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Changes of Body Mass Index in Response to Isolated and Combined Strength and Endurance Training among University Players from Different Discipline

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Abstract

The purpose of the study was to investigate the changes on Body Mass Index in response to Isolated and combined strength and endurance training among university players from different discipline. Sixty university represented players from different discipline selected as a subjects from the Department of Physical Education and Sports Sciences, Annamalai University. The age, height and weight of the subjects ranged from 19 to 22 years, 158 to 166 centimeters and 55 to 65 kilograms respectively. The selected subjects were randomly assigned into four equal groups of 15 subjects each. Strength training group – I, endurance training group – II, combined strength and endurance training group – III and control group – IV. The collected data analyzed by analysis of covariance (ANCOVA). When the obtained 'F' ratio value was significant the Scheffe's test was applied as post hoc test. The result of the study revealed that twelve weeks of isolated and combined strength and endurance training reduced of body mass index.

Keywords: Body mass index, Strength Training, Endurance Training and combined training.

Introduction

Endurance is a term widely used in sport and can mean many different things to many different people. In sports it refers to an athlete's ability to sustain prolonged exercise for minutes, hours, or even days. Endurance requires the circulatory and respiratory systems to supply energy to the working muscles in order to support sustained physical activity. Kraemer and fleck (2004) suggest that strength and endurance training programs with a moderate amount of volume seem to be compatible with no deleterious effects on either strength or endurance. As the volume increases to that adopted by elite athletes, detriments in strength are more likely to occur. In many of the sports, combination of strength and endurance training is required to improve the performance and reduce the body fat. Therefore the researcher selected this study to find out which training alone induces more adaption on body composition variables.

Methodology

The purpose of the study was to investigate the changes on Body Mass Index in response to Isolated and combined strength and endurance training among university players from different discipline. Sixty university represented players from different discipline selected as a subjects from the Department of Physical Education and Sports Sciences, Annamalai University. The age, height and weight of the subjects ranged from 19 to 22 years, 158 to 166 centimeters and 55 to 65 kilograms respectively. The selected subjects were randomly assigned into four equal groups of 15 subjects each. Strength training group – I, endurance training group – II, combined strength and endurance training group – III and control group – IV. The selected body composition variable such as body mass index assessed by using the following formula.

$$BMI = \frac{\text{Weight (kg)}}{\text{Height (metres)}^2} \text{ kg/m}^2$$

The experimental groups performed the strength training, endurance training and combined strength and endurance training programs. Three sessions per week on alternative days for 12 weeks. The strength training program was a total body workout consisting of 3 sets of 6-10 repetitions on 8 exercises that trained all the major muscle groups. A percentage of each subject's one-repetition maximum for each exercise was used to determine the intensity of each week. The intensity and number of repetitions performed for each exercise changed once in two weeks. The endurance training consists of 20-40 minutes running 2-3 times per week with 65% HRR. The running intensity was determined by a percentage of heart rate reserve (HRR). The duration of each session were increased once in two weeks as training progressed. The combined strength and endurance training group underwent the both training schedule for three days per week and per day two

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sessions (morning and evening). The data collected from the two groups prior to and post experimentation on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). When the obtained 'F' ratio value was significant the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases statistical significance was fixed at 0.05 levels.

Results

Table I. Analysis of covariance on body mass index of strength training, endurance training and combined strength and endurance training and control groups

	Strength training	Endurance training	Combined Strength and Endurance training	Control Group	SOV	Sum of Squares	df	Mean squares	'F' ratio
Pre test Mean	27.14	27.56	27.38	27.40	B	0.74	3	0.24	0.09
SD	1.81	1.51	1.82	1.35	W	153.72	56	2.75	
Post test Mean	25.58	24.42	25.12	27.64	B	86.54	3	28.84	10.30*
SD	1.54	1.51	1.66	1.93	W	156.76	56	2.79	
Adjusted Post test Mean	25.66	24.34	25.13	27.64	B	89.16	3	29.72	13.79*
					W	118.49	55	2.15	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 3 and 55 is 2.77 and degrees of freedom 3 and 56 is 2.77)
*Significant at 0.05 level of confidence

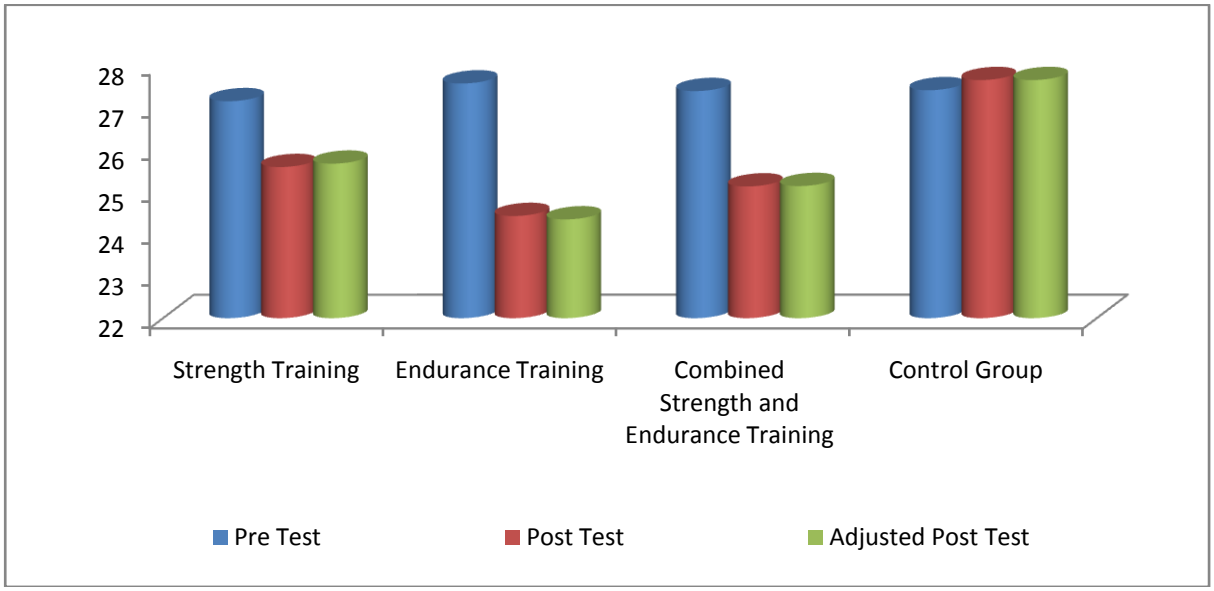
The adjusted post-test means on body mass index of strength training, endurance training and combined strength and endurance training groups and control group are 25.66, 24.34, 25.13 and 27.64 respectively. The obtained 'F' ratio value is 13.79 of body mass index was greater than the required table value of 2.77 for the degrees of freedom 3 and 55 at 0.05 level of confidence. Hence it was concluded that due to the effects of twelve weeks of isolated and combined strength and endurance training, the body mass index of the subjects was significant decreased. Hence there is a significant difference on body mass index among the four groups; the Scheffe's test was applied as post hoc test to determine the paired mean differences.

Table II. Scheffe's test for the difference between the adjusted post test paired means of body mass index

Adjusted Post Test Means				DM	CI
Strength Training	Endurance Training	Combined Strength and Endurance Training	Control Group		
25.66	24.34			1.32	1.54
25.66		25.13		0.53	1.54
25.66			27.64	1.98*	1.54
	24.34	25.13		0.79	1.54
	24.34		27.64	3.30*	1.54
		25.13	27.64	2.51*	1.54

The result of the study shows that there is a significant difference between the adjusted post test means of strength training group and control group, endurance training group and control group, combined strength and endurance training group and control group on body mass index. Also the result of the study reveals that there are no significant differences among the adjusted post test means of strength training, endurance training and combined strength and endurance training groups on body mass index.

Figure I. Cylinder diagram showing the mean value on body mass index of strength training, endurance training and combined strength and endurance training and control groups



Discussion and Conclusions

According to (Fleck and Kraemer, 2004) with regard to body composition, resistance training can increase lean body mass and decrease body fat levels. Gaining of strength and muscle mass from strength training, also while gaining muscle endurance from the endurance training. The researchers found from the result of the study combined strength and endurance training is better than the strength training or endurance training alone to reduce the body mass index .

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