

# REGIONAL AND SUBCUTANEOUS BODY FAT REDUCTIONS COMPARING A LOW CALORIE DIET WITH OR WITHOUT SUPPLEMENTS

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## ABSTRACT

The effectiveness of reduced calorie diets for fat and weight loss has been well documented. However, less is understood about the effects of a reduced calorie diet with supportive supplements such as fat burners, multi-vitamins, and compact protein gels. **PURPOSE:** Compare subcutaneous fat, and regional fat between a 1200 calorie diet with and without supplements. **METHODS:** In a double-blind placebo controlled study, forty women were assigned to one of three groups; control (28 +/- 4yr, 67.6 +/- 9.8kg, 24 +/- 3 BMI), placebo (26 +/- 5yr, 66.7 +/- 12.7kg, 25 +/- 4 BMI), or experimental (28 +/- 4yr, 69.5 +/- 7.7kg, 26 +/- 3 BMI). Control group subjects maintained their normal diet, placebo (PL) subjects followed a strict 1200 calorie diet including placebo pills (inert), olive oil pills, and gel packs (maltodextrin), and the experimental (EX) group followed a strict 1200 calorie diet including a fat burner, multi-vitamin, conjugated linoleic acid pills, and protein gels. Subjects participated in the diet for 21 days. Regional and subcutaneous fat were collected pre- and post-testing using dual-energy X-ray absorptiometry (DXA) and skinfold calipers (respectively). **RESULTS:** Significant ( $p < 0.05$ ) reductions in DXA arm (PL -0.17 +/- 0.19kg; EX -0.21 +/- 0.11kg), leg (PL -0.50 +/- 0.53kg; EX -0.82 +/- 0.45kg), and trunk fat (PL -0.90 +/- 1.03kg; EX -1.11 +/- 0.93kg) were identified for both PL and EX from pre to post-testing. Compared to the control (arm 0.02 +/- 0.31kg; leg 0.01 +/- 0.84kg, trunk 0.70 +/- 1.47kg), significant differences were observed in the EX group for DXA arm and leg fat while both PL and EX groups were lower than control for DXA trunk fat ( $p < 0.05$ ). Only the EX group showed a significant reduction in subcutaneous fat comparing pre- to post-measurements for all sites (triceps, subscapular, chest, axilla, hip, waist and thigh; mean differences  $> -2.3$ mm,  $p < 0.05$ ).

## INTRODUCTION

Dieting is common among adults who are interested in weight loss [1]. However, there are few rigorous studies to support the effectiveness and safety of many popular diets [2]. Additionally, there are many supplements on the market that are being touted as “fat burners” or “metabolism boosters.” These supplements also have few or no studies to support their claims [3]. Importantly, many individuals will combine diets and supplements to optimize the benefits of each. Therefore, the present study investigated whether a 3-week calorie-restricted diet plus supplements would result in higher weight loss than the diet alone.

Another area of interest is where fat loss takes place in the body. Various techniques for measuring body composition can accurately determine total body fat, segmental body fat or subcutaneous body fat. Subcutaneous fat loss may translate better to body image (i.e. the mirror) whereas any fat loss will translate to weight loss (i.e. the scale). Therefore, the present investigation compared changes in segmental fat loss via dual-energy X-ray absorptiometry (DEXA) to changes in subcutaneous fat loss via skinfold measurements.

## EXPERIMENTAL DESIGN

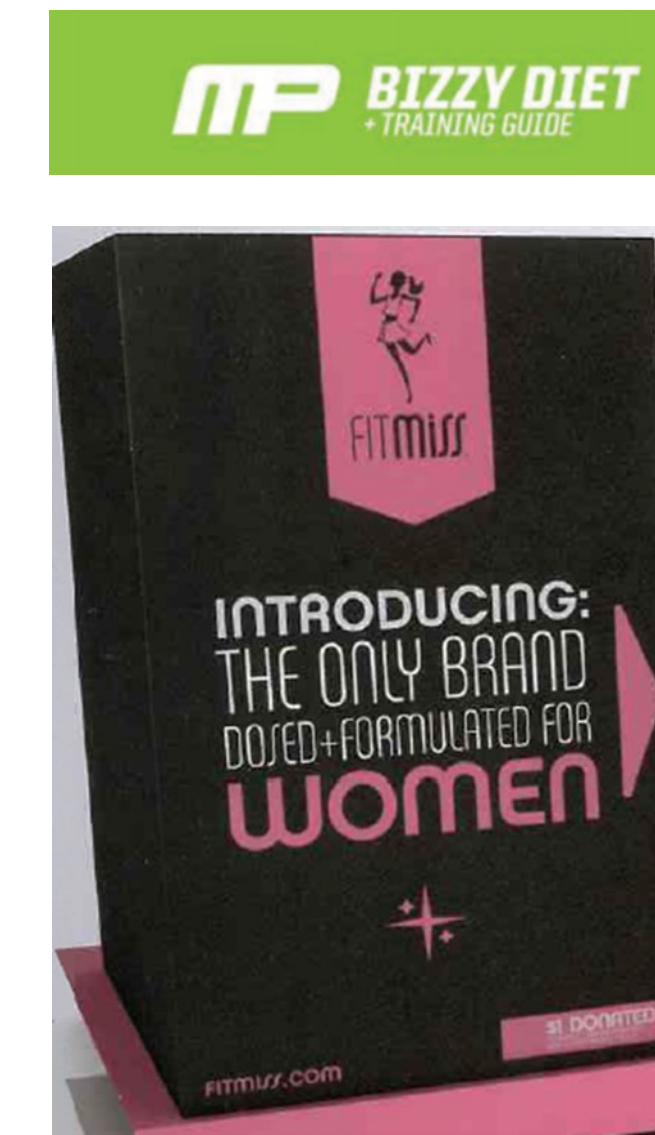
In a double-blind, placebo-controlled study, 40 young (18-35 yrs) women participated in this investigation. All subjects were healthy and moderately active (exercised twice or more per week), as assessed by health history and exercise questionnaires, respectively.

All subjects were fasted for 8 hours before testing. Participants were instructed to avoid exercise for at least twenty-four hours prior to testing. Hydration status was determined using specific gravity via handheld refractometry (Model ATA-2793, precision = 0.001 +/- 0.001, Atago, Inc. Tokyo, Japan) prior to all body composition measurements. Specific gravity values indicated all subjects were properly hydrated during both pre- and post-testing sessions ( $>1.005$ ,  $<1.030$ ) [4,5]. At this point, skinfold measurements were performed by the same researcher for all subjects, and DEXA measurements were performed by another researcher.

## METHODS

### Diet and Supplements

- DIET
  - 1200 kcal (includes supplements)
  - Protein, vegetables
- SUPPLEMENT PACK
  - Burn (fat burner)
  - Balance (multi-vitamin)
  - Tone (conjugated linoleic acid)
  - MuscleGel (22g of protein)



### Subject Characteristics

	n	Age	Height (cm)	Height (in)	Weight (kg)	Weight (lbs.)	BMI
Control	14	27.79 (3.72)	167.49 (7.28)	65.94 (2.87)	67.58 (9.78)	148.98 (21.57)	24.08 (3.00)
Placebo	14	26.14 (4.62)	162.91 (6.13)	64.14 (2.41)	66.65 (12.66)	146.95 (27.90)	24.96 (3.48)
Experimental	12	27.92 (4.32)	163.56 (6.81)	64.39 (2.68)	69.52 (7.69)	153.27 (16.96)	26.09 (3.40)

### Dual-Energy X-Ray Absorptiometry (DEXA)

Percent body fat was calculated using preset equations from the DEXA software (Lunar Prodigy, GE Healthcare, Waukesha, WI). Segmental calculations were derived from regions of interest parameters set by an investigator who had previously demonstrated a test-retest reliability of  $r > 0.90$ .



### Skinfold

Skinfold measurements were taken on the right side of the body with a calibrated Lange caliper by an investigator who had previously demonstrated a test-retest reliability of  $r > 0.90$ . Measurements were taken according to the recommendations of Jackson and Pollock at the chest, axilla, waist, hip, thigh, subscapular and triceps [6]. Percent fat values were estimated using the sum of 3 and sum of 7 skinfold measurements and the generalized equations of Jackson and Pollock [6] and population-specific equations of Evans et al. [7].

- Chest
- Axilla
- Waist
- Hip
- Thigh
- Subscapular
- Triceps



## RESULTS

		DEXA					Skinfold (Lange) (mm)						
		Weight (kg)	Regional % Fat	Fat (g) Arms	Legs	Trunk	Chest AVG	Axilla AVG	Waist AVG	Hip AVG	Thigh AVG	Subscap AVG	Triceps AVG
<b>Delta Mean</b>	CON	-0.01	0.06	20.64	13.57	692.50	1.07	0.63	0.30	2.04	0.68	0.29	0.45
<b>SD</b>	CON	1.25	1.25	314.37	837.04	1472.44	2.28	2.43	3.39	3.89	2.54	2.03	3.47
<b>Delta Mean</b>	PLA	-1.50*†	-1.53*†	-172.85*	-508.15*	-897.00*†	-0.71	-0.77	0.90	-0.81	-1.67	-0.44	0.23
<b>SD</b>	PLA	1.62	1.46	199.20	548.15	1067.41	3.16	2.04	2.78	2.94	3.95	2.35	2.67
<b>Delta Mean</b>	EXP	-2.96**‡	-1.99*†	-203.70*†	-927.30*†	-1208.90*†	-3.43**‡	-2.80**‡	-2.90**‡	-4.98**‡	-5.30*†	-3.05**‡	-3.25**‡
<b>SD</b>	EXP	1.66	2.10	121.47	412.55	969.96	2.92	3.10	4.04	2.71	4.51	2.32	1.97

Table 1. Change values from pre to post for weight, percent fat, segmental fat via DEXA and subcutaneous fat via skinfold. CON = control; PLA = diet only; EXP = diet + supplements. \* significant difference from pre; † significant difference from CON; ‡ significant difference from PLA; significant if  $p < 0.05$ .

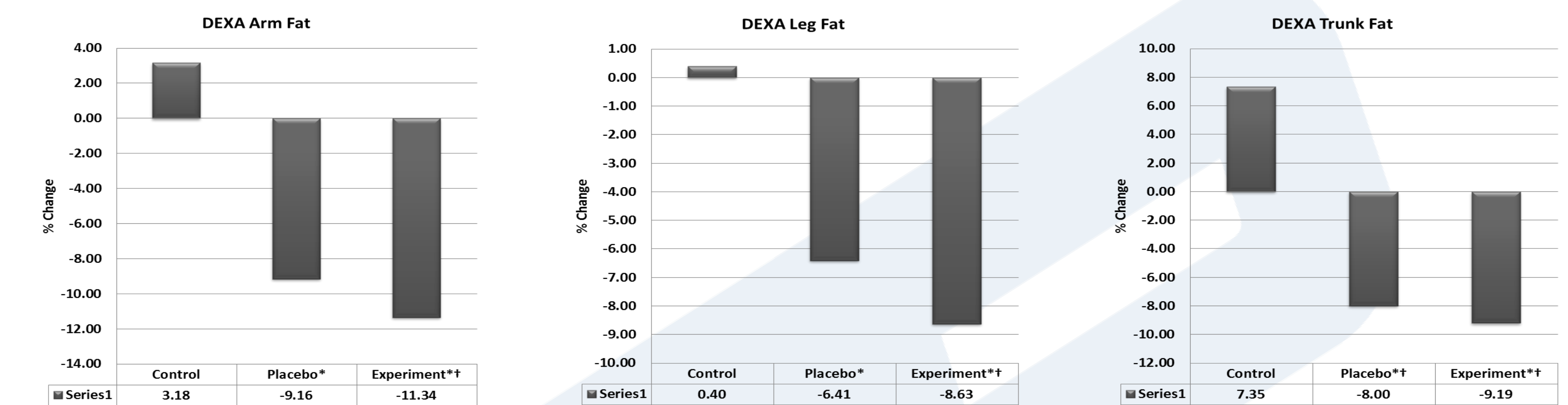


Figure 1. Percent change from pre to post for arm, leg and trunk fat via DEXA. CON = control; PLA = diet only; EXP = diet + supplements. \* significant difference from pre; † significant difference from CON; ‡ significant difference from PLA; significant if  $p < 0.05$ .

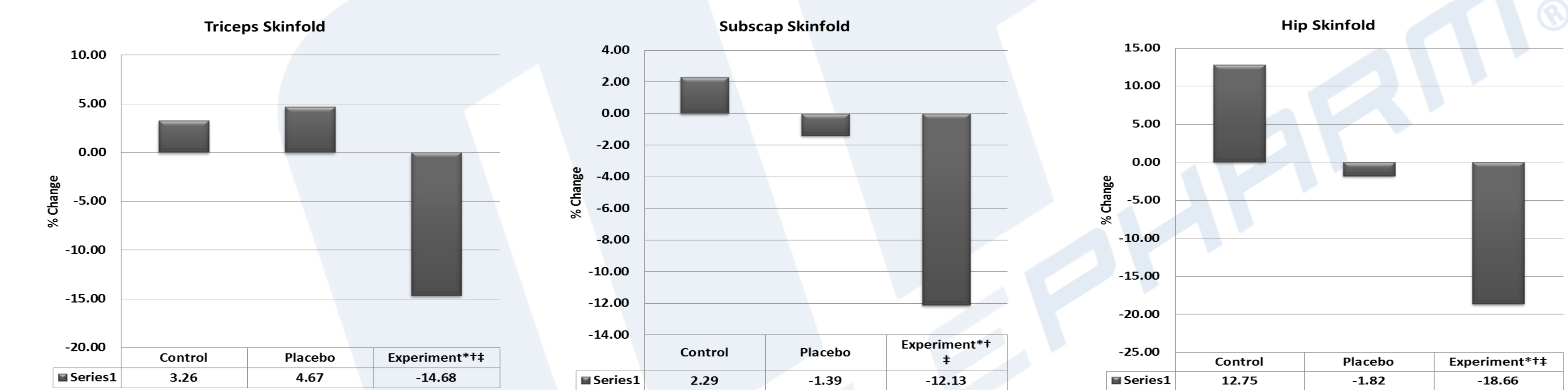


Figure 2. Percent change from pre to post for tricep, subscapular and hip skinfolds. CON = control; PLA = diet only; EXP = diet + supplements. \* significant difference from pre; † significant difference from CON; ‡ significant difference from PLA; significant if  $p < 0.05$ .

## CONCLUSIONS

Based the DEXA values, the diet alone did result in significant weight loss, in terms of both overall body fat and segmental fat. However, the addition of supplements to the diet resulted in significant subcutaneous fat loss as well. Since many individuals are interested in subcutaneous fat loss, this 3-week diet may provide more desirable results for individuals when supplements are added. Another possibility is that the diet alone could reduce subcutaneous fat loss if performed for a longer period of time.

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