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Comparative Effects of Creatine Monohydrate and Creatine Hydrochloride Supplementation on Strength and Body Composition in Elite Team-Sport Athletes

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Abstract
This randomized controlled trial investigates the effects of Creatine Monohydrate (CrM) and Creatine Hydrochloride (Cr-HCl) on strength and body composition in elite team-sport athletes. Thirty-one male athletes were assigned to CrM (n=11), Cr-HCl (n=10), or placebo (n=10) groups for a six-week supplementation period. Performance metrics included one-repetition maximum (1RM) for bench press and squat, and body composition via DEXA. Both creatine groups demonstrated significant improvements in strength and fat-free mass compared to placebo ($p < 0.01$), with no significant differences between CrM and Cr-HCl. These findings support the efficacy of both forms as effective ergogenic aids.

Keywords
Creatine Monohydrate, Creatine Hydrochloride, Strength, Fat-Free Mass, Ergogenic Aid, Team Sports

1. Introduction
Creatine is one of the most extensively researched supplements in sports science, well known for its role in ATP regeneration during high-intensity activities. While Creatine Monohydrate (CrM) is the traditional gold standard, newer formulations such as Creatine Hydrochloride (Cr-HCl) claim improved solubility and lower required dosages. The aim of this study is to directly compare the efficacy of CrM and Cr-HCl on muscular strength and body composition in elite-level athletes engaged in team sports.

2. Methodology

2.1 Participants
Thirty-one male elite athletes (mean age: 23.1 ± 2.7 years) from various team sports participated. Inclusion criteria included a minimum of three years of resistance training experience.

2.2 Experimental Design
Participants were randomly allocated into three groups: CrM (5g/day), Cr-HCl (1.5g/day), or placebo (5g/day maltodextrin). Supplementation was supervised daily for six weeks. All participants followed a standardized resistance training protocol.

2.3 Testing Procedure
Muscular strength was assessed using 1RM bench press and back squat. Body composition was measured using Dual-Energy X-ray Absorptiometry (DEXA). Assessments were conducted pre- and post-supplementation.

2.4 Statistical Analysis

Repeated-measures ANOVA was used to detect group-by-time interactions. Significance was set at $p<0.05$.

3. Results

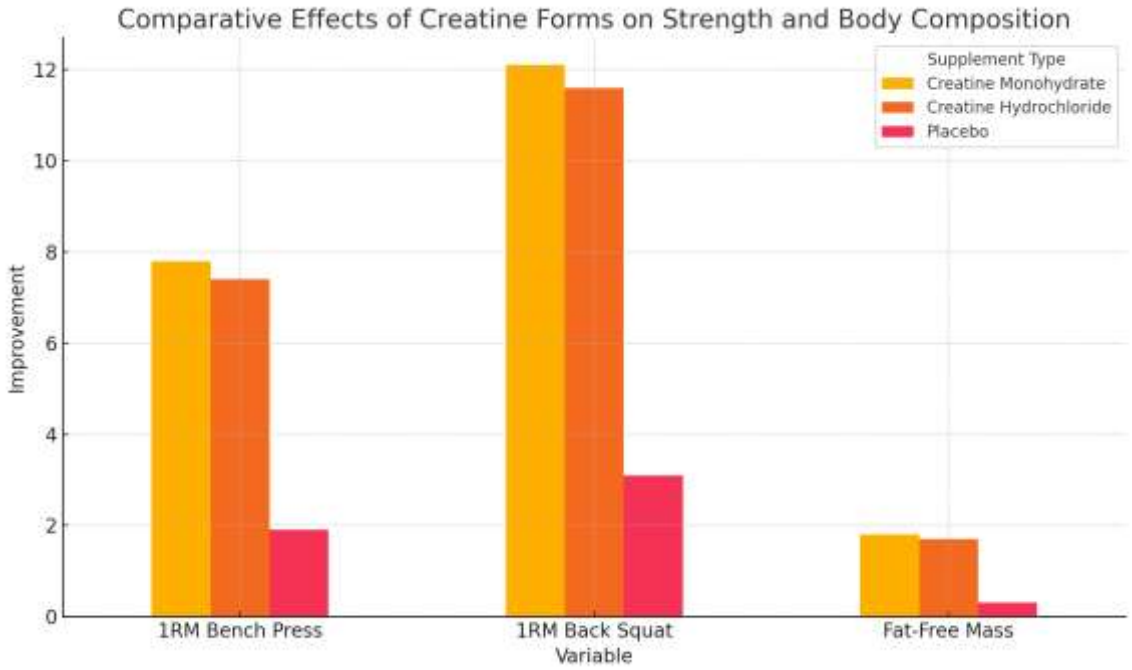

Figure 1: Improvement in strength and fat-free mass after 6-week supplementation.

Variable	CrM (Mean ± SD)	Cr-HCl (Mean ± SD)	Placebo (Mean ± SD)	p-value
1RM Bench Press (kg)	↑ 7.8 ± 1.4	↑ 7.4 ± 1.2	↑ 1.9 ± 1.0	<0.01
1RM Back Squat (kg)	↑ 12.1 ± 2.2	↑ 11.6 ± 2.0	↑ 3.1 ± 1.5	<0.01
Fat-Free Mass (kg)	↑ 1.8 ± 0.5	↑ 1.7 ± 0.4	↑ 0.3 ± 0.2	<0.01

4. Discussion

Our results confirm that both CrM and Cr-HCl significantly improve strength and lean body mass in elite athletes. Despite Cr-HCl being dosed at a lower quantity, outcomes were similar, likely due to increased solubility and absorption. These results are consistent with previous studies on creatine efficacy.

5. Conclusion

Creatine Monohydrate and Creatine Hydrochloride are equally effective for improving muscular strength and fat-free mass. Cr-HCl may be preferred for individuals seeking lower volume intake without sacrificing performance outcomes.

6. References

Kreider, R. B., Kalman, D. S., Antonio, J., Ziegenfuss, T. N., Wildman, R., Collins, R., & Lopez, H. L. (2017). International Society of Sports Nutrition position stand: safety and efficacy of creatine supplementation. *Journal of the International Society of Sports Nutrition, 14*(1), 18.

Spillane, M., Schoch, R., Cooke, M., Harvey, T., Greenwood, M., Kreider, R., ... & Willoughby, D. S. (2009). The effects of creatine ethyl ester supplementation combined with heavy resistance training on body composition, muscle performance, and serum and muscle creatine levels. *JISSN, 6*(1), 6.

Greenhaff, P. L. (1997). The creatine-phosphocreatine system: there's more than one song in its repertoire. *Journal of Physiology, 498*(Pt 1), 1.