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Effects of resistance training programme on anaerobic performance variables of college tennis players

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Abstract
The study was formulated as a reverse group design consisting of pre test, post test and test following detaining the subjects (n=15) were randomly selected from affiliated colleges of Bharathiar university. Only one group was selected, pre-test was conducted for all the selected subjects on anaerobic variables. Then group participated in the resistance training for a period of 12 weeks. The post test was conducted on the dependent variables after the training period. On completion of post-test the training ceased for next 12 weeks. The subjects were not participated in any training programme other than their regular work. Test after detraining was conducted on the dependent variables after a period of 12 weeks from the date of post-test was taken. The collected data on anaerobic performance variables due to the effect of resistance training was statistically analyzed with 't' test to find out the significant improvement between pre & post test. The level of significance was fixed at.05 level of confidence for all the cases. The result of the study indicates that there is significant difference among effects of resistance training programme on anaerobic performance variables of college tennis players.

Keywords: Anaerobic variables, upper body strength, explosive power, speed

Introduction
Tennis
Tennis is a game played with a racket and a ball by two (as in singles) or four (as in doubles) competitors, on a rectangular court with a net strung between the midpoints of the longer sides of the court. Tennis may be played indoors or outdoors. The game ranks as one of the most popular spectator and participation sports in the world, with fans and competitors in more than 100 countries. Originally called lawn tennis to distinguish it from the sport of court tennis, from which it was derived, the game is now commonly known as tennis. Tennis requires strength, agility, and power. Strength is the base for all 3 qualities. Improving lower body and upper body strength will lead to more power hitting the ball and an improved ability to move around the tennis court. The energy demands of tennis are 99% Anaerobic (high intensity bouts of work with medium to short recovery periods). The average point length for an amateur tennis match is 6 seconds. The work to rest ratio is 1 to 4. For every 6 seconds of work, players will rest an average of 24 seconds.

Resistance Training
Resistance training has two different meanings. A broader meaning that refers to any training that uses a resistance to the force of muscular contraction (better termed strength training), and elastic or hydraulic resistance, which refers to a specific type of strength training that uses elastic or hydraulic tension to provide this resistance

Statement of the Problem
The purpose of the study was to find out the effects of resistance training programme on anaerobic performance variables of college tennis players.

Methodology
The purpose of this study was to find out the influence of resistance training programme anaerobic performance variables of college male tennis players. To achieve the purpose of the study fifteen University male tennis players were randomly selected from affiliated colleges of

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Bharathiar University. Their age ranged between 17 and 21 years. The subjects were given resistance training for three days a week, for a period of 12 weeks and detraining for 12 weeks. Following the 12 weeks of resistance training programme, the training was ceased for 12 weeks by which the effects of detaining would be evaluated.

Training Programme
The training programme was lasted for 45 minutes per session in a day, 3 days in a week for a period of 12 weeks duration.

These 45 minutes included 5 minutes warm up and 5 minutes warm up down remaining 35 minutes allotted for training programme. Every three weeks of training 5 % of intensity of load was increased from 65% to 80% of work load. Following the 12 weeks of resistance training programme, the resistance training group ceased the training for 12 weeks to provide for model form which the effects of detraining would be evaluated.

weeks	Name of the exercise	sets &repetition	Recovery	Intensity
1-3 weeks	Travelling lunges	2 x 8	30 secs	65%
	Bench press	2 x 8		
	Hack squad	2 x 8		
	One arm rowing	2 x 8		
	Prone leg curl	2 x 8		
	Arnold press	2 x 8		
4-6 weeks	Travelling lunges	2 x 10	45 secs	70%
	Bench press	2 x 10		
	Hack squad	2 x 10		
	One arm rowing	2 x 10		
	Prone leg curl	2 x 10		
	Arnold press	2 x 10		
7-9 weeks	Travelling lunges	2 x 12	1 min	75%
	Bench press	2 x 12		
	Hack squad	2 x 12		
	One arm rowing	2 x 12		
	Prone leg curl	2 x 12		
	Arnold press	2 x 12		
	Leg extension	2 x 12		
	Dumbbell hammer curl	2 x 12		
	Glut extension	2 x 12		
	Dumbbell kick back	2 x 12		
10-12 weeks	Travelling lunges	3 x 10	1 min	80%
	Bench press	3 x 10		
	Hack squad	3 x 10		
	One arm rowing	3x 10		
	Prone leg curl	3 x 10		
	Arnold press	3 x 10		

Criterion Measures

S. No	Anaerobic variables	Test Item	Unit of Measurement
1	Upper body strength	1 RM Bench Press	Kilograms
2	Leg explosive strength	Vertical Jump	Centimeters
3	Speed.	50 Yards Dash	Seconds

Statistical Technique
The collected data on anaerobic performance variables due to the effect of resistance training was statistically analyzed with 't' test to find out the significant improvement between pre & post-test. The level of significance was fixed at.05 level of confidence for all the cases.

Table 1: Computation of 'T' Ratio on Selected anaerobic performance variables of college tennis players. on Experimental Group and Control Group

Group	variables		Mean	N	Std.Deviation	Std.error	t ratio
Experimental group	Upper body strength	Pre test	0.75	15	0.0175	0.004	7.74*
		Post test	0.79	15	0.0174		
	Leg explosive power	Pre test	28.60	15	2.16	0.62	8.46*
		Post test	33.93	15	2.68		
	speed	Pre test	7.81	15	0.043	0.003	13.43*
		Post test	7.77	15	0.432		
Control group	Upper body strength	Pre test	0.76	15	0.02	0.006	0.612
		Post test	0.75	15	0.01		
	Leg explosive power	Pre test	26.73	15	3.01	0.86	1.07
		Post test	27.60	15	3.06		
	speed	Pre test	7.81	15	0.41	0.02	0.48
		Post test	7.82	15	0.43		

*Significant level 0.05 level degree of freedom (2.14, 1 and 14)

Table 3 reveals the computation of mean, standard deviation and 't' ratio on selected anaerobic performance variables namely upper body strength, explosive power and Speed, experimental group. The obtained 't' ratio on upper body strength, explosive power, and Speed, were 7.74, 8.46 and 13.43 respectively. The required table value was 2.14 for the degrees of freedom 1and 14 at the 0.05 level of significance. Since the obtained 't' values were greater than the table value it was found to be statistically significant.

Further the computation of mean, standard deviation and 't' ratio on selected anaerobic performance variables namely upper body strength, explosive power and Speed, control group. The obtained' ratio on agility, flexibility and dribbling ability were 0.61, 1.07 and 0.48 respectively. The required table value was 2.14 for the degrees of freedom 1and 14 at the 0.05 level of significance. Since the obtained 't' values were lesser than the table value it was found to be statistically not significant
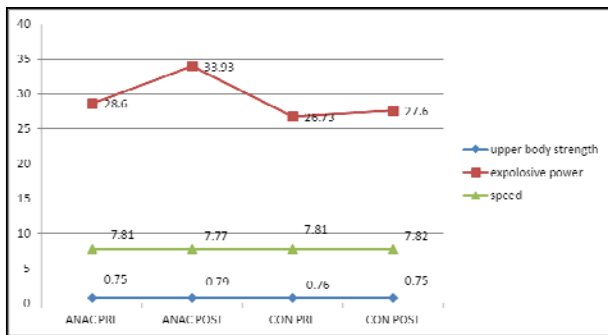

Fig I: Bar diagram showing the mean value on anaerobic Performance variables of college tennis players. On Experimental and control group

Discussion on Findings
The results of the present study indicates that the resistance training programme was effective method to produce significant changes in the selected variables such as, anaerobic performance variables of upper body strength, leg explosive power and speed due to twelve weeks of systematic training.

Bourke (2009) [1] suggested that it may be beneficial to employ an resistance sprint training intervention with the aim of increasing initial acceleration from a static start for sprinting. Robbins (2009) [2] reported that complex set resistance training would appear to be an effective method of exercise with respect to efficiency and strength development Umesh (2010) [3] revealed that the speed, leg explosive power and anaerobic power were significantly improved due to the influence of two modes of resistance training. Chtara (2008) [4] revealed that circuit resistance training significantly improved explosive strength and power of physical education students. Eight weeks of resistance training was sufficient to result in a significant improvement in VO2max in untrained male volunteers.

Conclusions
1. It was concluded that 12 weeks twelve weeks resistance training significantly improved the upper body strength, explosive power, and Speed. College tennis players
2. Resistance training is one among the most appropriate means to bring about the desirable changes over anaerobic variables and upper body strength, explosive power, and Speed College tennis players. Hence, suggested that coaches and the experts deal with tennis players to incorporate resistance training as a component in their training programme.

Recommendations
Systematic resistance training programme can be chalked out for the improvement of tennis of players of different age and achievement level. Resistance training can be included as a regular part of training programme for tennis and various sports and games. The amount of loss in variables due to detraining must be taken into consideration for fixing the load for retraining period. Similar study may also be conducted for college women and school students. Studies of similar nature may also be conducted by changing the dependent variables.

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