Isolated and Combined Effect of Interval Training and Plyometric Exercise on anaerobic power of College Men

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ABSTRACT

The purpose of the study was to find out the isolated and combined effect of interval training and plyometric exercise on anaerobic power of college men. To achieve the purpose of this study, the investigator chosen sixty college men as participants in the age group of 18 to 23 years. The subjects were chosen from various colleges in Bangalore, Karnataka state, India who were never exposed to any kind of regular physical conditioning earlier were only considered. The study population was randomly divided into four equal groups of 15 each. Experimental group-I was given the packages of interval Training (IT), experimental group-II was given the packages of Plyometric Training (PT), experimental group-III was given the packages of Combined interval and Plyometric Training (IT & PT) and group IV was control. The data collected from the four groups prior to and post experimentation on anaerobic power was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four 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 to determine the paired mean differences, if any. Due to Interval training (2.93%), Plyometric Training (9.61%) and Combined Training (5.59%) the college men's anaerobic power (AP) enhanced greatly.

Keywords: *Interval training, Plyometric exercise, Anaerobic power and College men*

INTRODUCTION

Physical fitness is very much needed to improve the capacity of the heart, blood vessels, lungs, and muscles to function at optimal efficiency. It gives a basis for living a full and satisfying life style. The essential health components of physical fitness are cardio-respiratory endurance, strength, muscular endurance, flexibility, and body composition. To be physically fit requires effort, but exercise does not have to be punishing to help to develop and maintain physical fitness. Regular and vigorous exercise of the total body is an essential ingredient of muscular and circulatory fitness - the key to good health and well being. Lack of exercise is starts to show its consequence. An increase of body fatness, a loss of muscle tone, and a poor breathing capacity are some of the evident signs of physiological deterioration.

Physical fitness is a general state of good physical health. Obtaining and maintaining physical fitness is a result of physical activity, proper diet and nutrition and of course proper rest for physical recovery. In its simplest terms, physical fitness is to the human body what fine-tuning is to an engine. It enables people to perform up to their potential. Regardless of age, fitness can be described as a condition that helps individuals look, feel and do their best. Thus, physical fitness trainers, describe it as the ability to perform daily tasks vigorously and alertly, with left over energy to enjoy leisure-time activities and meet emergency demands. Specifically

true for senior citizens, physical fitness is the ability to endure, bear up, withstand stress and carry on in circumstances where an unfit person could not continue.

The protocol for interval training is, to push our body past the aerobic threshold for a few moments and then return to aerobic conditioning level with the objective of improving speed, strength, endurance and cardiovascular fitness. The aerobic threshold is the intensity where our body switches from burning a greater percentage of fat to a greater percentage of carbohydrate and is generally 85% of maximum heart rate. Interval training can be referred to the organization of any cardiovascular workout (e.g., cycling, running, rowing, etc.), and is prominent in training routines for many sports. It is a technique particularly employed by runners, but athletes in many disciplines use this type of training. Today, athletes use more structured interval training workouts to build speed and endurance. This variation of interval training and speed work can be a simple or sophisticated routine, but the basics are still the same as the original fartlek training.

Regular participation in a plyometric training program may also help to strengthen bone and facilitate weight control. Furthermore, well-rounded fitness programs that include plyometric training have been found to decrease the risk of sports-related injuries. This may be of particular benefit to young female athletes who are at increased risk for knee injuries as compared to young male athletes. There are thousands of plyometric exercises, ranging from low intensity double leg hops to high intensity drills such as depth jumps. Although the latter is typically associated with plyometric training for the mature athlete, common games and activities such as hopscotch, jumping rope and jumping jacks can also be characterized as plyometrics because every time the feet make contact with the ground the quadriceps are subjected to the stretch-shortening cycle. Knowledge of the various methods of training is most essential for coaches and players to attain optimal gain. The purpose of the present study was to assess the isolated and combined effect of interval training and plyometric exercise on anaerobic power of college men.

METHODOLOGY

To achieve the purpose of this study, the investigator chosen sixty college men as participants in the age group of 18 to 23 years. The subjects were chosen from various colleges in Bangalore, Karnataka state, India who were never exposed to any kind of regular physical conditioning earlier were only considered. The study population was randomly divided into four equal groups of 15 each. Experimental group-I was given the packages of interval Training (IT), experimental group-II was given the packages of Plyometric Training (PT), experimental group-III was given the packages of Combined interval and Plyometric Training (IT & PT) and group IV was control. The training groups participated in a 12 week training program performing a variety of exercises designed. The anaerobic power was chosen as dependent variable and was assessed by conducting RAST test.

Training Programme

The experimental group-I performed Interval Training (IT) alternatively three days in a week for 12 weeks. To decide the training intensity the participants were assessed for their training heart rate due to various work bouts, for planned repetitions as well as sets, with active rest on work-rest ratio basis. The training zone was calculated by means of Karvonen method and it was set at 65% to 80% of maximum heart rate. Subjects in the interval training (IT) group performed continuous running, 3days/week. To subjects performed the training distance of 5 minutes continuous running with proposed repetition and sets. The rest interval given between exercises and sets were of 1:1 and 1:3 respectively.

The experimental group-II performed Plyometric Training (PT) alternatively three days in a week for 12 weeks. Training volume ranged from 90 foot contacts to 140 foot contacts per session. Since, it is a quality session with the emphasis on high speed of movement for each repetition, ample recovery was given between exercises, sets and sessions. Rest interval of 1:1 between each exercise repetitions, 1:2 between sets and one day between plyometrics sessions was given in order to allow the neromuscular system to recover.

The experimental group-III was given the packages of combined interval and Plyometric Training (IT & PT) alternatively three days in a week for 12 weeks. They performed interval training during every odd numbered week and plyometric training during every even numbered week.

Statistical Technique

The data collected from the experimental and control groups on anaerobic power 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 anaerobic power due to the impact of experimental treatment. In order to nullify the initial mean differences the data collected from the three groups prior to and post experimentation on anaerobic power were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four 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 to determine the paired mean differences, if any. In all the cases the level of confidence was fixed at 0.05 level for significance.

RESULT

The chosen anaerobic power (AP) pre and post test values of Interval training, Plyometric training, Combined Training (CT) and control groups are analyzed as mentioned in table I-III.

Table – I: Paired't' Test as well as % of improvement in Anaerobic Power (AP) of Interval Training, Plyometric Training, Combined (CT) & Control group

Group	Tests	No.	Test Mean	S.D	D.M	't' - ratio	Percentage (%)
Interval Training	Pre	15	289.0000	82.86305	8.467	9.961*	2.93%
	Post		297.4667	82.20781			
Plyometric Training	Pre	15	289.2667	82.01783	27.800	21.046*	9.61%
	Post		317.0667	82.25176			
Combined Training	Pre	15	287.4667	86.19734	16.067	5.258*	5.59%
	Post		303.5333	81.57194			
Control	Pre	15	286.6000	82.67821	0.067	0.049	0.001%
	Post		286.6667	81.98926			

*Table value for df 14 is 2.15(*significant)*

The chosen college men's anaerobic power (AP) pre and post test values of Interval training, Plyometricl training, Combined Training (CT) and control groups differ clearly since the 't' values of interval (IT=9.96), Plyometricl training (PT=21.05) as well as combined treatment (CT=5.26) groups are greater than ('t'-ratio >2.15) table value (df14=2.15). Due to Interval training (2.93%), Plyometricl training Training (9.61%), Combined Training (5.59%) the college men's anaerobic power (AP) enhanced greatly.

The chosen college men's anaerobic power (AP) pre and post test values of Interval training, Plyometricl training, Combined Training (CT) and control groups were analyzed by ANCOVA statistics and displayed in table-II.

Table – II: Result of ANCOVA Statistics on Anaerobic Power (AP) of Interval Training, Plyometricl training, Combined (CT)& Control groups

Mean	Interval Training	Plyometric Training	Combined Training	Conl. Group (CG)	S o V	SS	df	MS	'F' ratio
Adjusted	296.57	315.91	304.14	288.12	B	6262.097	3	2087.366	42.556*
					W	2697.769	55	49.050	

*(Table value for df 3 &55=2.77)*Significant(.05 level)*

The chosen college men's anaerobic power (AP) adjusted post test values of interval (IT=296.57), Plyometric training (PT=315.91), Combined Training (CT=304.14) and control

groups (CG=288.12) differs from each other, since these derived adjusted mean's 'F' value (42.56) is more than mandatory table value (*df 3 & 55* =2.77).

As the Interval training, Plyometric training, Combined (CT) and control group's adjusted anaerobic power (AP) mean's 'F' value (F= 42.56) is found significant, Scheffe's Test was also applied as presented in table-III.

Table – III: Results of Scheffe's Test on Anaerobic Power (AP) of Interval Training, Plyometricl Training, Combined (CT)& Control groups

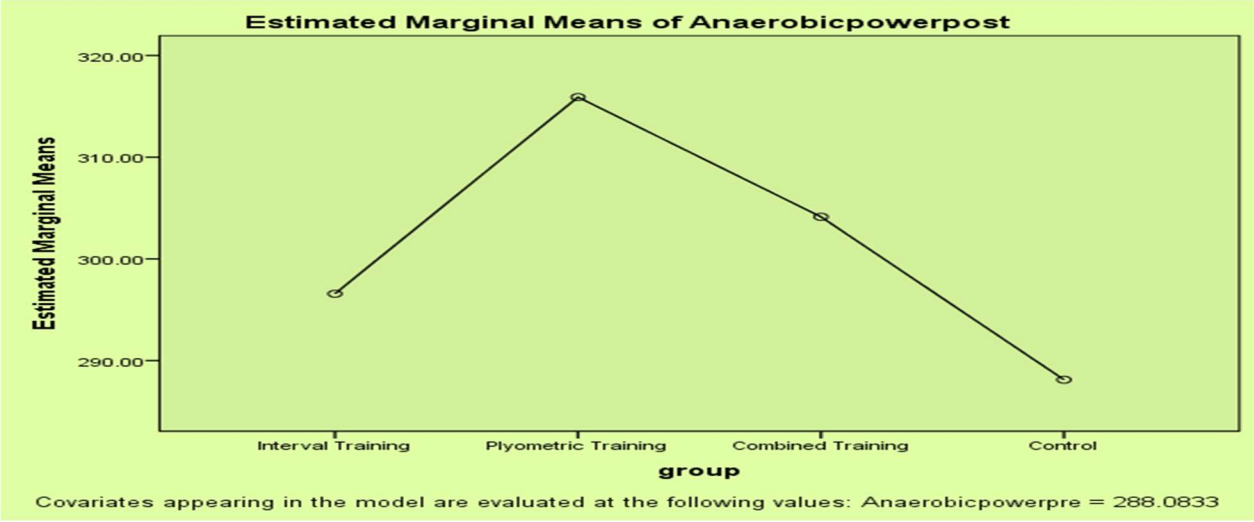
Variable	Interval Training	Plyometric Training	Combined Training	Conl. Group (CG)	MD	CI
Anaerobic Power	296.57	315.91			19.34*	6.02
	296.57		304.14		7.57*	6.02
	296.57			288.12	8.45*	6.02
		315.91	304.14		11.77*	6.02
		315.91		288.12	27.79*	6.02
			304.14	288.12	16.02*	6.02

**Significant (.05)*

This post hoc (Scheffe's Test) analysis proved that due to interval(IT =8.45), Plyometricl training (PT=27.79) and combined Training (CT=16.02) the college men's anaerobic power (AP) was greatly enhanced. Though, Plyometric training and Combined Training (CT) are much better than Interval training. Since these mean differences (19.34 &7.57) are higher than CI value (6.02). Whereas Plyometric training was better than Combined Training (CT) group (CI<11.77).

The chosen three experimental and Control group college men's anaerobic power (AP) scores are graphically displayed in diagram-I.

Figure – I: Figure Screening is the Anaerobic Power (AP) of Interval Training, Plyometric Training, Combined (CT) & Control Groups



DISCUSSION

The current study indicated that 12 weeks of combined intereval and plyometric training elicited enhancements in physical fitness components in college men. The combined training method is a workout system, which combines strength and plyometric for an optimal positive effect to improve the linear power (Chu, 1996). Burgener (1998) and Chu et al (2000) advocated the value of complex training to develop overall body control. According to Brown et al (1986), plyometric training (depth jumps) with coordinated arm movement and leg drive helps to enhance vertical jump. Duke & BenEliyahu (1992), conducted similar study and suggested that it would be logical to combine resistance training, plyometrics and speed training in the same session to increase power. Anecdotal evidence suggests that this is the optimal method for maximum power conversion.

Zepeda and Gonzalez (2000) reported that plyometric training enhances speed within 3 to 8 weeks period and resembles the training effect produces as a result of 30 to 50% of 1RM of three weeks. Therefore combining resistance training and plyometrics is the most effective method in maximizing power development as it allows more components of explosive power to be developed. This finding is in concurrence with the results of Newton and William (1994). Similarly, the present study is in conformity with the study of Radcliffe (1994), Bielik et. al (1986), Chu (1996) and National strength and conditioning association (NSCA) round table discussion on plyometrics with resistance training (complex training).

CONCLUSION

Due to Interval training (2.93%), Plyometricl training Training (9.61%), Combined Training (5.59%) the college men's anaerobic power (AP) enhanced greatly. Though, Plyometric training and Combined Training (CT) are much better than Interval training. Whereas Plyometric training was better than Combined Training (CT) group.

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