



## EFFECTS OF WEIGHT TRAINING, PLYOMETRIC TRAINING AND COMPLEX WEIGHT AND PLYOMETRIC TRAINING, DETRAINING AND RETRAINING ON EXPLOSIVE POWER IN TERMS OF VERTICAL DISTANCE

**Dr. G. RAVINDRAN**

*Principal, Koviloor Andavar College of Physical Education, Koviloor, Sivaganga, India.*

### Abstract

*The purpose of the study was to find out the effects of weight training, plyometric training and complex weight and plyometric training, detraining and retraining on explosive power in terms of vertical distance. For the purpose of the study, sixty men students studying in Koviloor Andavar College of Physical Education, Koviloor, Karaikudi, Tamil Nadu, India were selected as subjects and they were divided into four equal groups of fifteen subjects each at random. Group I and Group II underwent weight training and plyometric training respectively for three days per week for twelve weeks whereas Group III underwent complex weight and plyometric training and they underwent weight training for first six weeks and plyometric training for remaining six weeks as three days per week for twelve weeks. And Group IV acted as control who did not undergo any special training programme apart from their regular physical education programme of the curriculum. All the subjects of the four groups were tested on explosive power in terms of vertical distance at prior and immediately after the training programme as pre and post tests respectively, at every ten days of detraining programme for forty days (four cessations) and after the four weeks of retraining programme. The collected data were statistically analysed by using 4 × 7 factorial ANOVA with last factor repeated measures to find out the significant differences between rows (groups) and columns (tests). Whenever, the obtained "F" ratio for interaction effect was found to be significant, the simple effect test was used as a follow up test. Since, four groups and seven different stages of tests were compared, whenever the obtained "F" ratio value in the simple effect was significant the Scheffe'S test was applied as post hoc test to determine the paired mean differences, if any. The results of the study showed that there was significant difference exist between weight training group, plyometric training group and complex weight and plyometric training group when compared to control group on explosive power in terms of vertical distance. Significant differences were found among the experimental groups on explosive power in terms of vertical distance after first and second cessation of detraining period. And no significant differences were found among the experimental groups on explosive power in terms of vertical distance after third and fourth cessation of detraining period. It is revealed that there were no significant decreases on selected explosive power in terms of vertical distance after first and second cessation of detraining period. And there were significant decreases on selected power parameters after third and fourth cessation of detraining period. The results of the study also showed that there was significant difference exist between fourth cessation and after four weeks of training period on explosive power in terms of vertical distance for weight training group, plyometric training group and complex weight and plyometric training group.*

**Keywords:** Weight Training, Plyometric Training, Complex Training, Explosive Power.

### INTRODUCTION

Sports training is the basic form of an athlete's training. It is the preparation systematically organized with the help of exercises, which in fact is a pedagogically organized process of controlling an athlete's development (his sporting perfection)

### METHODOLOGY

The purpose of the study was to find out the effects of weight training, plyometric training and complex weight and plyometric training, detraining and retraining on explosive power in terms of vertical distance. For the purpose of the study, sixty men students studying in Koviloor Andavar College of Physical Education, Koviloor, Karaikudi, Tamil Nadu, India were

selected as subjects and they were divided into four equal groups of fifteen subjects each at random. Group I and Group II underwent weight training and plyometric training respectively for three days per week for twelve weeks whereas Group III underwent complex weight and plyometric training and they underwent weight training for first six weeks and plyometric training for remaining six weeks as three days per week for twelve weeks. And Group IV acted as control who did not undergo any special training programme apart from their regular physical education programme of the curriculum. All the subjects of the four groups were tested on explosive power in terms of vertical distance at prior and immediately after the training programme as pre and post tests respectively, at every ten days of detraining

programme for forty days (four cessations) and after the four weeks of retraining programme. The collected data were statistically analysed by using  $4 \times 7$  factorial ANOVA with last factor repeated measures to find out the significant differences between rows (groups) and columns (tests). Whenever, the obtained "F" ratio for interaction effect was found to be significant, the simple effect test was used as a follow up test. Since, four groups and seven different stages of tests were compared, whenever the obtained "F" ratio value in the simple effect was significant the Scheffe'S test was applied as post hoc test to determine the paired mean differences, if any.

### TRAINING PROGRAMME

Group I and Group II underwent weight training and plyometric training respectively for three days per week for twelve weeks whereas Group III underwent complex weight and plyometric training and they

underwent weight training for first six weeks and plyometric training for remaining six weeks as three days per week for twelve weeks. And Group IV acted as control who did not undergo any special training programme apart from their regular physical education programme of the curriculum. Training was given in the morning session. The training session includes warming up and limbering down. Every day the workout lasted for 45 to 60 minutes approximately. The subjects underwent their respective training programmes as per the schedules under the strict supervision of the investigator.

### ANALYSIS OF THE DATA

The two way analysis of variance values on explosive power in terms of vertical distance of all four groups at seven different stages of test have been presented in Table I-A.

**TABLE I-A**  
**THE TWO WAY ANALYSIS OF VARIANCE ON EXPLOSIVE POWER IN TERMS OF VERTICAL DISTANCE OF WEIGHT TRAINING, PLYOMETRIC TRAINING, COMPLEX WEIGHT AND PLYOMETRIC TRAINING AND CONTROL GROUPS AT SEVEN DIFFERENT STAGES OF TESTS**

Source of variance	Sum of squares	Df	Mean squares	Obtained "F" ratio
<b>Between</b>				
A factor (groups)	62.49	3	20.83	
Error	224.36	56	4.01	5.20*
<b>Within</b>				
B factor (tests)	96.72	6	16.12	201.50*
AB factor (interaction)	34.71	18	1.93	24.13*
Error	26.57	336	0.08	

\* Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence with df 3 and 56, 6 and 336 & 18 and 336 were 2.772, 2.1264 and 2.10 respectively.

Table I-A shows that the obtained 'F' ratio value 5.20 for row (groups) on explosive power in terms of vertical distance which is greater than the required table value 2.772 for significance with df 3 and 56. It further shows that the obtained 'F' ratio value 201.50 for column (tests) on explosive power in terms of vertical distance which is greater than the required table value 2.1264 for significance with df 6 and 336. It also shows that the obtained 'F' ratio value 24.13 for interaction effect (groups  $\times$  tests) on explosive power in terms of vertical distance which is also greater than the required

table value 2.10 for significance with df 18 and 336. The results of the study indicated that there was a significant difference among rows (groups) and among columns (different stages of tests) on explosive power in terms of vertical distance. The results of the study indicated that there was a significant difference in the interaction effect [between rows (groups) and columns (tests)] on explosive power in terms of vertical distance. Since, the interaction effect was significant, the simple test was applied as follow up test and they are presented in table I-B.

**TABLE I-B**  
**THE SIMPLE EFFECT VALUES OF ALL FOUR GROUPS (ROWS) AT SEVEN DIFFERENT STAGES OF TESTS (COLUMNS) ON EXPLOSIVE POWER IN TERMS OF VERTICAL DISTANCE**

Sources of variance	Sum of squares	df	Mean squares	Obtained "F" ratio
Groups and Pre Test	0.18	3	0.06	0.75
Groups and Post Test	25.40	3	8.47	105.88*
Groups and First Cessation	23.38	3	7.79	97.38*
Groups and Second Cessation	21.47	3	7.16	89.50*
Groups and Third Cessation	0.40	3	0.13	1.63
Groups and Fourth Cessation	0.18	3	0.60	0.75
Groups and After Retraining Period	26.18	3	8.73	109.13*
Tests and Weight Training Group	21.30	6	3.55	44.38*
Tests and Plyometric Training Group	42.90	6	7.15	89.38*
Tests and Complex Weight and Plyometric Training Group	61.12	6	10.19	127.38*
Tests and Control Group	0.11	6	0.02	0.25
Error	26.57	336	0.08	

\* Significant at .05 level of confidence.

(The table value required for significance at .05 level of confidence with df 3 and 336, and 6 and 336 were 2.60 and 2.1264 respectively).

The table I-B shows that the obtained "F" ratio values 105.88, 97.38, 89.50 and 109.13 for groups and post test values, groups and first cessation values, groups and second cessation values and groups and after retraining period values respectively on explosive power in terms of vertical distance which are greater than the required table value 2.60 for significance with df 3 and 336 at .05 level of confidence. And also the obtained "F" ratio value 44.38, 89.38 and 127.38 respectively for tests and weight training group, tests and plyometric training group and tests and complex weight and plyometric training group on explosive power in terms of vertical distance which are greater than the required table value 2.1264 for significance with df 6 and 336 at .05 level of confidence. The table I-B also shows that the obtained "F" ratio values 0.75, 1.63 and 0.75 for groups and pre test values, groups and third cessation values and groups and fourth cessation values respectively on explosive power in terms of vertical distance which are less than the required table value 2.60 for significance with df 3 and 336, at .05 level of confidence. It further shows that the obtained "F" ratio value 0.25 and tests and control group respectively on explosive power in terms of vertical distance which is also less than the required table value 2.1264 with df 6 and 336 for significance at .05 level of confidence.

Hence, the results of the study showed that there was a significant difference between groups and post test values, groups and first cessation values, groups and second cessation values, groups and after retraining period values, tests and weight training group, tests and plyometric training group and tests and complex weight and plyometric training group on explosive power in terms of vertical distance. And no significant difference was found between groups and pre test values, groups and third cessation values, groups and fourth cessation

values and tests and control group on explosive power in terms of vertical distance. Since, four groups and seven different stages of tests were compared, whenever the obtained "F" ratio value in the simple effect was significant, the Scheffe'S test was applied as post hoc test to find out the paired mean difference, if any and it was presented below.

The results of the study showed that there was a significant difference between weight training group and plyometric training group, weight training group and complex weight and plyometric training group, weight training group and control group, plyometric training group and complex weight and plyometric training group, plyometric training group and control group and complex weight and plyometric training group and control group on explosive power in terms of vertical distance at post test period, at after first cessation of detraining period, at after second cessation of detraining period and at after retraining period. The results of the study showed that there was a significant difference between pre test and post test values, pre test and first cessation values, pre test and second cessation values, pre test and after retraining period values, post test and third cessation values, post test and fourth cessation values, first cessation and third cessation values, first cessation and fourth cessation values, second cessation and third cessation values, second cessation and fourth cessation values, third cessation and after retraining period values, fourth cessation and after retraining period values on explosive power in terms of vertical distance of weight training group. It was also found that there was no significant difference between pre test and third cessation values, pre test and fourth cessation values, post test and first cessation values, post test and second cessation values, post test and after retraining period values, first cessation and second cessation values, first

cessation and after retraining period, second cessation and after retraining period values and third cessation and fourth cessation values on explosive power in terms of vertical distance of weight training group, plyometric training group and complex weight and plyometric training group.

## RESULTS

1. The results of the study showed that there was significant difference exist between weight training group, plyometric training group and complex weight and plyometric training group when compared to control group on explosive power in terms of vertical distance.
2. Significant differences were found among the experimental groups on explosive power in terms of vertical distance after first and second cessation of detraining period.
3. And no significant differences were found among the experimental groups on explosiver power in terms of vertical distance after third and fourth cessation of detraining period.
4. It is revealed that there were no significant decreases on selected explosive power in terms of vertical distance after first and second cessation of detraining period.
5. And there were significant decreases on selected power parameters after third and fourth cessation of detraining period.
6. The results of the study also showed that there was significant difference exist between fourth cassation and after four weeks of training period on explosive power in terms of vertical distance for weight training group, plyometric training group and complex weight and plyometric training group.

## REFERENCES

1. Albert, Mark., *Eccentric Muscle Training in Sports and Orthopaedics*. London: Churchill Livingstone Inc., 1991.
2. Avery D. Faigenbaum et al., "The Effects of Strength Training and Detraining on Children", *The Journal of Strength and Conditioning Research*, 10: 2, 1996.
3. Baechle, Thomas R., *Essentials of Strength Training and Conditioning*. Champaign, Illinois : The Human Kinetics Publishers, 1994.
4. Blakey J.G. and D. Southard, "The Combined Effects of Weight Training and Plyometric Training on Dynamic Leg Strength and Leg Power", *Journal of Applied Sports Science Research*, 1:1, 1987.
5. Blakey, Jay B. and Dan Southard, "The Combined Effects of Weight Training and Plyometrics on Dynamic Leg Strength and Leg Power", *The Journal of Strength and Conditioning Research*, 1:1, 2002.
6. Bompa, Tudor O. *Periodization Training for Sports*. Champaign, Illinois; The Human Kinetics Publishers, 1999.
7. Broota, *Experimental Design in Behavioural Research*. Delhi: Wiley Eastern Limited, 1994.
8. Clarke, H. Harrison. *Application of Measurement to Health and Physical Education*. Englewood Cliffs, New Jersey : The Prentice Hall Inc., 1976.
9. Dintiman, George Blough et al., *Sports Speed*. Champaign, Illinois: The Human Kinetics Publishers, 1998.