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Effect of Resistance Training With and Without Protein Supplementation on Lean Body Mass of Inter-Collegiate Athletes

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Abstract

The study was designed to find out the effect of resistance training and resistance training with protein supplementation on lean body mass of inter-collegiate athletes. To achieve this purpose, forty five male inter-collegiate level athletes from various colleges affiliated to Acharya Nagarjuna University, Guntur, Andhra Pradesh during the academic year 2014-2015 were randomly selected as subjects. The age of the selected subjects were ranged from 18 to 24 years. The selected subjects were divided into three equal groups of fifteen subjects each at random. Group-I underwent resistance training for three days per week for twelve weeks. Group-II underwent resistance training with protein supplementation for three days per week for twelve weeks. Group-III acted as control. The lean body mass was selected as dependent variable. The data collected from the experimental and control groups on selected dependent variable was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated to find out the chances in selected dependent variables due to the impact of experimental treatment. The data collected from the three groups prior to and post experimentation on selected dependent variable was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test. In all the cases the level of confidence was fixed at 0.05 level for significance. The result of the study also produced 4.83% of improvement due to resistance training, and 7.30% of improvement due to resistance training with protein supplementation on lean body mass of inter-collegiate level athletes.

Keywords: Resistance training, Protein supplementation and lean body mass.

Introduction

For the longest time a lot of the training done have been centered around aerobic conditioning, while overlooking important aspects like, strength, speed and power, agility and flexibility. Resistance training for any sport is vital to the overall success of an athlete. With a good foundation to build on, athletes fully prepared to move into building maximal strength. The benefit of resistance training is not only to provide the players with the necessary skills and strength but also help to keep them intact for the entire session of the competition. Good nutrition is important for optimal athletic performance. In addition to the impact on athletic performance a nutritionally sound diet is essential to both the immediate and the future health of the athletes. Protein plays an important role in the diet of sportsman. Proteins are very complicated molecules. They are truly the physical basis of life, because every function in the living cell of our organism depends on them. Some scientists call this nutrient VIP (Very Important Protein).

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Its main function is to build up, keep up, and replace the tissues in our body. Our organs and even some of our hormones are made up mostly of protein. Various studies show that athletes who refueled with carbohydrate and protein had hundred percent glycogen stores than those who only had carbohydrate. The insulin was also highest in those who consumed the carbohydrate and protein drink. After exercise, consuming a sports drink enriched with protein results is much faster sports drink (Masa & Lige, 2003). According to Niles et al.,(2001) sports supplements that provide the amino acids necessary to restore muscle glycogen and rebuild muscle tissue that is damaged during intense, prolonged exercise would be beneficial. It also increases and improves the absorption of water from the intestines and improves muscle hydration. The amino acids in protein can also stimulate the immune system making the individual more resistant to colds and other infections. Resistance training with protein supplementation for athletes is a hotly debated topic. Resistance training with protein supplementation for athletes has been the source of debate for many years and it still unresolved. In this present study an attempt has been made to find out whether there is any improvement on lean body mass due to the effect of

resistance training protocol and resistance training with protein supplementation among inter collegiate athletes.

Methodology

Subjects and Variables

To achieve the purpose of the study forty five (N=45) inter collegiate level male athletes from various colleges affiliated to Acharya Nagarjuna University, Guntur, Andhra Pradesh, India during academic year 2014-2015 were selected as subjects. Their age ranged from 18 to 24 years. The selected subjects were divided into three equal groups of fifteen subjects each at random. Group-I underwent resistance training, group-II underwent resistance training with protein supplementation and group-III acted as control. The purpose, nature and importance of experiment, the procedure to be employed in the collection of data, and the role of the subjects during experimentation and testing periods were explained to the subjects. The lean body mass was selected as dependent variable.

Training Protocol

During the training period, the two experimental groups (group I & II) namely resistance training group and protein supplementation with resistance training group underwent their respective training programme, three days per week for twelve weeks, in addition to their regular sports activities. For the both resistance training groups eight exercises were given in order to keep the number of the sets were kept constant for each exercise. In between exercises, stretching exercises were done properly and specifically. The load was fixed for the two experimental groups after seeing the one repetition maximum (1 RM) of each participant in each exercises. All the subjects of the two experimental groups performed the same volume, intensity and frequency of training. However, 1.2 g/kg protein was supplemented for the subjects of experimental group-II before performing resistance training. Proper warm-up and warm-down exercises were given on the days of training.

Statistical Technique

The data collected from the experimental and control groups on lean body mass was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated to find out the chances in selected dependent variables due to the impact of experimental treatment. The data collected from the three groups prior to and post experimentation on lean body mass was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since three groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test. In all the cases the level of confidence was fixed at 0.05 level for significance.

Result

The descriptive analysis of the data showing mean and standard deviation, range, mean differences, 't' ratio and percentage of improvement on lean body mass of experimental and control groups are presented in table-I.

Table I. Descriptive Analysis of the Pre and Post Test Data and 'T' Ratio on Lean Body Mass of Experimental and Control Groups

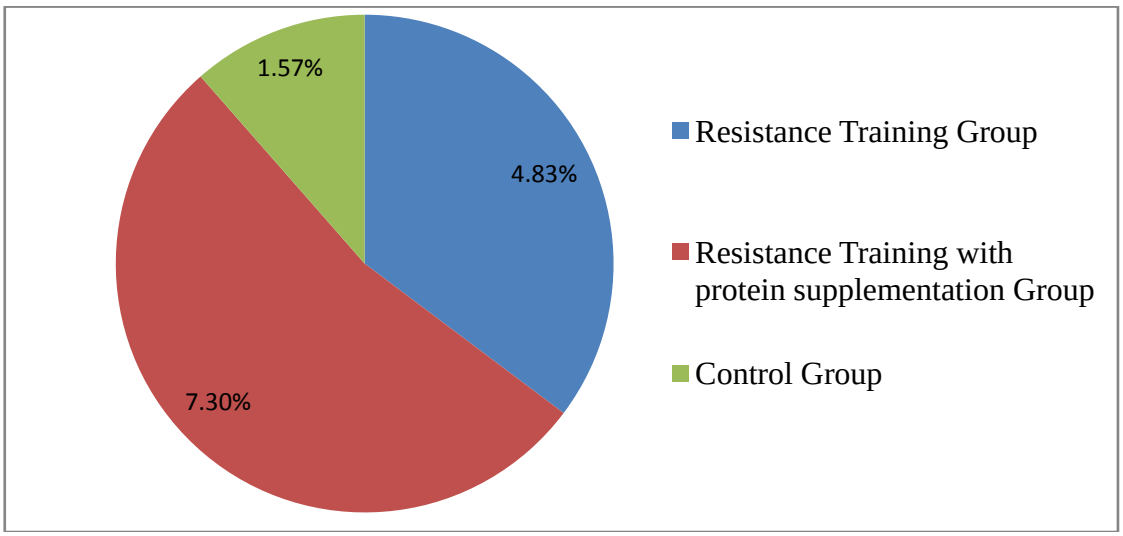
Group	Test	Mean	SD	Range	MD	't' ratio	Percentage of Changes
Resistance Training	Pre test	57.37	3.59	12.25	2.77	15.89*	4.83%
	Post test	60.14	3.47	12.55			
Resistance Training with Protein Supplementation	Pre test	58.34	4.93	14.67	4.26	10.43*	7.30%
	Post test	62.60	4.52	13.24			
Control Group	Pre test	58.65	3.22	12.64	0.92	1.76	1.57%
	Post test	57.73	3.52	12.76			

Table t-ratio at 0.05 level of confidence for 14 (df) =2.15
**Significant*

Table-I shows that the mean, standard deviation, range and mean difference values of the pre and post test data collected from the experimental and control groups on lean body mass. Further, the collected data was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post data. The obtained 't' values of resistance training and resistance training with protein supplementation groups are 15.89 and 10.43 respectively which are greater than the required table value of 2.15 for significance at 0.05 level for 14 degrees of freedom. It revealed that significant differences existed between the pre and post test means of experimental groups on lean body mass. However, there is no significant differences

existed between the pre and post test means of control group on lean body mass since, the obtained 't' value 1.76 is lesser than the required table value of 2.15 for significance. The result of the study also produced 4.83% of improvement due to resistance training, and 7.30% of improvement due to resistance training with protein supplementation on lean body mass of inter-collegiate level athletes.

Figure I. Pie Diagram Showing the Percentage of Changes on Lean Body Mass of Experimental and Control Groups



The pre and post test data collected from the experimental and control groups on lean body mass is statistically analyzed by using analysis of covariance and the results are presented in table-II.

Table II. Analysis of Covariance on Lean Body Mass of Experimental and Control Groups

	Resistance Training Group	Resistance Training with Protein Supplementation Group	Control Group	S o V	Sum of Squares	df	Mean squares	'F' ratio
Pre test Mean	57.37	58.34	58.65	B	13.389	2	6.695	0.422
SD	3.59	4.93	3.22	W	666.46	42	15.868	
Post test Mean	60.14	62.60	57.73	B	177.54	2	88.771	5.94*
SD	3.47	4.52	3.52	W	627.72	42	14.946	
Adjusted Post test Mean	60.81	62.40	57.25	B	207.79	2	103.89	46.16*
				W	92.273	41	2.251	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 42 and 2 and 41 is 3.23)

**Significant at .05 level of confidence*

Table-II shows that the adjusted post-test means on lean body mass of resistance training and resistance training with protein supplementation groups and control group are 60.81, 62.40 and 57.25 respectively. The obtained 'F' value of 46.16 on lean body mass is greater than the required table value of 3.23 of 2, 41 df at 0.05 level of confidence. Hence, it is concluded that significant differences exist between the adjusted post test means of resistance training, resistance training with protein supplementation and control groups on lean body mass. Since, the obtained 'F' value in the adjusted post test means is found to be significant, the Scheffe's test is applied as post hoc test to find out the paired mean difference, and it is presented in table-III.

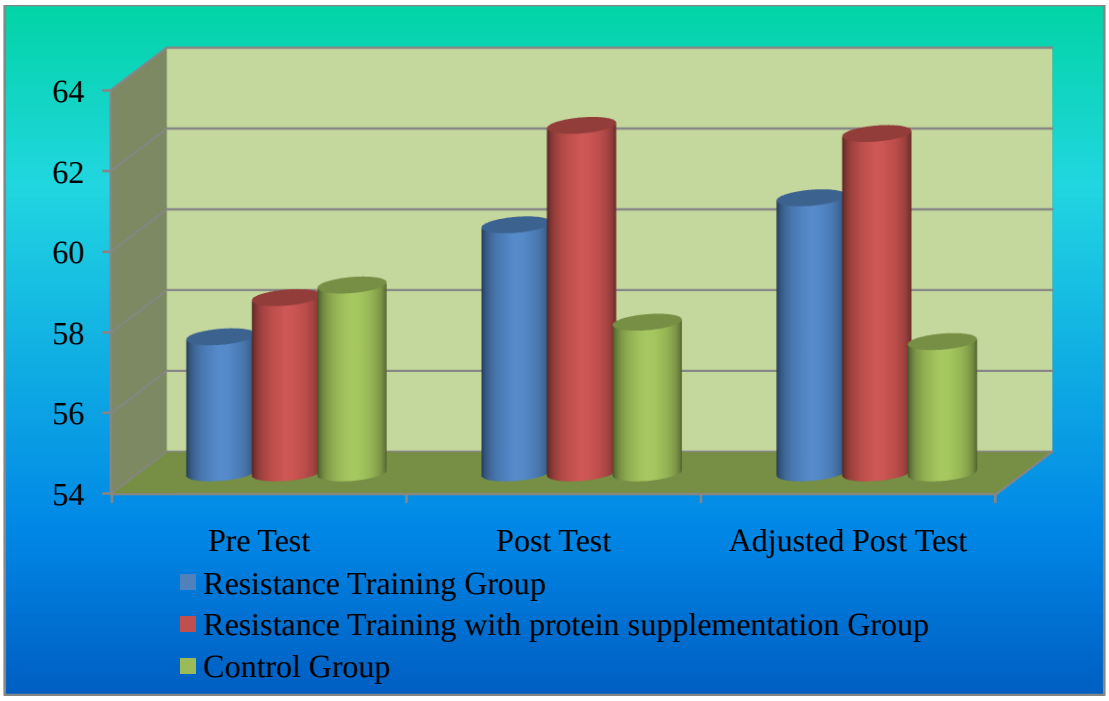
Table III. Scheffe's Post Hoc Test for the Differences among Paired Means of Experimental and Control Groups on Lean Body Mass

Resistance Training Group	Resistance Training with Protein Supplementation Group	Control Group	Mean Difference	Confidence Interval
60.81	62.40		1.59*	1.39
60.81		57.25	3.56*	1.39
	62.40	57.25	5.15*	1.39

**Significant at .05 level*

The Scheffe's post hoc analysis proved that significant mean differences existed between resistance training and resistance training with protein supplementation groups, resistance training and control groups, resistance training with protein supplementation and control groups on lean body mass since, the mean differences 1.59, 3.56 and 5.15 are higher than the confident interval value of 1.39 at 0.05 level of significance. Hence, it is concluded that due to the effect of resistance training and resistance training with protein supplementation the lean body mass of the inter collegiate athletes is significantly improved. It is also concluded that resistance training with protein supplementation is significantly better than resistance training in improving lean body mass of the athletes. The pre, post and adjusted post test mean values of resistance training, resistance training with protein supplementation and control groups on lean body mass is graphically represented in figure-II.

Figure II. Diagram Showing the Mean Values on Lean Body Mass of Experimental and Control Groups



Discussion

The results of the study indicates that the lean body mass of resistance training and resistance training with protein supplementation groups changed significantly by underwent the twelve weeks of training. These results are conformity with the following findings. According to Hakkinen et al., (2003) the strength and endurance training showed significant decreases in the body fat percentage throughout the experimental training period. Whereas fat-free mass only increased in groups performing resistance training regardless of endurance training inclusion (Kraemer et al., 1995). Changes in body composition are typically observed after chronic resistance training favouring an increase in fat-free mass and a decrease in the percentage of body fat (Hakkinen et al., 2003; Williams et al., 2002; Knapik, 1997). Sillanpaa et al., (2008) observed that combined strength and endurance training is a greater value than either alone in optimizing body composition in older men. Davis et al., (2008) found decline in fat mass and percent body fat of concurrent training group. Hass et al., (2001) documented that concurrent training, resulted in significant reductions in fat mass and percentage body fat. A recent study found that provision of a

protein/creatine/carbohydrate supplement just before and just after a resistance training programme that was carried out three times weekly for 10 weeks was more effective in promoting lean body mass and muscle strength. Athletes are encouraged to increase lean body mass. These athletes are pressured and almost expected to use protein supplementation when involved in training. The use of additional supplementation shows a serious commitment to their sport. Coaches encourage its use to create "an edge" over their opponents (Phillips, 2004). It has been observed that the dietary means of meeting the established protein requirements can be difficult and even impossible without incorporating protein supplementation. Many athletes believe that protein supplements are the magic bullet that will increase their lean body mass while improving their overall performance.

Conclusion

It is concluded that due to the effect of resistance training and resistance training with protein supplementation the lean body mass of the inter collegiate athletes is significantly changed. It is also concluded that resistance training with protein supplementation is significantly better than resistance training in increasing lean body mass of the athletes. The result of the study produced 4.83% of improvement due to resistance training, and 7.30% of improvement due to resistance training with protein supplementation on lean body mass of inter-collegiate level athletes.

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