

Effect of Varied Resistance Circuit Weight Training on Percent Body Fat



Physical Education

KEYWORDS : Circuit Weight Training, High Intensity, Low Intensity, Medium Intensity

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ABSTRACT

The purpose of the study was to find out the effect of varied resistance circuit weight training on percent body fat. To achieve the purpose sixty male students studying Bachelor degree in Sivanthi Adithanar college of Physical Education, Thiruchendur were selected at random as subjects for this study. Their age, height and weight ranged between 18 and 22 years, 154 cms and 174 cms, and 50 kg and 71 kg respectively. They were randomly divided into four groups and each group consisted of fifteen subjects. Group I underwent high intensity circuit weight training, Group II underwent moderate intensity circuit weight training, Group III underwent low intensity circuit weight training, Group IV acted as control group. The criterion variables selected for the study is percent body fat and it is measured by standard anthropometric measurements. The experimental groups participated in their respective training for a period of twelve weeks. The data were collected on body composition variables of varied resistance circuit weight training groups and control group before and after the training programme. The collected data were analyzed statistically by analysis of covariance (ANCOVA) and Scheffe's post-hoc test was used to test the paired mean differences.

INTRODUCTION

In physical fitness body composition is used to describe the percentages of fat bone and muscle in human bodies. Because muscular tissue takes up less space in our body than fat tissue, our body composition, as well as our weight, determines leanness. Two people at the same height and same body weight may look completely different from each other because they have a different body composition. Circuit training is a method of resistance training, or weight training that maximizes the volume of work done in a short period of time. Circuit training consists of performing multiple exercises on multiple body parts in a row with little rest in between exertions. Circuit training is also a convenient way to exercise. It maximizes the total exercise volume (number of sets, repetitions, and amount of weight) completed in a period of time. Exercises are completed in a row, and therefore, the time spent exercising is condensed.

Weight training refers to an interest in physical fitness or importance of being strong in a particular sport. It is not usually an end in itself but as a means to an end. The essentials of weight training (Strength training) and regularity and gradual increase in training intensity (principles of over loading) are supported by proper nutrition and adequate rest. Unlike endurance training, weight training does not spend many calories. As such, its role of reducing body weight is limited; on the other hand, re-phrasing needed here, strength training does not mean one will loose flexibility or become muscle bound. Studies on Olympic athletes have shown only the gymnasts have better flexibility than the weight lifters. Weight training does not slow down muscular movement. It has also been established that increase in muscular speed (Explosive Power) accompanies an increase in muscular strength. Physical activity has paramount importance in the treatment of obesity. Exercise should be taken on a regular basis over a protected period of time if it is to be effective (Lawrence Gray Kumar, 2002). Body composition is the body's relative amount of fat to fat-free mass. Those with optimal body composition are typically healthier, move more easily and efficiently, and in general, feel better than those with less-than-ideal body composition.

METHODOLOGY

The purpose of the study was to find out the effect of varied resistance circuit weight training on percent body fat. To achieve the purpose sixty male students studying Bachelor degree in Sivanthi Adithanar college of Physical Education, Thiruchendur were selected at random as subjects for this study. Their age, height and weight ranged between 18 and 22 years, 154 cms and 174 cms, and 50 kg and 71 kg respectively. They were randomly divided into four groups and each group consisted of fifteen subjects. Group I underwent

high intensity circuit weight training, Group II underwent moderate intensity circuit weight training, Group III underwent low intensity circuit weight training, Group IV acted as control group. The criterion variables selected for the study is percent body fat and it is measured by standard anthropometric measurements. The experimental groups participated in their respective training for a period of twelve weeks. The data were collected on body composition variables of varied resistance circuit weight training groups and control group before and after the training programme. The collected data were analyzed statistically by analysis of covariance (ANCOVA) and Scheffe's post-hoc test was used to test the paired mean differences.

Table-1

S.No	Variable	Test
1.	Body density	$1.1017 - (0.000282) \times (A) - 0.000736 \times (B) - 0.000883 \times (C)$ A - abdominal skin fold B - chest skin fold C - arm skin fold
2.	Percent body fat (%)	$\left[\frac{4.570}{\text{Density}} - 4.412 \right] \times 100$

The intensity of training was given in the table-2

Table-2 CHANGE OF RESISTANCE IN DIFFERENT INTENSITIES FOR HIGH, MEDIUM AND LOW GROUPS FOR TWELVE WEEKS

Group Sets × Repetition	I - III	IV-VI	VII - IX	X-XII
High intensity group 3 Sets × 4 Repetition	80	85	90	95
Medium intensity group 3 Sets × 6 Repetition	70	75	80	85
Low intensity group 3 Sets × 9 Repetition	60	65	70	75

5% intensity increase once in three weeks.

Rest period: One minute between sets and two minutes between exercises.

ANALYSIS OF THE DATA

PERCENT BODY FAT

The statistical analysis of data collected on percent body fat prior to and after the experimental period is presented in table 3.

Table -3 ANALYSIS OF COVARIANCE FOR PRE- AND POST-TEST DATA ON percent body fat AMONG HIGH, MEDIUM, LOW INTENSITY CIRCUIT WEIGHT TRAINING GROUPS AND CONTROL GROUP

	High intensity group	Medium intensity group	Low intensity group	Control group	SOV	Sum of squares	df	Mean square	'F' ratio
Pre-Test									
Mean	6.91	6.09	6.50	6.15	B:	6.38	3	2.13	1.37
SD	1.36	1.06	1.32	1.23	W:	86.70	56	1.55	
Post-Test									
Mean	6.23	5.18	5.31	6.65	B:	22.86	3	7.62	6.91*
SD	1.24	0.88	1.03	1.02	W:	61.79	56	1.10	
Adjusted Post-Test									
Mean	5.82	5.45	5.24	6.87	B:	23.38	3	7.79	120.23*
					W:	3.57	55	0.07	

* Significant at 0.05 level of confidence.

The table value required for significance at 0.05 levels with df 3 & 56, and 3 & 55 are 2.776 and 2.78 respectively.

It is clear from table 3 that pre-test mean in percent body fat of high intensity group is 6.91, medium intensity group is 6.09, low intensity group is 6.50 and control group is 6.15. The 'F' ratio calculated for the four groups in pre-test is 1.37. It shows that there is no significant difference in percent body fat among the four groups. The post-test mean of high intensity group is 6.23, medium intensity group is 5.18, low intensity group is 5.31 and control group is 6.65. The 'F' ratio of 6.91 indicates that there is statistically significant difference between the four groups in post-test, since the table value required for significance at 0.05 levels with df 3 and 56 is 2.776. Further, the adjusted post-test means of high intensity group is 5.82, medium intensity group is 5.45, low intensity group is 5.24 and control group is 6.87 and its 'F' ratio is 120.23 which is significant at 0.05 level and the table value required for significance with df 3 and 55 is 2.78.

The result of the study reveals that there is a significant variation in percent body fat among the four groups after the training period. Scheffe's test was applied as a post-hoc test to determine which of the paired means had a significant difference and the result of the follow-up test is presented in table 4.

Table-4 scheffe's test for the differences between the adjusted post-test paired means of percent body fat

Adjusted Post-Test Means				Means Differences
High intensity group	Medium intensity group	Low intensity group	Control group	
5.82	5.45			0.37*
5.82		5.24		0.58*
5.82			6.87	1.05*
	5.45	5.24		0.21
	5.45		6.87	1.42*
		5.24	6.87	1.63*

* Significant at 0.05 level.

The confidence interval required for significance at 0.05 level is 0.28.

Table 4 shows that the adjusted post-test mean difference in percent body fat between control group and high intensity group, control group and medium intensity group and between control group and low intensity group are 1.05, 1.42, 1.63 respectively which are statistically significant at 0.05 level and the required confidence interval is 0.28. The mean difference between low and high intensity groups and between medium and high intensity group are 0.58 and 0.37 respectively, which are significant at 0.05 level of confidence since the required confidence interval is 0.28. The mean difference between medium and low intensity groups 0.21 is less than the confidence interval value i.e. 0.28 at 0.05 level of significance.

DISCUSSION ON FINDINGS

Hass (2000) and others study on single and multiple sets on muscular strength, muscular endurance and body composition significantly improved body composition (physical variables). Maxine Friedman (2000) study on the effects of increasing volume from one set to three sets on muscular strength muscular endurance and body composition (physical variables). Twenty one subjects performed one set routine, and another 21 subjects performed 3 sets of 8 to 12 repetitions, 3 days per week for 13 weeks. Both the groups significantly improved their muscular strength, muscular endurance and body composition (physical variables). Maddalozzo and Gianni (1999) study on the effect of two resistance training protocols on insulin like growth factors, muscle strength and bone mass found that the high intensity resistance training produces regional changes in bone mass. They also compared the moderate intensity resistance training programme to a high intensity resistance training programme. Both the training programmes resulted in improvements in anaerobic power and lean body mass. Gettman et al (1978) documented that changes elicited by circuit weight training (CWT) and running (RN) programs was most specific in improving strength and changing body composition. Dornemann (1997) and his group conducted a study to find out the effect of heavy resistance training. The results of the study indicated that even a short-term weight training programme improved muscular strength and bone mineral density. These findings support the results of the present study. The results of the study reveals that the high, medium and low intensity groups show decrease in percent body fat due to the respective training programme as compared to control group. The decrease in percent body fat is higher for low intensity group as compared with high and medium intensity groups and the decrease in percent body fat for medium intensity group as compared to high intensity group is greater. But there is no significant difference in percent body fat between medium and low intensity groups.

CONCLUSIONS

Based on the results of the study it was concluded that,

1. The high, medium and low intensity groups show decrease in percent body fat due to the respective training as compared to control group.
2. The low intensity circuit weight training significantly reduced percent body fat as compared to high intensity circuit weight training. And the medium intensity circuit weight training showed significant decrease in percent body fat than the high intensity circuit weight training.

REFERENCE

1. Dornemann, T.M. et al., "Effects of High-intensity Resistance Exercises on Bone Mineral Density and Muscle Strength of 40-50 year Old Women", Journal of Sports Medicine and Physical Fitness, 37(4): (1997). | 2. Gettman LR, Ayres JJ, Pollock ML, Jackson A (1978). The effect of circuit weight training on strength, cardiorespiratory function, and body composition of adult men. . Med Sci Sports.Fall;10(3):171- | 3. Hass, C.J. et al., "Single versus Multiple Sets in Long-term Recreational Weight Lifters", Medicine and Science in Sports and Exercise, 32(1): (2000). | 4. Maddalozzo and F. Gianni, "Effects of Two Resistance Training Protocols on Insulin-like Growth Factors, Muscle Strength and Bone Mass in Older Adults", Ph.D. Abstract, Oregon State University PE 3971, 12(2): (1999). | 5. Maxine B. Friedman, "One Set Versus Three: How Much is enough?", Medicine and Science in Sports and Exercise, 32(1): (2000). |