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EFFECTS OF THE WEIDER PRINCIPLE OF SUPER-SETS ON MUSCLE HYPERTROPHY IN ADVANCED BODYBUILDERS

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Abstract

Aim. The purpose of this paper is to highlight the effects of applying the Weider Principle of Super-Sets on muscle mass hypertrophy in bodybuilders at an advanced stage of training. The present research was based on the hypothesis that the application of the Weider Super-Set Principle within bodybuilding training would have a significantly greater effect than the classical bodybuilding method.

Methods. The research included 40 male participants aged 21 to 43, all with at least two years of bodybuilding-specific training experience. Conducted over a six-month period, the study evaluated three primary indicators: circular anthropometric measurements (arms, chest, and thighs), body composition, and maximal strength in bench press, squats, and deadlifts.

Results. Regarding the increase in muscle circumference at the level of the arms, chest, and thighs, both groups recorded a significant improvement by the end of the study. However, the intervention group (G2) demonstrated a greater increase in muscle circumference compared to the control group (G1). The level of dispersion was lower in G2 compared to G1, while the degree of homogeneity was also slightly lower. The analysis of body composition revealed a reduction in body fat percentage, accompanied by an increase in lean muscle mass in both groups, with more pronounced results in the intervention group (G2). Regarding maximal strength, increases were observed in both groups for all tested exercises; however, the intervention group recorded greater improvements compared to the control group. The most significant average increase was noted in the *Deadlift* exercise, with a gain of 20.6 kg, whereas the control group showed an increase of only 15.3 kg.

Conclusions. This research demonstrates that the Weider principle of super-sets is effective in promoting muscle mass hypertrophy in bodybuilders. Compared to traditional bodybuilding training, super-sets offer advantages in terms of muscle growth, reduction of body fat percentage, and increase in maximal strength. Considering the results obtained, we can state with certainty that the working hypothesis has been validated. Based on these findings, we recommend the inclusion of super-sets in training programs for advanced-level bodybuilders aiming to increase both muscle mass and strength.

Keywords: muscle hypertrophy, Weider principle, super-sets, muscle strength.

Introduction

Muscle mass hypertrophy refers to the increase in the cross-sectional area of muscle fibers and is a common goal in strength and bodybuilding training (Chirazi & Ciorbă, 2006). According to Dragnea and Bota (1999), "the greater the functional hypertrophy, the more the contraction force progresses". It is well known that "the somatic muscles of athletes hypertrophy as a result of training" (Ciucurel, 2008).

"The increase in strength is primarily conditioned by the size of muscle mass" (Zamora, Kory Mercea, & Zamora, 1996), but also by the intensity of the effort, or by "the amount of mechanical work performed per unit of time," as defined by Duma (1997).

In this study, we investigated the effects of two distinct training programs on muscle mass hypertrophy, using two experimental groups.

To induce hypertrophy and strength gains in a muscle, it is necessary to apply a stimulus of greater intensity than what the muscle is normally accustomed to. This forces it to adapt to the new demands, resulting in increased strength and a larger cross-sectional area.

To support this process, optimal post-exercise nutrition is required, including proteins, slow-absorbing complex carbohydrates, vitamins, and minerals. Additionally, both guided and natural recovery are recommended (Herlo, 2005; Herlo & Bulzan, 2024).

Objectives

The purpose of this paper is to highlight the effects of applying the Weider Principle of Super-Sets on muscle mass hypertrophy in bodybuilders at an advanced stage of training.

The present research was based on the hypothesis that the application of the Weider Super-Set Principle within bodybuilding training would have a significantly greater effect than the classical bodybuilding method.

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Methods

Among the methods employed in the research design were: the bibliographic study method, the experimental method, the graphical method, and the statistical-mathematical method.

The experiment was conducted on a group of 32 bodybuilders, aged between 18 and 35 years, all with at least two years of bodybuilding training experience. The participants were randomly assigned into two groups: a control group (G1) and an intervention/experimental group (G2). The research was conducted at the Panoramic Fitness Gym center in Arad, Romania.

Training Protocol:

The control group (G1) followed a traditional bodybuilding training program, consisting of 3–5 straight sets per exercise, with 6–10 repetitions and rest intervals of 60–120 seconds between sets.

The intervention/experimental group (G2) performed a training program based on the Weider Super-Set Principle. Subjects executed two consecutive exercises without rest, targeting antagonistic muscle groups, with 6–8 repetitions per set, followed by a 90–120 second break before proceeding to the next super-set. Exercises were selected to target opposing muscle groups (e.g., biceps–triceps, chest–back, or quadriceps–hamstrings).

The research was carried out over a 6-month period, with three training sessions per week for each group.

Anthropometric measurements were taken at the beginning and at the end of the 6-month training period and included:

- Muscle circumference measurements of the arms, chest, and thighs,
- Body composition evaluation using Bioelectrical Impedance Analysis (BIA),
- Maximal strength testing, defined as the maximum load a subject can lift in a single correct execution, was performed for selected exercises: bench press, squat, and deadlift.

Results

Regarding the increase in muscle circumference at the level of the arms, chest, and thighs, both groups recorded a significant improvement by the end of the study. However, the intervention group (G2) demonstrated a greater increase in muscle circumference compared to the control group (G1). The level of dispersion was lower in G2 compared to G1, while the degree of homogeneity was also slightly lower.

In the intervention group, the arm circumference showed the lowest degree of variability, with a coefficient of variation (CV) of 11.7%. A similar result was observed for the chest circumference. In contrast, the thigh circumference showed a higher level of dispersion, with a CV value of approximately 22%. These results are summarized in Table 1.

Table 1. Dynamics of muscle circumference (arms, chest, thighs)

Perimeter	Arithmetic Mean			Standard Deviation		Coefficient of Variation	
	G1 (cm)	G2 (cm)	Difference (cm)	G1	G2	G1	G2
Arms	+2.4	+5.1	+2.7	±0.5	±0.6	20.8%	11.7%
Chest	+1.8	+3.2	+1.4	±0.8	±0.5	44.4%	15.6%
Thighs	+3.7	+5.5	+1.8	±1.4	±1.2	37.8%	21.8%

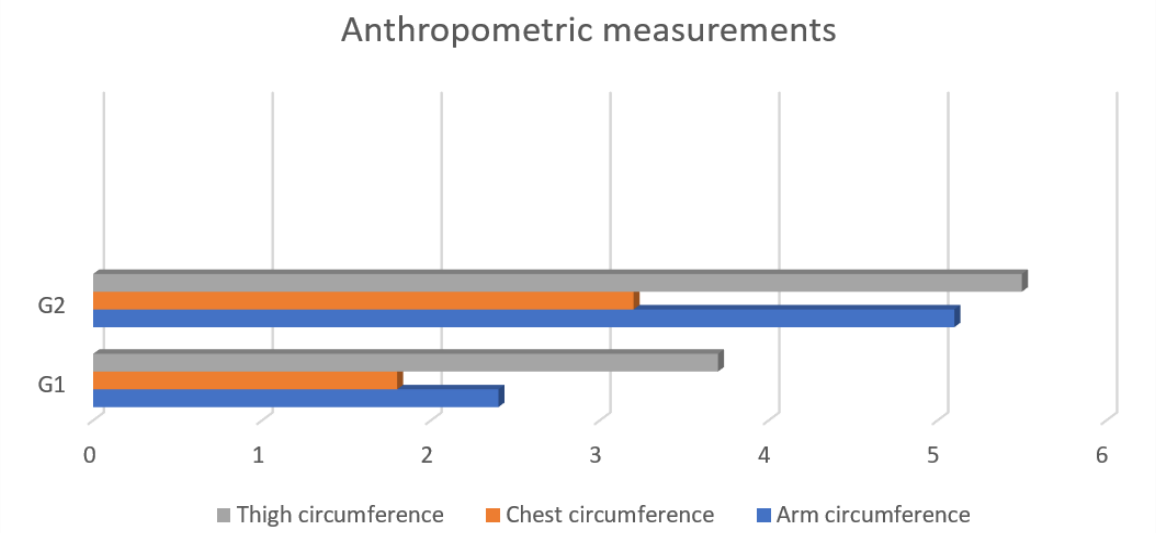

Figure 1. Histogram of Anthropometric Measurements

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The analysis of body composition revealed a reduction in body fat percentage, accompanied by an increase in lean muscle mass in both groups, with more pronounced results in the intervention group (G2).

Table 2. Dynamics of body composition

Perimeter	Arithmetic Mean			Standard Deviation		Coefficient of Variation	
	G1	G2	Difference	G1	G2	G1	G2
Body fat (%)	-4.5%	-4.9%	-0.7%	±1.8	±1.2	40.0%	24.4%
Lean muscle mass (kg)	+3.8	+5.3	+0.5	±1.1	±0.7	28.9%	13.2%

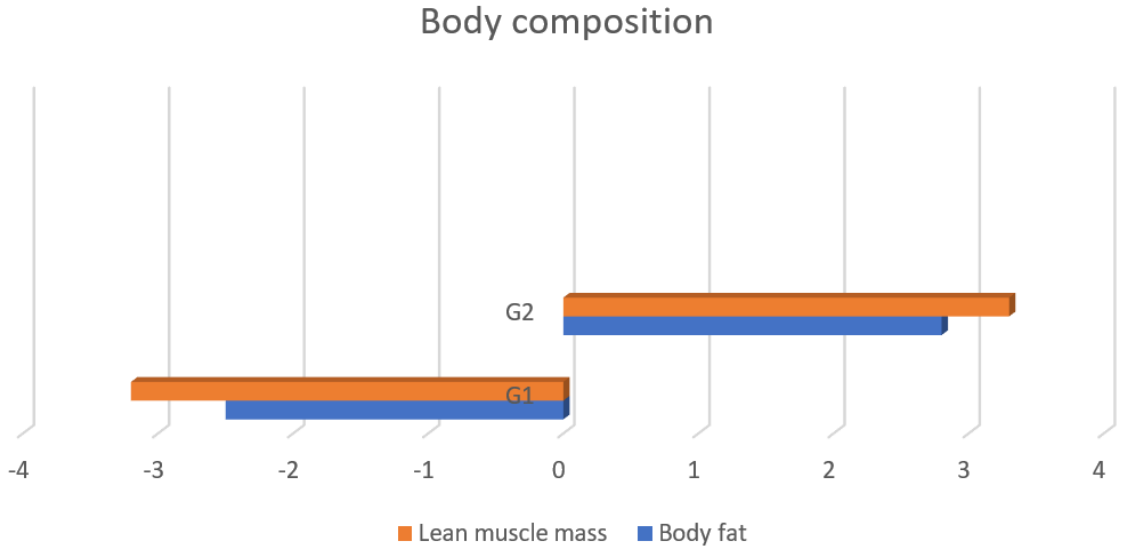

Figure 2. Histogram of Body Composition

Regarding maximal strength, increases were observed in both groups for all tested exercises; however, the intervention group recorded greater improvements compared to the control group. The most significant average increase was noted in the *Deadlift* exercise, with a gain of 20.6 kg, whereas the control group showed an increase of only 15.3 kg.

In the intervention group, from the perspective of data dispersion, analysis of the data in Summary Table no. 3 reveals low variability in the *Bench Press* exercise, with a coefficient of variation (CV) of 10.6%, while the highest heterogeneity was recorded in the *Deadlift* exercise, with a CV of 28.6%.

In the control group, CV values were considerably higher, reaching up to 42.4%, while the *Squat* exercise showed the lowest dispersion, with a CV of 19.1%.

Table 3. Dynamics of maximal strength

Exercises	Arithmetic Mean			Standard Deviation		Coefficient of Variation	
	G1 (kg)	G2 (kg)	Difference (kg)	G1	G2	G1	G2
Bench press	+10.5	+13.2	+2.7	±2.6	±1.4	24.7%	10.6%
Squat	+12.0	+15.9	+3.9	±2.3	±2.4	19.1%	15.1%
Deadlift	+15.3	+20.6	+5.3	±6.5	±5.9	42.4%	28.6%

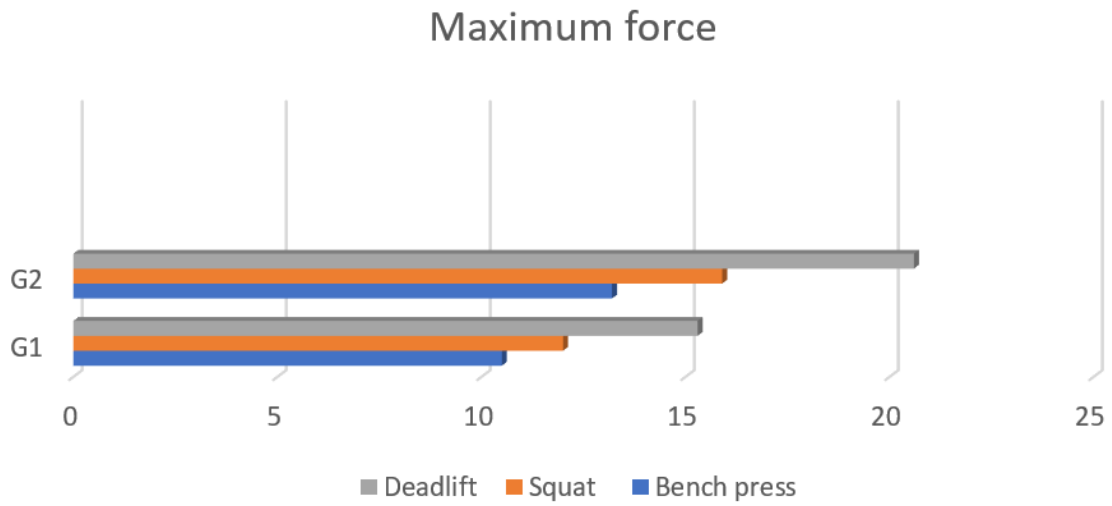

Figure 3. Histogram of Maximal Strength

Discussions

When referring to the effectiveness of the Weider Principle of super-sets, the results of this study indicate that this principle is effective for promoting muscle mass hypertrophy in bodybuilders. Compared to traditional bodybuilding workouts, super-sets offer several advantages, such as:

- Increased training intensity, due to the execution of two consecutive exercises without rest in between; this method maintains a high level of workout intensity, thereby stimulating muscle hypertrophy;
- Time efficiency, as super-set workouts are more time-effective by reducing rest periods between exercises;
- Variety in training and diverse muscle stimulation through alternating exercises that target different muscle groups, preventing monotony and providing varied stimuli to skeletal muscle, which may contribute to its hypertrophy.

Moreover, the efficiency of super-sets in stimulating hypertrophy can be explained through several physiological mechanisms, namely:

- Longer time under tension in super-set training compared to traditional workouts, which favors muscle growth;
- Metabolic stress induced by performing super-sets can lead to muscular adaptations through mechanisms such as the recruitment of fast-twitch muscle fibers, increased secretion of glycolytic enzymes, and the release of anabolic hormones;
- Increased blood flow, which plays a beneficial role in nutrient delivery and the removal of catabolites (waste products of metabolism).

These findings are consistent with recent evidence. For instance, a meta-analysis demonstrated that super-set training protocols are significantly more time-efficient and induce higher levels of metabolic stress compared to traditional set structures, while chronic adaptations in strength and hypertrophy remain largely similar (Neto et al., 2024). Furthermore, a randomized controlled trial confirmed that whole-body super-set training nearly halved workout duration, producing comparable improvements in body composition and hypertrophy, although traditional training yielded slightly greater gains in maximal strength for certain upper-body exercises (Fimland et al., 2024).Taken together, these studies reinforce the results of the present research, suggesting that super-sets may serve as a valid alternative to traditional training, particularly when time efficiency and training variety are desired outcomes. However, the small advantages observed in maximal strength development with traditional training should be acknowledged, especially in athletes for whom strength is a primary objective.

Research Limitations

The study highlighted clear benefits of applying the Weider Principle of super-sets regarding muscle mass hypertrophy. However, several limitations should be acknowledged. These limitations are primarily related to the small sample size of the experimental group and the limited duration of the study.

Conclusions

This research demonstrates that the Weider principle of super-sets is effective in promoting muscle mass hypertrophy in bodybuilders. Compared to traditional bodybuilding training, super-sets offer advantages in terms of muscle growth, reduction of body fat percentage, and increase in maximal strength.

Considering the results obtained, we can state with certainty that the working hypothesis has been validated.

Based on these findings, we recommend the inclusion of super-sets in training programs for advanced-level bodybuilders aiming to increase both muscle mass and strength. Future research will aim to examine the long-term effects of super-sets on a larger experimental sample, in order to provide a more comprehensive perspective on the effectiveness of this training principle.

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