



## RELATIVE EFFECT OF POWER EXERCISE PACKAGES ON SELECTED MOTOR FITNESS VARIABLES AMONG FOOTBALL PLAYERS

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### ABSTRACT

The purpose of the study was to find out the Influence of power exercise parcels on selected motor fitness variables among college football players. To achieve this purpose of the study 45 men football players studying in the faculty of education and engineering, Annamalai University, Chidamdaram were selected as subjects at random. Their age ranged between 18 to 24 years. The selected participants were randomly divided into three equal groups of 15 footballers (n=15 each), two experimental groups and one control group. The participants were made aware of the training programme. Group-I underwent isotonic strength training, Group-II underwent isometric strength training and Group - III was the control group as they were not taken part in any specific training throughout the 12 weeks of intervention period. The following variable namely leg strength, back strength and anaerobic power was selected as criterion variable. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significant difference, if any among the groups. Whenever the obtained “F” ratio was found to be significant, the scheffe’s test was applied as post hoc test to find out the paired mean difference, if any. The 0.5 level of confidence was fixed to test the level of significance which was considered as an appropriate. The results of the study showed that there was a significant difference exists among isotonic and isometric strength training groups and control group on physical parameters. And also isotonic and isometric strength training group showed significant improvement on selected motor variables when compared to control group.

**Key Words:** Isotonic and Isometric Strength training, Leg strength, Back strength and anaerobic power

### INTRODUCTION

Strength training is fast becoming the most popular exercise today. For centuries, strength training was primarily used only for the strengthening and conditioning of a group of certain athletes. Even in athletics, many athletes and coaches did not emphasize the importance of weight training if their sports activity does not require having high level of muscular strength in order to be competitive.

However, in recent years the amount of information and research on strength training has exploded. Athletes of all types, from the professional athlete to the weekend enthusiast how understand the potential benefits of partaking in a strength training program (Purvis and Aaberg, 1999). The

amount and form of resistance used as well as the frequency of resistance exercises are determined by specific program goals. Based on the available literature, the research scholar has designed the strength training packages to impact over the physical and skill performance improvement among cricket players.

Sports training is a pedagogical process, based on scientific principles, aiming at preparing a sportsman for higher performances in sports competition. Some experts understand that sports’ training is basically doing physical exercise. For performing these physical exercises, the following factors are essentials such as sports equipment and implements, verbal instructions, means of recovery, means of assessment of performance capacity, nutrition, psychological means etc. Further advanced training of sports persons significantly supported by several sports disciplines like sports medicine sports psychology, nutrition, physiotherapy sports physiology, sports biomechanics and other allied sciences.

Tudor Bompa consider resistance training as an exercise programme where free or stationary weights are needed for the purpose of increasing muscular strength, muscular endurance and power through which skills can be improved. For several years athletes have lifted weights to gain strength. For the muscles to gain weight, the principle of progressive resistance are followed. The investigator makes an

attempt to study the Influence of power exercise parcels on selected physical fitness variables among football players.

### STATEMENT OF THE PROBLEME

The purpose of the study was to find out the Influence of power exercise parcels on selected physical fitness variables among football players

### DEFINITIONS AND EXPLANATIONS OF THE TERMS

#### Leg Strength

The capacity of the lower limb to exert muscular force. Leg strength measures the limb of lifting resistance in lowering and arising from sitting position.

#### Back Strength

Back strength may be defined as “the capacity of a person to exert muscular force of the lower back muscles

#### Anaerobic Power

Anaerobic power is the amount of work performed using primarily anaerobic energy systems (Baechle, 1994).

#### Independent Variables

1. Isotonic strength training
2. Isometric strength training

#### Dependent Variables

Leg strength, Back strength and anaerobic power

### METHODOLOGY

#### Selection of the subjects

To achieve this purpose of the study 45 men football players studying in the faculty of education and engineering, Annamalai University, Chidamdaram were selected as subjects at random.

### RESULTS

Their age ranged between 18 to 24 years. The selected participants were randomly divided into three equal groups of 15 footballers (n=15 each), two experimental groups and one control group. The participants were made aware of the training programme. Group-I underwent isotonic strength training, Group-II underwent isometric strength training and Group - III was the control group as they were not taken part in any specific training throughout the 12 weeks of intervention period. The following variable namely leg strength, back strength and anaerobic power was selected as criterion variables.

#### Training programme

The participants were made aware of the training programme. Group-I underwent isotonic strength training, Group-II underwent isometric strength training and Group - III was the control group as they were not taken part in any specific training throughout the 12 weeks of intervention period. The following variable namely leg strength, back strength and anaerobic power was selected as criterion variables. Every day the workout lasted for 45 to 60 minutes approximately including warming up and warming down periods.

#### Analysis of the Data

The collected data were analyzed statistically through analysis of covariance (ANCOVA) to fund out the significant difference, if any among the groups. Whenever the obtained “F” ratio was found to be significant, the scheffe’s test was applied as post hoc test to find out the paired mean difference, if any. The 0.5 level of confidence was fixed to test the level of significance which was considered as an appropriate.

**Table - 1**  
**COMPUTATION OF ANALYSIS OF COVARIANCE ON LEG STRENGTH**

	Isotonic Strength Training Group	Isometric Strength Training Group	Control Group	Source of variance	Sum of Squares	df	Mean squares	Obtained 'F' ratio
Pretest Mean SD	91.66	91.20	91.20	Between	0.044	2	0.022	0.031
				Within	29.73	42	0.708	
Post test Mean SD	97.00	93.933	92.00	Between	190.71	2	95.35	49.48*
				Within	80.93	42	1.92	
Adjusted Post test Mean	96.98	93.93	92.00	Between	189.17	2	94.58	*48.97
				Within	79.19	41	1.93	

The required table value for significant at 0.05 level of confidence for 2 and 42 (df) =3.22, 2 and 41 (df) =3.23.

\*Significant

Table-I shows that the pre test means on leg strength of isotonic strength training and isometric strength training and control groups are 91.66, 91.20 and 91.20 respectively. The obtained ‘F’ ratio value of 0.031 for pre test means on leg strength of isotonic strength training and isometric strength training and control groups are lesser than the required table value of 3.22 for significance at 0.05 level of confidence with degrees of freedom 2 and 42, which proved that the random assignment of the subjects were successful and their scores in leg strength before the training were equal and there was no significant differences.

The post-test means on leg strength of isotonic strength training and isometric strength training and control groups are 97.00, 93.93 and 92.20 respectively. The obtained ‘F’ ratio value of 49.48 for posttest data on leg strength is higher than the required table value of 3.22 for significance at

0.05 level of confidence with degrees of freedom 2 and 42.

The adjusted post-test means on leg strength of isotonic strength training and isometric strength training and control groups are 96.98, 93.93 and 92.00 respectively. The obtained ‘F’ ratio value of 48.97 of adjusted posttest data on leg strength is greater than the table value of 3.22 required for significance at 0.05 level of confidence with degrees of freedom 2 and 41

The result of the study shows that, significant differences exist among the adjusted post-test means of isotonic strength training and isometric strength training and control groups on leg strength. Since the ‘F’ ratio is found to be significant, the Scheffe’s post hoc test has been applied to find out the significant paired mean differences, and it is presented in table- 2.

**Table – 2**  
**SCHEFFE’S TEST FOR THE DIFFERENCES BETWEEN THE ADJUSTED POST TEST PAIRED MEANS OF LEG STRENGTH**

Adjusted Post Test Mean			Mean Differences	Confidence Interval
Isotonic Strength Training Group	Isometric Strength Training Group	Control Group		
96.98	93.93		3.05*	1.26
96.98		92.00	4.98*	1.26
	93.93	92.00	1.93*	1.26

\*Significant at .05 level.

Table- 2 shows that the adjusted post test mean differences between isotonic strength training and control groups, and isometric strength training and control groups on leg strength are 4.98 and 1.93 respectively. The values are greater than the confidence interval value 1.26, which shows significant difference at .05 level of confidence. However adjusted post test mean differences between isotonic strength training and isometric strength training groups on leg strength is 3.05, which is greater than the confidence interval value 1.26 needed for significant.

The result of the study shows that significant differences exist between the adjusted post test means of isotonic strength training and control groups, and isometric strength training and control groups on leg strength. However there was significant differences exist between isotonic strength training and isometric strength training groups. It reveals that both isotonic strength training and isometric strength training groups have significantly improved the leg strength of the football players..

**Table - 3**  
**COMPUTATION OF ANALYSIS OF COVARIANCE ON BACK STRENGTH**

	Isotonic Strength Training Group	Isometric Strength Training Group	Control Group	Source of variance	Sum of Squares	df	Mean squares	Obtained 'F' ratio
Pretest Mean SD	81.80	81.66	81.66	Between	0.178	2	0.089	0.162
				Within	23.06	42	0.549	
Post test Mean SD	87.33	84.73	82.00	Between	213.37	2	106.68	184.65*
				Within	24.26	42	0.57	
Adjusted Post test Mean	87.28	84.75	82.02	Between	206.91	2	103.45	230.95*
				Within	18.36	41	0.448	

The required table value for significant at 0.05 level of confidence for 2 and 42 (df) =3.22, 2 and 41 (df) =3.23.

\*Significant

Table-3 shows that the pre test means on back strength of isotonic strength training and isometric strength training and control groups are 81.80, 81.66 and 81.66 respectively. The obtained 'F' ratio value of 0.162 for pre test means on back strength of isotonic strength training and isometric strength training and control groups are lesser than the required table value of 3.22 for significance at 0.05 level of confidence with degrees of freedom 2 and 42, which proved that the random assignment of the subjects were successful and their scores in back strength before the training were equal and there was no significant differences.

The post-test means on back strength of isotonic strength training and isometric strength training and control groups are 87.33, 84.73 and 82.00 respectively. The obtained 'F' ratio value of 184.64 for posttest data on back strength is higher than the required table value of 3.22 for significance

at 0.05 level of confidence with degrees of freedom 2 and 42.

The adjusted post-test means on back strength of isotonic strength training and isometric strength training and control groups are 87.28, 84.75 and 82.02 respectively. The obtained 'F' ratio value of 230.95 of adjusted posttest data on back strength is greater than the table value of 3.22 required for significance at 0.05 level of confidence with degrees of freedom 2 and 41

The result of the study shows that, significant differences exist among the adjusted post-test means of isotonic strength training and isometric strength training and control groups on back strength. Since the 'F' ratio is found to be significant, the Scheffe's post hoc test has been applied to find out the significant paired mean differences, and it is presented in table- 4.

**Table - 4**  
**SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN THE ADJUSTED POST TEST PAIRED MEANS OF BACK STRENGTH**

Adjusted Post Test Mean			Mean Differences	Confidence Interval
Isotonic Strength Training Group	Isometric Strength Training Group	Control Group		
87.28	84.75		2.53*	0.68
87.28		82.02	5.26*	0.68
	84.75	82.02	2.73*	0.68

\*Significant at .05 level.

Table- 4 shows that the adjusted post test mean differences between isotonic strength training and control groups, and isometric strength training and control groups on back strength are 5.26 and 2.73 respectively. The values are greater than the confidence interval value 0.68, which shows significant difference at .05 level of confidence. However adjusted post test mean differences between isotonic strength training and isometric strength training groups on back strength is 2.53, which is greater than the confidence interval value 0.68 needed for significant.

The result of the study shows that significant differences exist between the adjusted post test means of isotonic strength training and control groups, and isometric strength training and control groups on back strength. However there was significant differences exist between isotonic strength training and isometric strength training groups. It reveals that both isotonic strength training and isometric strength training groups have significantly improved the back strength of the football players..

**Table - 5**  
**COMPUTATION OF ANALYSIS OF COVARIANCE ON ANAEROBIC POWER**

	Isotonic Strength Training Group	Isometric Strength Training Group	Control Group	Source of variance	Sum of Squares	df	Mean squares	Obtained 'F' ratio
Pretest Mean SD	95.61	95.25	95.90	Between	3.135	2	1.567	1.04
				Within	63.121	42	1.503	
Post test Mean SD	99.34	96.70	95.87	Between	98.183	2	49.092	31.92*
				Within	104.596	42	1.538	
Adjusted Post test Mean	99.31	97.01	95.58	Between	106.017	2	53.01	240.95*
				Within	8.855	41	0.22	

The required table value for significant at 0.05 level of confidence for 2 and 42 (df) =3.22, 2 and 41 (df) =3.23.

\*Significant

Table-3 shows that the pre test means on anaerobic power of isotonic strength training and isometric strength training and control groups are 95.61, 95.25 and 95.90 respectively. The obtained 'F' ratio value of 0.162 for pre test means on anaerobic power of isotonic strength training and isometric strength training and control groups are lesser than the required table value of 3.22 for significance at 0.05 level of confidence with degrees of freedom 2 and 42, which proved that the random assignment of the subjects were successful and their scores in back strength before the training were equal and there was no significant differences.

The post-test means on anaerobic power of isotonic strength training and isometric strength training and control groups are 99.34, 96.70 and 95.87 respectively. The obtained 'F' ratio value of 31.92 for posttest data on anaerobic power is higher than the required table value of 3.22 for significance

at 0.05 level of confidence with degrees of freedom 2 and 42.

The adjusted post-test means on back strength of isotonic strength training and isometric strength training and control groups are 99.32, 97.01 and 95.58 respectively. The obtained 'F' ratio value of 240.95 of adjusted posttest data on anaerobic power is greater than the table value of 3.22 required for significance at 0.05 level of confidence with degrees of freedom 2 and 41

The result of the study shows that, significant differences exist among the adjusted post-test means of isotonic strength training and isometric strength training and control groups on anaerobic power. Since the 'F' ratio is found to be significant, the Scheffe's post hoc test has been applied to find out the significant paired mean differences, and it is presented in table- 6

**Table – 6**  
**SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN THE ADJUSTED POST TEST PAIRED**  
**MEANS OF ANAEROBIC POWER**

Adjusted Post Test Mean			Mean Differences	Confidence Interval
Isotonic Strength Training Group	Isometric Strength Training Group	Control Group		
99.31	97.01		2.30*	0.43
99.31		95.58	3.73*	0.43
	97.01	95.58	1.43*	0.43

\*Significant at .05 level.

Table- 2 shows that the adjusted post test mean differences between isotonic strength training and control groups, and isometric strength training and control groups on anaerobic power are 3.73 and 1.43 respectively. The values are greater than the confidence interval value 0.43, which shows significant difference at .05 level of confidence. However adjusted post test mean differences between isotonic strength training and isometric strength training groups on anaerobic power is 2.30, which is greater than the confidence interval value 0.43 needed for significant.

The result of the study shows that significant differences exist between the adjusted post test means of isotonic strength training and control groups, and isometric strength training and control groups on anaerobic power. However there was significant differences exist between isotonic strength training and isometric strength training groups. It reveals that both isotonic strength training and isometric strength training groups have significantly improved the anaerobic power of the football players..

#### **DISCUSSION ON FINDINGS**

The results of this study suggest that twelve weeks of isotonic and isometric strength training have improved the selected physical fitness variables when compare to control group. The above findings can be substantiated by observations made by following renowned experts. It is well known that strength training increases muscle mass and strength. These findings agree with those of DeLorme (1945) who reported that a small number of repetitions with high resistance produced strength, whereas a large number of repetitions against low resistance increased endurance. These two principles are the basis of isotonic strength training. With isotonic

training, the total work done does not determine the magnitude of strength increase. Dons and others (1979) observed that individuals training at 50% of one repetition maximum (1 RM) and 80% 1 RM, the 50% group performed 20 contractions, the 80% group performed 12 contractions. After 7 weeks of training, only the 80% load group increased their strength significantly, although both groups performed the same amount of mechanical work each day. In terms of increasing strength, muscle contractions of high-intensity and short duration, whether isometric or isotonic, produce the greatest strength gains.

Maximal isometric training results in strength gains from 15%-90% after 5-16 weeks of training (Carolan and Cafarelli 1992, Cannon and Cafarelli 1987, Garfinkel and Cafarelli 1992, Ikai and Funkunaga 1970). Submaximal training has also been shown to increase strength, however, not to the same extent. Alway and others (1990) found a 30% increase in maximal isometric torque after 16 weeks of isometric training at 30% maximum voluntary contraction. However, the same authors carried out another study, this time training with maximum voluntary contraction's, and this resulted in a 44% increase in isometric torque over the same time period (Alway et al., 1989).

Similarly, Goto (2002) suggested that low intensity strength exercise improves muscular strength more than traditional strength training. LeMura and others (2002) observed 16 weeks of various modes of resistance training and found that the resistance training group increased upper and lower body strength. Starkey (1996) determined the effects of different volumes of high-intensity resistance training on isometric torque and muscle thickness; found that both groups improved muscular strength torque similarly at most angles. Dorgo and others (2009) found significant improvements in

muscular strength and muscular endurance of the manual resistance training and weight resistance training groups. The study was supported by **Brechue and Mayhew(2009)**

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