

CHANGES ON PERCENT BODY FAT DUE TO VARIED INTENSITY RESISTANCE TRAINING

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ABSTRACT

The purpose of the study was to find out the effect of varied intensity resistance training on percent body fat. To achieve the purpose sixty male students studying Bachelor degree in Physical Education at Annamalai University, Chidambaram 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 resistance training, Group II underwent moderate intensity resistance training, Group III underwent low intensity resistance 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.

Key words: Resistance Training, High Intensity, Low Intensity, Medium Intensity.

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1. INTRODUCTION

Resistance training as an exercise programme where free or stationary weights are used for the purpose of increasing muscular strength, muscular endurance and power and body composition through which skills can be improved *Moran and McGlynn (1990)*. *Hurely et al., (1987)* found that by doing exercises like jogging and weight training one can reduce the body fat, foster neuromuscular relaxation, and decrease the risk of cardiovascular diseases and perhaps the other diseases too. 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. 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. Resistance training or weight training that maximizes the volume of work done in a short period of time.

The national institute of health recommends that a healthy adult male's body should have between 8 and 17percent fat and a female should have 20-21% level significantly above these amounts may indicate excess body fat. Athletes, leaner individuals, and more muscular individuals will have a body fat percentage lower than these levels. In general, most athletes experience greater performance benefits at body fat percentages between 7 and 19 percent for men, and 10 and 25 percent for woman, depending on the sport. Excess body fat or a body composition with high fat-to- muscle ratio is unfavorable because it increases the risk of cardiovascular disease. Excess body fat, especially at levels considered obese, can also put stress on the joints and interfere with mobility and the ability to perform every day activities.

2. Methodology

The purpose of the study was to find out the effect of varied intensity resistance training on percent body fat. To achieve the purpose sixty male students studying Bachelor degree in Physical Education at Annamalai University, Chidambaram 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.

3. Training procedure

They were randomly divided into four groups and each group consisted of fifteen subjects. Group I underwent high intensity resistance training, Group II underwent moderate intensity resistance training, Group III underwent low intensity resistance 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.

Table-1

VARIATIONS IN RESISTANCE AMONG HIGH, MEDIUM AND LOW INTENSITY 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
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.

4. Statistical technique

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 (% fat)	$= \left[\frac{4.570}{\text{Density}} - 4.412 \right] \times 100$

5. 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 RESISTANCE 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). *Maddolozzo 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 resistance training significantly reduced percent body fat as compared to high intensity resistance training. And the medium intensity resistance training showed significant decrease in percent body fat than the high intensity resistance training.

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