak Power and Time to Peak Power for pre-and post-supplementation in FP and LP, separated by supplement group

	Creatine (n=19)				Placebo (n=20)			
	Follicular pre	*Follicular post*	*Luteal pre*	*Luteal post*	*Follicular pre*	*Follicular post*	*Luteal pre*	*Luteal post*
Total Average Power (W)	3160.5 ± 246.5	5116.5 ± 5	2372.5 ± 319.0	2553.3 ± 336.8	2874.2 ± 241.2	2835 ± 1190.7	2845.4 ± 310.9	3017.2 ± 328.3
Fatigue Index(%)	29.2 ± 2.6	30.3 ± 2.6	37.9 ± 4.7	30.3 ± 3.5*	27.5 ± 2.4	23.8 ± 2.6	27.6 ± 4.4	27.3 ± 3.3
Peak Power (W)	492.9 ± 21.9	508.1 ± 21.7	484.8 ± 25.0	520.6 ± 22.1	484.0 ± 21.2	488.8 ± 20.4	484.5 ± 24.1	494.6 ± 21.4
Time to Peak Power (ms)	1663.5 ± 181.6	2265.6 ± 207.3	1937.1 ± 159.7	2141.2 ± 239.0	1782.5 ± 175.5	2269.7 ± 200.2	2001.7 ± 154.3	2310.9 ± 230.9

indicates statistical significance from pre- to post-supplementation ($p \leq 0.005$) . Values from larger sample size after study completion

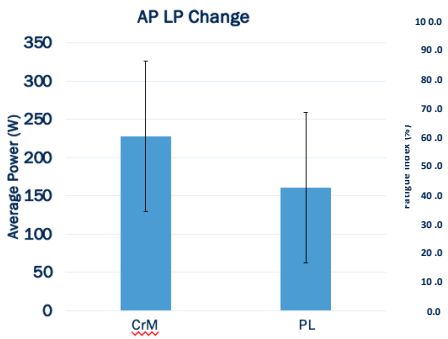

Figure 1. Average Power Change in the LP between CrM and PL groups

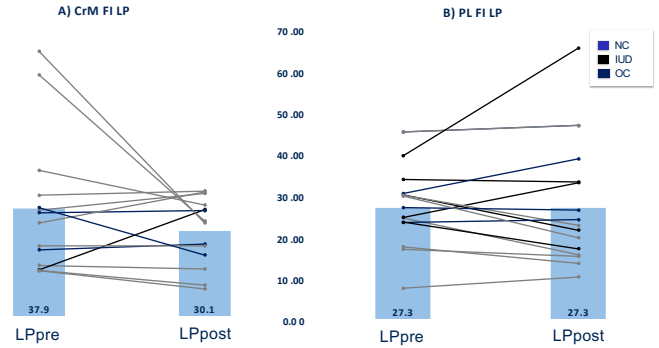

Figure 2. Fatigue Index from LPpre to LPpost in the A) CrM and B) PL groups