

# Combination of Squat and Plyometric Training Program on the Development of Power Production and Skill Performance of Inter Collegiate Men Volleyball Players

R.Annadurai<sup>1</sup>, S.Rajaram<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Physical Education  
Bharathiar University, Coimbatore, Tamil Nadu, India  
annadurai3@gmail.com

<sup>2</sup>PhD Scholar, Dept. of Physical Education  
Bharathiar University, Coimbatore, Tamil Nadu, India  
rajavolley23@gmail.com

**Abstract:** For this study thirty (N=30) inter collegiate men volleyball players were selected from the affiliated colleges of Bharathiar University, Tamil Nadu. Age ranged from 18 to 25 years. They were divided into two groups (n=15). Group - I Combination of Squat and Plyometric Training (CSQPT) and Group - II control group (CG). Spike jump, block jump and serving ability were selected as variables. The training period was six weeks. The variable was assessed by using a paired t-test at 0.05. The result of the study showed Combination of squat and Plyometric training get statistically improvement on all the variables.

**Keywords:** Squat, Plyometric Training, spike jump, block jump, serving ability.

## 1. Introduction

Sports have become as competitive as other fields in the world. In ancient times, our ancestors exhibited extraordinary talents in terms of physical activity. But now it has become completely professional. Somehow or other irrespective of age the human race is involved in different kinds of sports either for recreation or competition. In the present world, Sports have become extremely competitive. It is not mere participation or practice that makes an individual victorious.

### 1.1 Squat Training

Squat is an exercise used in weightlifting, which trains the thighs, hips and buttocks. It is also an important exercise for strengthening the bones, ligaments and tendons throughout the lower body. Squats are a vital exercise for increasing the strength and size of the legs and buttocks (Adams. K,1992).

### 1.2 Plyometric Training

Plyometric training, termed as "explosive-reactive" is a power training, which involves powerful muscular contractions in response to a rapid stretching of the involved musculature. The main objective in Plyometric training is to improve quickness through strength. The fast twist or white fiber is responsible for explosive type of muscular contraction (Chu, 1996).

### 1.3 Combination of Squat and Plyometric Training

Combining weight and Plyometric training is called complex training. It involves alternating between biomechanically similar high-load weight -training and Plyometric exercises, set for set, within the same workout. Complex training includes combining the bench press with

the medicine ball power drop or combining the squat with depth jumps (Harris, G.R, 1999).

### 1.4 Statement of the Problem

The purpose of the study was to determine the effect of combination of Squat and Plyometric training programme on the development of power production and skill performance of inter collegiate men volleyball players.

### 1.5 Significance of the Study

The present study is significant in the following aspects,

1. Players can be benefited by identified their level of factors related to power production and skill performance of volleyball players.
2. The outcome of the present study help explore and meaningful in dealing with volleyball skills.
3. As for as the trainings are concerned the functions of power production and the players asses their standard themselves.
4. As earlier studies conformed that the power production training increased the explosive power. As for as the same in the various training programme will motivate the participants as the combined training programme.

### 1.6 Hypotheses

The hypotheses are formulated in the present study are as follows:-

1. It was hypothesized that, there would be a significant difference on combination of squat and plyometric training program on the development of power production and skill performance of inter collegiate men volleyball players.
2. It was hypothesized that, combination of squat and plyometric training programme would be statistically

significant than the control group on the development of power production and skill performance of inter collegiate men volleyball players.

**1.7 Delimitations**

The Present study was delimited into the following aspects:-

1. The present study was confined to men volleyball players only at inter collegiate level from various affiliated colleges of Bharathiar University, Coimbatore.
2. The subjects were age ranged from 18 to 28 years.
3. The total number of subjects for the present study was thirty (N=30). They were divided into two equal groups. Each group consists of 15 subjects.
4. The Group - I underwent combination of squat and plyometric training (CSQPT) and Group - II acted as control group (CG).

**1.1 Limitations**

The Present Study was limited into the following aspects:-

1. Selection of subjects was be made according to their interest in involving themselves in this study.
2. Certain factors like food habits, life style routine work, etc which may affect our result of this investigation was not taken into consideration.
3. The climatic conditions were not taken into consideration.
4. The performance and skills of their background experience in the field of sports and games were not taken into consideration.

**2. Methodology**

**2.1 Selection of the Subjects**

1. To achieve the purpose of the study, thirty (N=30) inter collegiate men volleyball players were randomly selected from the affiliated colleges of Bharathiar University Coimbatore, Tamil Nadu.
2. The subjects were age ranged from 18 to 25 years. They were divided into two equal groups. Each group consists of 15 subjects.
3. Group - I underwent Combination of Squat and Plyometric Training (CSQPT) and Group - II acted as control group (CG). The control group did not participate any specific training.

**2.2 Selection of the Variables**

**Power Production Variables**

1. Spike Jump
2. Block Jump

**Skill Performance Variable**

3. Serving Ability

**2.3 Selection of the Tests**

**Table 1**

Variables	Test Items	Units
Spike Jump	Vertical jump test	In meters
Block Jump		
Serving Ability	Russell Lange volleyball test	In numbers

**2.4 Administration of Training Program**

After the initial measurements the specially designed training programme was given to the subjects of the Combination of Squat and Plyometric training group.

**Table 2:** Combination of Squat and Plyometric Training Schedule for 1 to 6 weeks

Squat Training	Intensity			Rep	Sets	Plyometric Training
	2	4	6			
Barbell Front squat	65 %	70%	75 %	3-5	3	Squat jump
	L	M	H	4-6		
Hack Squat	65 %	70%	75 %	3-5	3	Multiple box squat jump
	L	M	H	4-6		
Launge	65 %	70%	75 %	3-5	3	Depth jump
	L	M	H	4-6		
Dead Lift	65 %	70%	75 %	3-5	3	Split squat jump
	L	M	H	4-6		
Good morning Lift	65 %	70%	75 %	3-5	3	Tuck jump
	L	M	H	4-6		

**L- Low, M-Medium, H-High.**

**Description for Combination of Squat and Plyometric Training**

The Combination of Squad and Plyometric Training (CSQPT) group were treated with Squat training for the first 25 minutes, after completion of squat training for another 25 minutes of Plyometric training in the same session. The intensity of Squat Training (SQT) for first two weeks was 65% (1RM) with 3-5 repetitions of 3 sets. The rest in between the exercise was 30 seconds and rest in between sets was 1 to 2 minutes. Squat training intensity was raised by 5% for every two weeks (70% and 75% respectively).

In the Plyometric session the subjects were actively involved in plyometric training. Each exercise was 4-6 repetitions for 3 sets. The rest in between the exercises were 30 seconds and sets were 2 minutes. The intensity of the Plyometric Training (PT) for the first two weeks were low, second two weeks was medium and third two weeks were high levels, for all jumping exercises. The load progression technique was adapted in the training to maintain the training load and training principles. Before starting their training they

last undergo warm up and training was done for 3day a week with 2 day of rest. On the after alternate day they practiced their traditional training.

Variables	Pre test Mean $\pm$ SD	Post test Mean $\pm$ SD	Mean Diff	SE	N	"t"
Block jump	43.60 $\pm$ 2.29	43.93 $\pm$ 2.18	0.33	0.21	15	1.58
Spike jump	50.93 $\pm$ 1.86	51.13 $\pm$ 1.40	0.20	0.31	15	0.64
Serving Ability	35.93 $\pm$ 1.91	36.33 $\pm$ 1.85	0.40	0.19	15	1.69

**2.5 Collection of Data**

The subjects have been divided into two equal groups. Initial reading has been taken for all three groups, and the reading have been carefully recorded. The experimental group was treated combination of squat and plyometric training. The selected subjects were tested on selected power production variable like explosive power (block jump & spike jump) and skill performance (service). On completion of pre test, they were treated with respective training programme for a period of six weeks. After six weeks of treatment, the post test was conducted for all three groups and the final readings have been recorded carefully.

**2.6 Statistical Technique**

The collected data were statistically analyzed with a paired (samples) t-test to find out the significant improvement between pre and post test means of all groups. The level of  $p > 0.05$  was considered significant.

Variables	Pre test Mean $\pm$ SD	Post test Mean $\pm$ SD	Mean Diff	SE	N	"t"
Block jump	45.00 $\pm$ 2.73	52.93 $\pm$ 2.69	7.93	0.81	15	9.82*
Spike jump	52.86 $\pm$ 2.10	61.46 $\pm$ 3.23	8.60	0.63	15	13.63*
Serving Ability	35.93 $\pm$ 1.91	44.53 $\pm$ 1.85	8.60	0.70	15	12.36*

**3. Analysis of Data and Results of this Study**

**Table 3:** Significance of mean gains /losses between pre and post test of combination of squat and plyometric training on selected power production and skill performance variables

**\*Significant at 0.05 level (2.14). df (1, 14)**

Table -3 Indicates that the obtained't' ratio for power production and skill performance variables were block jump (9.82), spike jump (13.63) and serving ability (12.36). The obtained't' ratio on power production and skill performance variables were greater than the critical value of 2.14 for df (1, 14). It was observed that the mean gains and losses made from pre-test and post-test were statistically significant. For resulting six weeks practice of combination of squat and plyometric training (CSQPT) produced significant improvement in block jump (7.93cm  $p < 0.05$ ), spike jump

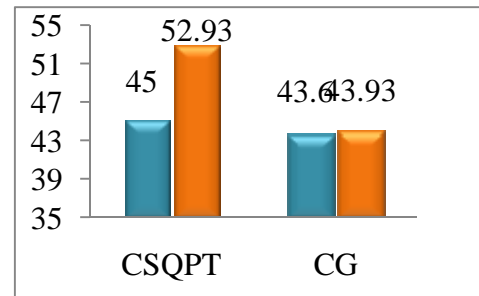
(8.60cm  $p < 0.05$ ) and serving ability (8.60cm  $p < 0.05$ ) from the performance of baseline.

**Table -4:** Significance of mean gains /losses between pre and post test of control group on selected power production and skill performance variables

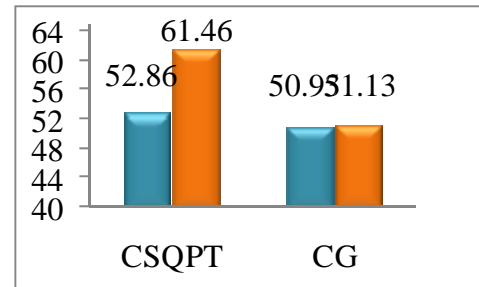
**\*Significant at 0.05 level (2.14). df (1, 14)**

Table -4 Indicates that the obtained't' ratio for power production and skill performance variables were block jump (1.58), spike jump (0.64) and serving ability (1.69). The obtained't' ratio on power production and skill performance variables were greater than the critical value of 2.14 for df (1, 14). It was observed that the mean gains and losses made from pre-test and post-test were statistically insignificant. For resulting six weeks practice of combination of squat and plyometric training (CSQPT) produced insignificant improvement in block jump (0.33cm  $p < 0.05$ ), spike jump (0.20cm  $p < 0.05$ ) and serving ability (0.40cm  $p < 0.05$ ) from the performance of baseline.

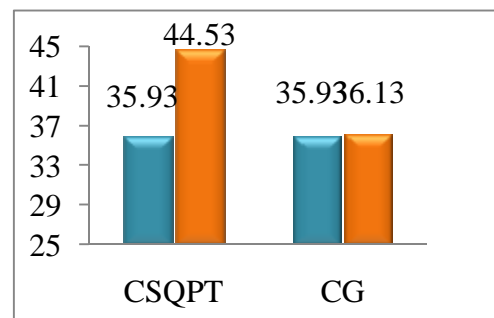
**Figure 1:** Bar diagram showing the mean values of pre-test and post-test on Block Jump



**Figure 2:** Bar diagram showing the mean values of pre-test and post-test on Spike Jump



**Figure 3:** Bar diagram showing the mean values of pretest and post-test on Serving Ability



### 3.1 Discussion on Findings

The findings of the present study as follows;

1. In testing the individualized effect of combination of squat and plyometric training on selected power production variables (block and spike jump) and skill performance (serving ability) of inter collegiate men volleyball players.
2. The mean difference observed on the performance of variables between combination of squat and plyometric training and control group before treatment is statistically not significant.
3. The mean difference observed on the performance of variables after completion of training period, the combination of squat and plyometric training was statistically significant.
4. Combination of squat and plyometric training is significantly better in the development of block jump, spike jump and serving ability than the control group.

### 3.2 Conclusions

1. It was concluded that individualized Combination of squat and Plyometric training (CSQPT) showed a statistically significant positive sign over the course of the treatment period on selected power production and skill performance variables of inter-collegiate men volleyball players.
2. The results of comparative effects lead to conclude that combination of Squat and Plyometric Training (CSQPT) has significant improvement on selected power production and skill performance variables of inter-collegiate men volleyball players as compared to their performance with control group (CG).

### 3.3 Recommendations

Based on the results of the study the following recommendations were suggested by the investigator.

1. The present study is mainly concerned with the men volleyball players at inter-collegiate level as samples. So the same study can be conducted on women volleyball players at the inter-collegiate and university level.
2. The same may be conducted at different age group for boys and girls.

3. A similar study may be conducted with a change of training protocol for other games like basketball, handball and football.
4. The study can further be conducted separately for rural and urban students having different nutritional habits.

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### Authors Profile



**Dr. R. Annadurai**, Assistant Professor, Dept. of Physical Education, Bharathiar University, Coimbatore, Tamil Nadu, India, has received the M.Phil, and Ph.D degrees in physical education. Then published more than five international papers and more than ten national papers, and also published basic skills in basketball book.



**S. Rajaram**, PhD Scholar, Dept. of Physical Education, Bharathiar University, Coimbatore, Tamil Nadu, India, has received M.P.Ed and M.Phil Degrees in physical education. Then published one international paper and more than five national papers, and participated more than five workshops related in physical education.