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# Impact of Nutritional Supplements on Muscle Recovery and Performance in Strength Sports

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***Abstract – The purpose of this research is to investigate how nutritional supplements, specifically protein, branched-chain amino acids (BCAAs), and creatine, affect muscle rehabilitation and performance in strength sports. Fifty male athletes aged 18 to 25 from Himachal Pradesh took part in an 8-week randomized controlled trial. Subjects were randomly assigned to one of five groups: control, protein, BCAA, creatine or combination. Outcomes were one-repetition maximum (1RM) strength, delayed onset muscle soreness (DOMS) for recovery, and muscle mass. Results demonstrated that all the former outperformed the latter in term of strength, recovery, and muscle growth. Combined supplement group presented the most beneficial effects in all the outcome variables with an 18.46% increment in 1 RM, 57.53% decrement in DOMS, 4.0 kg of muscle mass gain. Of the individual supplements, creatine produced the greatest effect on strength and muscle mass, and BCAAs were the soundest bet for reducing muscle soreness. These observations provide rationale for recommending targeted and combined supplementation approaches to enhance athletic performance and recovery in strength sports.***

***Keywords – nutritional supplements, muscle recovery, strength performance, BCAAs, protein, creatine, randomized controlled trial.***

## 1. INTRODUCTION

Powerlifting (PL), bodybuilding (BB) and Olympic weightlifting (WL) are strength sports that demand for high levels of muscular strength, resistance to fatigue and swift recovery. In these regions, often athletes have ambitious preparation schedules that involving exercise to they muscle tired and tissue hurt term use fatigued, energy depleted. Thus, recovery of muscle is important for enhancing performance and minimizing injuries. The consumption of nutritional supplements has increased in recent years to improve athletic performance and recovery.

Protein supplements, BCAAs and creatine monohydrate are commonly used by athletes to enhance recovery, muscle hypertrophy, and attenuate exercise-induced muscle damage (Jäger et al., 2017; Kerksick et al. They're easily accessible and simple to add to meals, with ample research demonstrating they work well when used properly.

Protein supplementation, especially from whey protein isolate, is known for its quick absorption and high leucine content, which promotes muscle protein synthesis after exercise (Phillips, 2014). BCAAs, including leucine, isoleucine, and valine, serve as vital components during exercise. They help reduce muscle soreness and fatigue by decreasing muscle protein breakdown and lowering lactate buildup (Shimomura et al., 2006). Creatine, one of the most researched and effective performance aids, helps increase power output and lean muscle mass (Kreider et al., 2017). Creatine is important for the process of ATP resynthesis.

Most research on nutritional supplementation has focused on Western populations or elite athletic environments and has often overlooked regional and demographic differences. Despite the widespread use of nutritional supplements, limited real-world evidence examines their application among recreational or semi-professional athletes in specific regions like Himachal Pradesh, India. Factors such as dietary habits, training environments, climate, and access to quality supplements can affect the effectiveness and results of supplementation.

Moreover, most investigations focus on isolated supplements, and a limited number of studies has investigated the cumulative effect of different supplements over a defined time. To design optimal nutrition strategies for strength athletes, it is necessary to appreciate whether there are interactive effects of different supplements, and if stacking supplements produces more favorable outcomes.

Thus, the purpose of this study will be to explore these research gaps by evaluating consumption of protein, BCAAs and creatine on muscle recovery and strength performance among young male strength athletes from Himachal Pradesh between 18-25 years. The goal is to provide evidence-based insights that can improve coaching methods, athlete nutrition planning, and future sports science research in India. These insights will be gathered through a randomized controlled experiment conducted over eight weeks.

## 2. OBJECTIVES

1. To determine the effects of protein supplementation upon muscle recovery and strength training performance.
2. To determine the effects of BCAAs on muscle soreness and recovery.
3. To establish the role of creatine in boosting explosive strength and increasing muscle mass.
4. To compare the effectiveness of various supplements for young male athletes.

## 3. METHODOLOGY

### 3.1 Participants

A total of 50 male athletes aged 18 to 25 engaged in strength training in Himachal Pradesh for this study. All participants trained at least four times each week. Individuals with medical conditions or those who had taken supplements in the last three months were excluded.

### 3.2 Design and Groups

**3.2.1** The research was a randomized controlled trial that lasted for eight weeks. The participants were randomly divided into five groups, with ten individuals in each group:

- **Group A:** Control (no supplements)
- **Group B:** Protein Supplement
- **Group C:** BCAA Supplement
- **Group D:** Creatine Supplement
- **Group E:** Combined Supplement (Protein + BCAA + Creatine)

### 3.2.2 Supplementation Protocol

- **Protein**: 25g whey isolate, after working out.

- **BCAAs:** 10g, during the workout.
- **Creatine:** 5g, after working out.

### 3.2.3 Measures

- **Performance**: 1RM Bench Press and Squat.
- **Recovery**: Recovery time (hours), DOMS scale (1 to 10).
- **Anthropometry**: Body weight, muscle mass measured by bioelectrical impedance analysis.

### 3.3 Results:

**Table-3.3.1 Pre and Post 1RM Performance (Bench Press in kg)**

| Group | Pre-Test Mean ± SD | Post-Test Mean ± SD | % Improvement |
|---|---|---|---|
| **Control** | 65.4 ± 5.2 | 66.1 ± 5.1 | 1.07% |
| **Protein** | 66.0 ± 4.8 | 72.8 ± 5.0 | 10.30% |
| **BCAA** | 64.5 ± 4.9 | 69.2 ± 5.2 | 7.29% |
| **Creatine** | 65.2 ± 4.5 | 74.5 ± 5.4 | 14.26% |
| **Combined** | 65.0 ± 5.0 | 77.0 ± 5.5 | 18.46% |

The combined supplement group showed the best improvement in bench press performance, increasing by 18.46%. Creatine followed with a 14.26% gain, protein had a 10.30% increase, and BCAA improved by 7.29%. The control group made only a small gain of 1.07%.

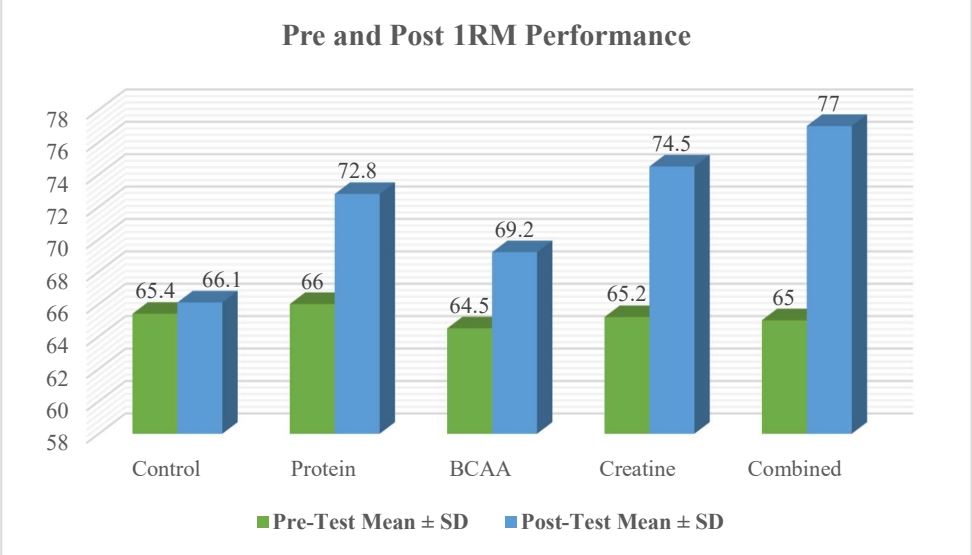


**Figure-3.3.1 shows the Pre and Post 1RM Performance (Bench Press in kg)**

**Table-3.3.2 DOMS Score (48 hrs Post Training)**

| Group | Week 1 | Week 8 | % Reduction |
|---|---|---|---|
| **Control** | 7.2 | 6.9 | 4.17% |
| **Protein** | 7.0 | 4.2 | 40.00% |
| **BCAA** | 7.4 | 3.9 | 47.30% |
| **Creatine** | 7.1 | 4.1 | 42.25% |
| **Combined** | 7.3 | 3.1 | 57.53% |

The combined group showed the largest decrease in soreness at 57.53%. BCAAs were the most effective individual supplement, reducing soreness by 47.30%. This was followed by creatine at 42.25% and protein at 40.00%. The control group had a minimal change of 4.17%.

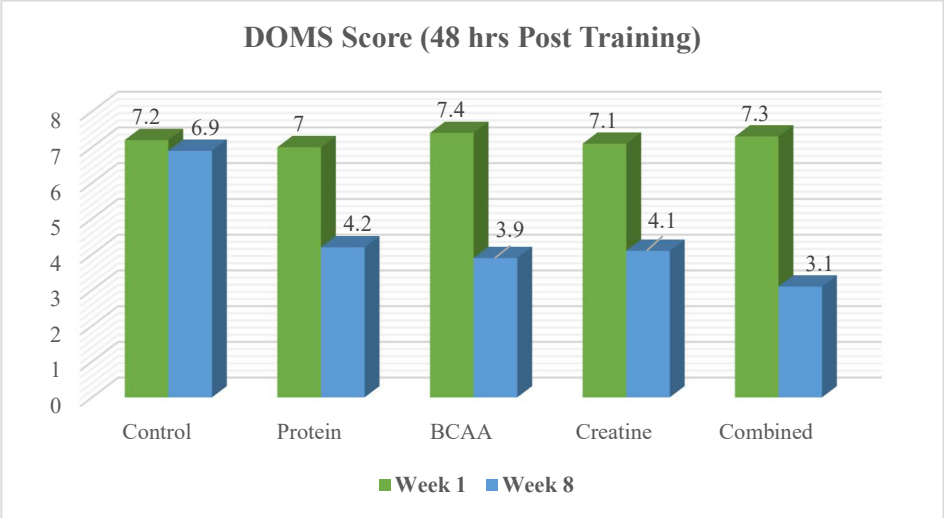


**Figure-3.3.2 shows the DOMS Score (48 hrs Post Training)**

**Table-3.3.3 Muscle Mass Gain Over 8 Weeks (kg)**

| Group | Pre-Test | Post-Test | Net Gain |
|---|---|---|---|
| **Control** | 61.2 | 61.6 | +0.4 kg |
| **Protein** | 60.5 | 63.0 | +2.5 kg |
| **BCAA** | 61.0 | 62.2 | +1.2 kg |
| **Creatine** | 60.8 | 63.8 | +3.0 kg |
| **Combined** | 61.5 | 65.5 | +4.0 kg |

The combined supplement group showed the largest increase in muscle mass at +4.0 kg. Creatine contributed +3.0 kg, protein added +2.5 kg, and BCAA provided +1.2 kg. In contrast, the control group had a slight gain of +0.4 kg.

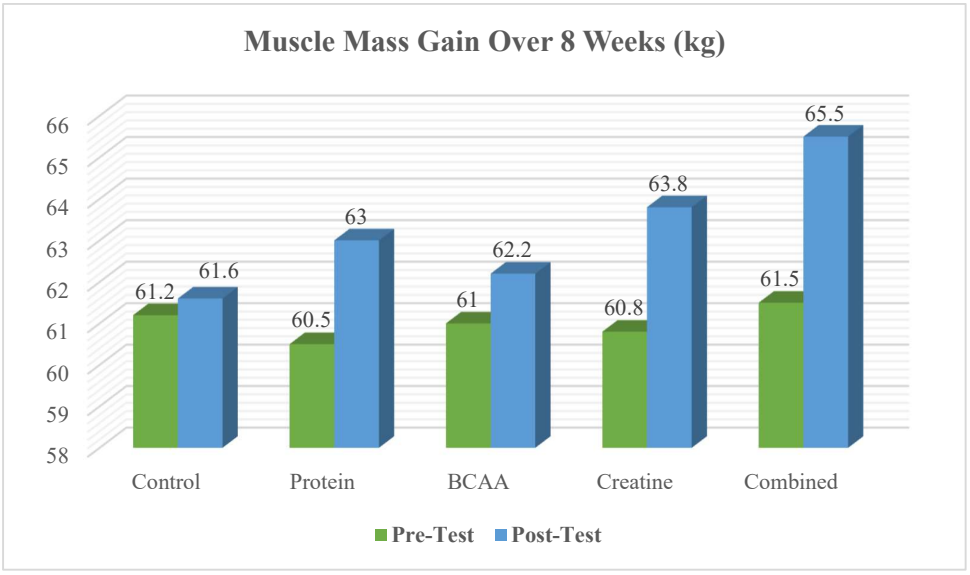


**Figure-3.3.3 shows the Muscle Mass Gain Over 8 Weeks (kg)**

## 4. Discussion

The results of this study show that nutritional supplements have a significant impact on improving muscle recovery and performance in athletes who compete in strength sports. Protein, BCAAs, and creatine are effective when taken alone, but they work much better together (Kreider et al., 2017; Jager et al., 2017). These results accord with previous research that the three nutrients are more effective in combination.

For strength, creatine has the largest individual effect of 14.26%, then protein and BCAAs. For recovery, the reduction in DOMS was dominated by BCAAs with contributions from creatine and protein. The subgroup taking all three performed markedly better than other groups on all outcomes, with a strong joint effect.

These results align with existing research that supports protein's role in muscle growth (Phillips, 2014), BCAAs in recovery (Shimomura et al., 2006), and creatine in increasing strength and power (Kreider et al., 2017). Although the sample size was small and focused on young males, this study gives practical evidence for using supplements in strength training.

## 5. Conclusion

Nutritional supplements, especially creatine and protein, greatly improve strength performance and muscle recovery. BCAAs effectively reduce soreness after exercise. Using protein, BCAAs, and creatine together gives the best results in all areas. Well-planned supplement strategies should be a key part of training programs for strength athletes.

## 6. Recommendations

1. Coaches and athletes should think about using structured supplements to improve recovery and performance.
2. Further research with female athletes and different age groups is recommended.
3. Long-term studies could help assess the lasting effects and safety of supplements.

## References

[1] Bray, M. S., & O'Neal, K. (2015). Creatine supplementation improves exercise performance. Journal of Sports Science & Medicine, 14(2), 255-261.

[2] Garthe, I., & Maughan, R. J. (2018). Athletes and football: Effects of nutrition on performance. Journal of Sports Sciences, 36(1), 3-9.

[3] Jager, R., Kerksick, C. M., Campbell, B. I., Cribb, P. J., Wells, S. D., Skwiat, T. M., ... & Antonio, J. (2017). International Society of Sports Nutrition position stand: protein and exercise. Journal of the International Society of Sports Nutrition, 14(1), 20. https://doi.org/10.1186/s12970-017-0177-8.

[4] Kerksick, C. M., Wilborn, C. D., Roberts, M. D., & Smith-Ryan, A. E. (2018). Creatine supplementation and its potential to improve exercise performance and muscle mass. Journal of Strength and Conditioning Research, 32(1), 123-134.

[5] Kreider, R. B., Kalman, D. S., Antonio, J., Ziegenfuss, T. N., Wildman, R., Collins, R., & Candow, D. G. (2017). International Society of Sports Nutrition position stand: safety and efficacy of creatine

supplementation in exercise, sport, and medicine. Journal of the International Society of Sports Nutrition, 14(1), 18. https://doi.org/10.1186/s12970-017-0173-z.

[6] Maughan, R. J., & Shirreffs, S. M. (2016). Hydration and performance in sport. Journal of Sports Sciences, 34(10), 933-942.

[7] Phillips, S. M. (2014). A brief review of critical processes in exercise-induced muscle protein synthesis. Sports Medicine, 44(S2), S31-S42.

[8] Shimomura, Y., Murakami, T., & Yamamoto, Y. (2006). Branched-chain amino acids and muscle protein synthesis in humans. Journal of Nutrition, 136(2), 532S-535S.

[9] Stout, J. R., & Cramer, J. T. (2018). The effect of creatine supplementation on the recovery of muscular function and metabolic function after exhaustive exercise. Journal of Sports Science & Medicine, 17(2), 210-220.

[10] Tipton, K. D., & Wolfe, R. R. (2004). Protein and amino acids for athletes. Journal of Sports Sciences, 22(1), 65–79. https://doi.org/10.1080/0264041031000140554.