IMPACT OF RESISTANCE TRAINING ON REGIONAL BODY COMPOSITION IN OVERWEIGHT FEMALES INITIATING AN EXERCISE AND WEIGHT LOSS PROGRAM

TEXAS A&M UNIVERSITY Kinesiology

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Abstract

Background

It is well recognized that structured resistance training and conditioning coupled with a caloric deficit can favorably impact body composition (e.g., reduced fat mass (FM) and increased lean mass). However, less is reported regarding the impact of resistance and endurance training on regional body composition (e.g., upper and lower extremity percent body fat [%BF]) in women.

Purpose

To examine the relationship between changes in resistance training volume and regional body composition parameters among pre-menopausal, overweight and obese females.

Materials and Methods

Nineteen overweight and obese females (29.2±8.1 yrs; weight: 78.6±14.1 kg; height: 162.9±7.1 cm; BMI = 29.3±3.9 kg/m2; body fat % = 41.8±3.7 %) were studied. Participants engaged in a progressive, structured resistance and endurance exercise training for 12 weeks that consisted of 11 upper and lower body exercises, 8-10 repetitions per exercise at ≈70% of their one-repetition maximum, and 3 days/week of daily walking (10,000 steps/day). Participants also followed a –500 kcal/day diet. Fasting blood samples and dual-energy x-ray absorptiometry with regional, gynoid, android, and visceral estimates were collected pre-post training and diet intervention. Baseline and Week 12 step counts were compared via a pair sample t-test. A Bivariate Pearson correlation matrix was used to determine correlations ($p<0.05$).

Results

During the 12-week program, daily step count averaged 8,797±2,323 per day. After 12 weeks, changes in lower body resistance training volume (169,216±10,964 [CI: 146,958; 191,474] kg) negatively correlated with total android mass (r=-0.491, p=0.033) and right leg fat mass (r=-0.465, p =0.045); upper body resistance training volume (71,236±4,470 [CI: 62,160; 80,312] kg) negatively correlated with total android mass (r=-0.533, p=0.019); total training volume (240,453±16,232 [CI: 207,499; 273,407] kg) negatively correlated with total android mass (r=-0.509, p=0.019); and step count (-176±687 [CI: -1,570; 1,218] steps) negatively correlated with FM/height2 (r=-0.511, p=0.025), total android mass (r=-0.526, p=0.021), total gynoid mass (r=-0.459, p=0.048), left leg %BF (r=-0.491, p=0.033), right leg %BF (r=-0.487, p=0.035), subtotal %BF (r=-0.532, p=0.019), subtotal FM (r=-0.559, p=0.013), total FM (r=-0.576, p=0.010), android FM (r=-0.505, p=0.027), gynoid FM (r=-0.522, p=0.022), subtotal bone mineral content (r=-0.613, p=0.005), total bone mineral content (r=-0.657, p=0.002).

Practical Application

The addition of a walking regimen to a structured resistance and endurance training program should be considered.

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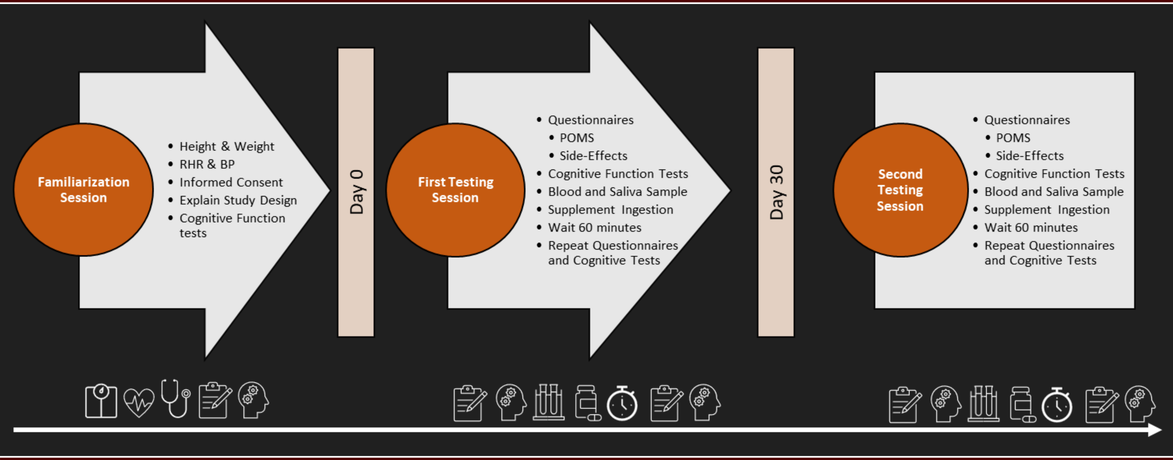
Experimental Design



Figures

	Variable	Test	Steps	Low-Body Training Volume	Upper-Body Training Volume	Total Training Volume
Change from Baseline	Subtotal Bone Mineral Content	Pearson Correlation	-.613**	-0.078	-0.093	-0.084
		Sig. (2-tailed)	0.005	0.751	0.706	0.734
	Total Bone Mineral Content	Pearson Correlation	-.657**	-0.052	-0.060	-0.055
		Sig. (2-tailed)	0.002	0.833	0.808	0.823
	Right leg Fat Mass	Pearson Correlation	-0.444	-.465*	-0.401	-0.450
		Sig. (2-tailed)	0.057	0.045	0.089	0.053
	Total Fat Mass	Pearson Correlation	-.576**	-0.193	-0.258	-0.216
		Sig. (2-tailed)	0.010	0.428	0.286	0.375
	Android Fat Mass	Pearson Correlation	-.505*	-0.278	-0.315	-0.293
		Sig. (2-tailed)	0.027	0.249	0.188	0.224
	Gynoid Fat Mass	Pearson Correlation	-.522*	-0.219	-0.240	-0.228
		Sig. (2-tailed)	0.022	0.369	0.323	0.349
	Android Total Mass	Pearson Correlation	-.526*	-.491*	-.533*	-.509*
		Sig. (2-tailed)	0.021	0.033	0.019	0.026
	Gynoid Total Mass	Pearson Correlation	-.459*	0.014	-0.057	-0.008
		Sig. (2-tailed)	0.048	0.954	0.817	0.975
	Left leg Percent Fat	Pearson Correlation	-.491*	-0.325	-0.245	-0.304
		Sig. (2-tailed)	0.033	0.175	0.312	0.206
	Right leg Percentage Fat	Pearson Correlation	-.487*	-0.236	-0.144	-0.210
		Sig. (2-tailed)	0.035	0.331	0.557	0.388
	Subtotal Percent Fat	Pearson Correlation	-.532*	-0.092	-0.130	-0.105
		Sig. (2-tailed)	0.019	0.707	0.596	0.669
	Fat Mass/Height^2 Ratio	Pearson Correlation	-.511*	-0.190	-0.252	-0.212
		Sig. (2-tailed)	0.025	0.436	0.297	0.385

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Methods

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- 12 week resistance and endurance exercise training
  - 11 upper and lower body exercises,
  - 8-10 repetitions
  - ≈70% of their one-repetition maximum, and
- 3 days/week of daily walking (10,000 steps/day)
- –500 kcal/day diet
- Fasting blood samples and dual-energy x-ray absorptiometry with regional, gynoid, android, and visceral estimates were collected pre-post

Statistical Analysis

- Baseline and Week 12 step counts were compared via a pair sample t-test. A Bivariate Pearson correlation matrix was used to determine correlations ($p<0.05$).

Results

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- changes in lower body resistance training volume (169,216±10,964 [CI: 146,958; 191,474] kg) negatively correlated with total android mass (r=-0.491, p=0.033) and right leg fat mass (r=-0.465, p =0.045)
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Conclusions

Following 12 weeks of structured resistance and endurance training, overweight and obese females experienced augmented training volume that correlated to favorable changes in several regional body composition parameters. The changes in total step count (i.e., steps walked per day) were reduced after 12 weeks and negatively correlated to several regional body composition parameters.

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