

Effect of Nutritional Supplementation on Anthropometric Characteristics among Young Power Lifters: A Controlled Experimental Study

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Abstract

Background: Nutritional supplementation is widely practiced among athletes to enhance muscle development and performance. However, empirical evidence on its influence on anthropometric parameters among young athletes remains limited.

Objective: To investigate the effect of a commercial protein supplement, compared to a high-protein diet and a regular diet, on selected anthropometric measurements in young male power lifters.

Methods: Thirty male power lifters aged 18–20 years from Talwalkar’s Health Spa, Mumbai, were randomly assigned into three groups: (A) Normal Diet + Supplement (NSD), (B) High Protein–Fat Diet (HFP), and (C) Control (regular diet). All groups followed identical 12-week resistance training schedules. Measurements of Ponderal Index, Weight, Biacromial Breadth, Chest, Upper Arm, Thigh, and Calf Girths were taken pre- and post-intervention. Data were analyzed using ANOVA and ANCOVA at the 0.05 significance level.

Results: The NSD group exhibited the greatest gains in body weight ($F = 19.48, p < .05$), biacromial breadth ($F = 8.36, p < .05$), chest girth ($F = 6.44, p < .05$), thigh girth ($F = 20.40, p < .05$), and calf girth ($F = 29.28, p < .05$). No significant changes were observed in Crural Index, Upper Arm Length, or Forearm Length.

Conclusion: Combining a balanced diet with a commercial protein supplement significantly improves muscle girths and weight among young power lifters, demonstrating its potential as an effective nutritional strategy during strength training.

Keywords: Nutritional supplementation, Anthropometry, Power lifting, Protein intake, Muscle hypertrophy

Introduction

Nutrition plays a pivotal role in optimizing athletic performance, body composition, and recovery. Among athletes, protein supplementation has emerged as a common practice to accelerate muscular growth and enhance strength outcomes (Williams & Rollo, 2015). The global expansion of the supplement industry has made protein powders and amino acid formulations easily accessible, yet empirical validation of their efficacy—especially among young, developing athletes—remains essential.

The Dietary Supplements Health and Education Act (1994) defines dietary supplements as substances intended to augment the diet, encompassing vitamins, minerals, amino acids, and other compounds. Commercial protein supplements are frequently consumed by athletes to promote muscle hypertrophy (Kreider, 1999). Studies by Balsom et al. (1993) and Earnest et al. (1995) have shown improved lean body mass with creatine and protein supplementation. However, there remains a need to compare these effects with high-protein natural diets and standard nutrition among adolescent athletes.

This study aimed to examine whether a commercial protein supplement combined with a normal diet results in greater improvements in anthropometric parameters than a high-protein natural diet or regular diet in young power lifters undergoing structured strength training.

2. Methods

2.1 Participants

Thirty male power lifters aged 18–20 years were selected through random sampling from Talwalkar’s Health Spa, Mumbai. All participants trained regularly and were medically cleared for participation. They were randomly divided into three equal groups (n = 10 each):

- **Group A (NSD):** Normal balanced diet + commercial protein supplement
- **Group B (HFP):** High-protein and fat natural diet
- **Group C (Control):** Regular diet without modification

All participants followed identical weight-training routines for 12 weeks.

2.2 Experimental Design

A randomized control design was employed. All groups performed progressive resistance training targeting major muscle groups, five days per week, adhering to standardized intensity and recovery schedules.

2.3 Dietary Regimens

Dietary intake was standardized and monitored. The NSD group received a balanced diet with an added protein supplement (two servings per day with milk). The HFP group consumed high-protein natural foods (eggs, dairy, lentils, meat), while the control group maintained regular diets. Caloric intake was matched to individual needs based on daily energy expenditure.

2.4 Measurements

Anthropometric measures included:

- **Weight (kg) and Height (cm)** for Ponderal Index
- **Girths (inches):** Chest, Upper Arm, Thigh, Calf
- **Biacromial breadth (inches)**

Measurements were taken pre- and post-intervention using standardized procedures and calibrated instruments. Tester reliability coefficients ranged from 0.85–0.98.

2.5 Statistical Analysis

Means, standard deviations, and F-ratios were computed using ANOVA and ANCOVA at a 0.05 significance level. Post hoc LSD tests identified significant pairwise differences.

3. Results

Table 1. Mean Pre- and Post-Test Values of Key Anthropometric Variables

Variable	Group	Pre-Test Mean	Post-Test Mean	Change	Significance
Weight (kg)	NSD	68.7	70.6	+1.9	✓ Significant
	HFP	66.3	67.6	+1.3	✓ Significant
	Control	69.4	70.1	+0.7	✗ NS
Biacromial Breadth (in)	NSD	18.75	19.52	+0.77	✓ Significant
	HFP	18.67	19.12	+0.45	✓ Significant
	Control	18.30	18.50	+0.20	✗ NS
Chest Girth (in)	NSD	35.67	37.42	+1.75	✓ Significant

Variable	Group	Pre-Test Mean	Post-Test Mean	Change	Significance
	HFP	35.72	36.20	+0.48	✔ Significant
	Control	35.00	35.62	+0.62	✘ NS
Upper Arm Girth (in)	NSD	13.10	14.67	+1.57	✔ Significant
	HFP	12.97	13.75	+0.78	✔ Significant
	Control	12.75	13.20	+0.45	✘ NS
Thigh Girth (in)	NSD	19.6	21.2	+1.6	✔ Significant
	HFP	19.0	20.1	+1.1	✔ Significant
	Control	19.0	19.7	+0.7	✘ NS
Calf Girth (in)	NSD	11.57	12.22	+0.65	✔ Significant
	HFP	11.27	11.62	+0.35	✔ Significant
	Control	11.45	11.67	+0.22	✘ NS

✔ = Significant at $p < .05$; ✘ = Not Significant (NS)

Table 2. Summary of Statistical Findings (ANOVA/ANCOVA Results)

Variable	F-Ratio	Level of Significance	Interpretation
Ponderal Index	7.72	$p < .05$	Significant
Weight	19.48	$p < .05$	Significant
Biacromial Breadth	8.36	$p < .05$	Significant
Chest Girth	6.44	$p < .05$	Significant
Upper Arm Girth	5.76	$p < .05$	Significant
Thigh Girth	20.40	$p < .05$	Significant
Calf Girth	29.28	$p < .05$	Significant
Crural Index, Upper Arm Length, Forearm Length	< 1.0	NS	Not Significant

4. Discussion

The findings demonstrate that the inclusion of a protein supplement alongside a balanced diet significantly improves key anthropometric variables among young power lifters. The enhanced gains in girth measurements and body weight are consistent with literature suggesting that dietary supplementation supports muscle protein synthesis and hypertrophy during resistance training (Kreider, 1999; Greenhaff et al., 1994).

Increased muscle girths without corresponding increases in fat mass indicate favourable changes in lean body mass. The NSD group's superior results may stem from better amino acid availability and bioavailability in

the supplemented diet. Similar effects have been documented by Balsom et al. (1993) and Earnest et al. (1995), who noted enhanced muscular performance and body mass following creatine and protein supplementation.

The absence of significant changes in bone-length-related indices (Cruial and Arm lengths) aligns with growth stabilization at this age (Malina et al., 2004). Thus, the improvements are primarily attributable to muscular hypertrophy, not skeletal elongation.

5. Conclusion

Combining a balanced diet with a commercial protein supplement leads to significant improvements in body weight and muscle girth measurements among young power lifters. The supplement-based regimen (NSD) outperformed both the high-protein natural diet and the control diet. No changes were found in limb-length-related indices.

These findings support the use of nutritional supplementation, under professional guidance, as an adjunct to structured strength training for promoting muscle development and performance in young athletes.

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