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Efficacy circuit training and circuit weight training with and without protein supplementation on lean body mass

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Abstract
The purpose of the study is to find out the effects of circuit training and circuit weight training with and without protein supplementation on Lean Body Mass. Sixty (N=60) College men studying in Annamalai University were randomly selected as subjects. The age, height and weight of the subjects ranged from 18 to 21 years, 162 to 171 cms and 60 to 68 kg respectively, and the standard d The experimental design used in this study was random group design. The selected subjects were divided at random into four groups of fifteen each (n=15). Group-I underwent Circuit Training with supplementation of protein (placebo), Group-II underwent Circuit Training without supplementation of protein, Group-III underwent Circuit weight training with supplementation of protein (placebo) and Group-IV underwent Circuit weight training without supplementation of protein. All the subjects were tested prior to and immediately after the training period for all the selected variables.
The data collected from the three groups prior to and immediately after the training programme on the selected criterion variables were statistically analyzed with dependent 't' test and Analysis of Covariance (ANCOVA). Whenever the 'F' ratio for adjusted post test means was found to be significant, Scheffe's post hoc test was followed to determine which of the paired mean differences was significant. In all the cases .05 level of confidence was fixed to test the hypotheses. It may be concluded that the Circuit weight training with supplementation of protein (placebo) group is better than the other experimental groups in improving Lean Body Mass.

Keywords: circuit training and circuit weight training with and without protein supplementation, lean body mass

Introduction
Circuit training is a method of physical conditioning that employs both apparatus resistance training and calisthenics' conditioning exercises. It provides a means of achieving optional fitness in a systemized controlled fashion. The intensity and vigor of circuit training are indeed challenging and enjoyable to the performer. The system produces positive changes in motor performance, general fitness, muscular power, endurance and speedCircuit training is resistance training or weight training that maximizes the volume of work done in a short period of time. Circuit training is a great tool to use for people who are interested in weight loss, muscle gain and overall strength increase.
Circuit training can provide vigorous activity in a number of selected fitness and motor ability activities and is aimed at developing all the basic physical fitness components performed in an interesting and imaginative fashion.

Methodology
The purpose of the study is to find out the effects of circuit training and circuit weight training with and without protein supplementation on Lean Body Mass. Sixty (N=60) College men studying in Annamalai University were randomly selected as subjects. The age, height and weight of the subjects ranged from 18 to 21 years, 162 to 171 cms and 60 to 68 kg respectively, and the standard d The experimental design used in this study was random group design. The selected subjects were divided at random into four groups of fifteen each (n=15). Group-I underwent Circuit Training with supplementation of protein (placebo), Group-II underwent Circuit Training without supplementation of protein, Group-III underwent Circuit weight training with supplementation of protein (placebo) and Group-IV underwent Circuit weight training without supplementation of protein. All the subjects were tested prior to and immediately after the training period for all the selected variables.

The data collected from the three groups prior to and immediately after the training programme on the selected criterion variables were statistically analyzed with dependent 't' test and Analysis of Covariance (ANCOVA). Whenever the 'F' ratio for adjusted posttest means was found to be significant, Scheffe's post hoc test was followed to determine which of the paired mean differences was significant. In all the cases .05 level of confidence was fixed to test the hypotheses.

Result

The analysis of dependent 't'-test on the data obtained for Lean Body Mass of the subjects in the Pre-test and Post-test of experimental groups and control group has been presented in Table I.

Table 1: The summary of mean and dependent't' test for the pre and post tests on lean body mass of experimental groups

Mean	Circuit Training with supplementation of protein Group – (I)	Circuit Training without supplementation of protein Group – (II)	Circuit weight Training with supplementation of protein Group – (III)	Circuit weight training without supplementation of protein Group – (IV)
Pre- test mean	39.78	39.65	39.74	39.81
Post-test mean	38.27	37.70	37.15	37.37
't'-test	2.42*	3.19*	4.16*	3.92*

* Significant at .05 level. (Table value required for significance at .05 level for't'-test with df 14 is 2.15)

From table I it is learnt that the dependent 't' test values between the pre and posttest means of Circuit Training with supplementation of protein (placebo), Circuit Training without supplementation of protein and that of between Circuit weight training with supplementation of protein (placebo) and Circuit weight training without supplementation of protein are 2.42, 3.19, 4.16 and 3.92 respectively. Since the obtained 't'-test value of experimental groups is greater than the table value 2.15 with df 14 at .05 level of confidence, it is concluded that Circuit Training with supplementation of protein (placebo), Circuit Training without supplementation of protein, Circuit weight training with supplementation of protein (placebo) and Circuit weight training without supplementation of protein have registered significant improvement in performance of Lean Body Mass.

The Analysis of covariance (ANCOVA) on Lean Body Mass of experimental groups has been presented in Table -II.

Table 2: Values of analysis of covariance for experimental groups on lean body mass

Adjusted Post test Means				Source of Variance	Sum of Squares	df	Mean Squares	'F' Ratio
Circuit Training with upplementation of protein Group – (I)	Circuit Training without supplementation of rotein Group – (II)	Circuit weight Training with supplementation of protein Group – (III)	Circuit weight training without supplementation of protein Group – (IV)					
38.24	37.77	37.16	37.31	Between With in	10.85 36.93	355	3.620.67	5.39*

* Significant at.05 level of confidence (Lean Body Mass Scores in Centimeters) (The table value required for Significance at .05 level with df 3 and 55 is 2.77)

Table II shows that the adjusted posttest mean value of Lean Body Mass for Circuit Training with supplementation of protein (placebo), Circuit Training without supplementation of protein, Circuit weight training with supplementation of protein (placebo) and Circuit weight training without supplementation of protein are 38.24, 37.77, 37.16 and 37.31 respectively. The obtained F-ratio of 5.39 for the adjusted posttest mean is more than the table value of 2.77 for df 3 and 55 required for significance at .05 level of confidence.

The results of the study indicate that there are significant differences among the adjusted posttest means of experimental groups on the increase of Lean Body Mass.

To determine which of the paired means have a significant difference, Scheffe's test has been applied as Post hoc test and the results are presented in Table III.

Table 3: The scheffe's test for the differences between the adjusted posttests paired means on lean body mass

Adjusted Posttest Means				Mean Difference	Confidence Interval
Circuit Training with supplementation of protein Group – (I)	Circuit Training without supplementation of protein Group – (II)	Circuit weight Training with supplementation of protein Group – (III)	Circuit weight training without supplementation of protein Group – (IV)		
38.24	37.77	--	--	0.47	0.85
38.24	--	37.31	--	0.93*	0.85
38.24	--	--	37.16	1.08*	0.85
--	37.77	37.31	--	0.46	0.85
--	37.77	--	37.16	0.61	0.85
--	--	37.31	37.16	0.15	0.85

* Significant at.05 level of confidence

Table II shows that the adjusted posttest mean differences between Circuit Training with supplementation of protein (placebo) group and Circuit weight training with supplementation of protein (placebo) group, between Circuit Training with supplementation of protein group and Circuit weight training without supplementation of protein (placebo) group, are 0.93 and 1.08 respectively and they are greater than the confidence interval 0.85 which shows significant differences at .05 level of confidence.

The differences between Circuit Training with supplementation of protein (placebo) group and Circuit Training without supplementation of protein group, Circuit

Training without supplementation of protein (placebo) group and Circuit weight training with supplementation of protein (placebo) group, Circuit training without supplementation of protein (placebo) group, Circuit weight training without supplementation of protein (placebo) group and Circuit weight training with supplementation of protein (placebo) group and Circuit weight training without supplementation of protein (placebo) group, are 0.47, 0.46, 0.61 and 0.15. The value is less than the confidence interval 0.85, which shows insignificant difference at 0.5 level of confidence.

The results of the study have further disclosed that there is a significant difference in Lean Body Mass between the adjusted posttest means of Circuit Training with supplementation of protein (placebo) group and Circuit weight training with supplementation of protein (placebo) group, between Circuit Training with supplementation of protein group and Circuit weight training without supplementation of protein (placebo) group.

The differences between Circuit Training with supplementation of protein (placebo) group and Circuit Training without supplementation of protein group, Circuit Training without supplementation of protein (placebo) group and Circuit weight training with supplementation of protein (placebo) group, Circuit training without supplementation of protein (placebo) group, Circuit weight training without supplementation of protein (placebo) group and Circuit weight training with supplementation of protein (placebo) group and Circuit weight training without supplementation of protein (placebo) group have shown insignificant differences.

However, the improvement in Lean Body Mass is significantly higher for Circuit weight training with supplementation of protein (placebo) group than other Experimental Groups.

It may be concluded that the Circuit weight training with supplementation of protein (placebo) group is better than the other experimental groups in improving Lean Body Mass.

The mean values of experimental groups on Lean Body Mass are graphically represented in the Figure -1.

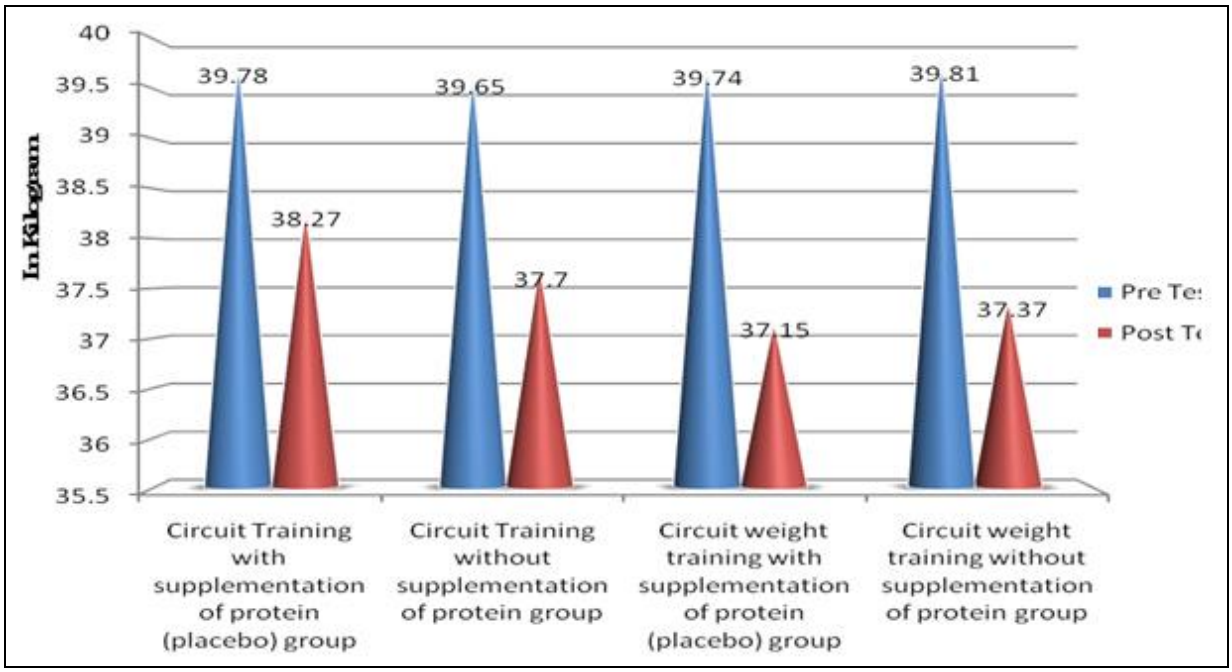

Fig 1: Mean values of experimental groups on lean body mass

Conclusion

It may be concluded that the Circuit weight training with supplementation of protein (placebo) group is better than the other experimental groups in improving Lean Body Mass.

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