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## **Effect of plyometric training with and without weight on anaerobic power of hand ball players**

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### **Abstract**

The purpose of the study was to find out the relative effects of plyometric training with and without handheld weights on anaerobic power of men hand ballplayers. For this purpose, sixty men handball Players who had participated in inter collegiate handball tournaments from Annamalai University were randomly selected as subjects. The selected subjects were divided at random into three groups of twenty each (n=20). Group I underwent Plyometric training with handheld weights, Group II underwent Plyometric training without handheld weights and Group III acted as Control. The subjects carried out their respective training programmes for three days per week for a period of twelve weeks. The data obtained from the experimental groups before and after the experimental period were statistically analyzed with dependent 't'-test and Analysis of covariance (ANCOVA). Whenever the 'F' ratio for adjusted post-test means was found to be significant, the Scheffe's Post hoc test was applied to determine the paired mean differences. The level of confidence was fixed at .05 level for all the cases. The results of the study indicate that there was significant differences among the adjusted post-test means of Plyometric training with handheld weights group, Plyometric training without handheld weights group and Control group on the improvement of Anaerobic power.

**Keywords:** Anaerobic power, plyometric training with and without handheld weights

### **Introduction**

The term training refers to the acquisition of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies.

Power output and reactive neuromuscular control represents a component of function. Power and reactive neuromuscular control are perhaps the best measures of success in activities that require rapid force production. Plyometric training, also called reactive training, makes use of the stretch shortening cycle to produce maximum force in the shortest period of time and to enhance neuromuscular control, efficient rate of force production, and reduce neuromuscular inhibition. Anaerobic power is the amount of work performed using primarily anaerobic energy system.

### **Methodology**

The purpose of the study was to find out the relative effects of plyometric training with and without handheld weights on anaerobic power of men hand ballplayers. For this purpose, sixty men handball Players who had participated in inter collegiate handball tournaments from Annamalai University were randomly selected as subjects. The selected subjects were divided at random into three groups of twenty each (n=20). Group I underwent Plyometric training with handheld weights, Group II underwent Plyometric training without handheld weights and Group III acted as Control. The subjects carried out their respective training programmes for three days per week for a period of twelve weeks. Margaria kalamen anaerobic power test was conducted to test the anaerobic power of the subjects. The data obtained from the experimental groups before and after the experimental period were statistically analyzed with dependent 't'-test and Analysis of covariance (ANCOVA). Whenever the 'F' ratio for adjusted posttest means was found to be significant, the Scheffe's Post hoc test was applied to determine the paired mean differences. The level of confidence was fixed at .05 level for all the cases.

**Results**

The results of the dependent ‘t’-test on the data obtained for Anaerobic power of the subjects in the pre-test and post-test

of the experimental groups and control group have been analyzed and presented in Table I.

**Table I:** The Summary of Mean and Dependent ‘T’ Test For the Pre and Post-tests on Anaerobic Power of Experimental Groups and Control Group

	<b>Plyometric Training with handheld weights Group – (I)</b>	<b>Plyometric Training without handheld weights Group – (II)</b>	<b>Control Group – (III)</b>
Pre- test mean	87.81	87.06	87.68
Post-test mean	110.65	98.67	87.70
‘t’-test	7.48*	4.99*	0.01

\* Significant at.05 level.

(Table value required for significance at.05 level for ‘t’-test with df 19 is 2.09)

Table I shows the dependent ‘t’ test values between the pre and post-test means of Plyometric training with hand held weights group, Plyometric training without hand held weights group and Control group were, 7.48, 4.99 and 0.01 respectively. Since the obtained ‘t’-test values of experimental groups are greater than the required table value of 2.09 with df 19 at.05 level of confidence it is concluded that Plyometric training with hand held weights group, and

Plyometric training without hand held weights group had registered significant improvement in performance of Anaerobic power.

The Analysis of covariance (ANCOVA) on Anaerobic power of Plyometric training with hand held weights group, Plyometric training without hand held weights group and Control group, have been analyzed and presented in Table - II.

**Table II:** Analysis of Covariance on Anaerobic Power of Experimental Groups and Control Group

<b>Adjusted Post-test Means</b>			<b>Source of Variance</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Squares</b>	<b>‘F’ Ratio</b>
<b>Plyometric Training with handheld weights Group – (I)</b>	<b>Plyometric Training without handheld weights Group – (II)</b>	<b>Control Group (III)</b>					
110.47	98.94	87.61	Between With in	5227.52 3889.86	2 56	2613.76 69.46	37.63*

\* Significant at.05 level of confidence

(Anaerobic Power scores in seconds)

(The table value required for significance at.05 level with df 2 and 56 is 3.16)

Table II shows that the adjusted post-test mean values of Anaerobic power for Plyometric training with handheld weights group, Plyometric training without handheld weights group and Control group are 110.47, 98.94 and 87.61 respectively. The obtained F-ratio of 37.63 for adjusted post-test means is greater than the required table value of 3.16 for df 2 and 56 required for significance at.05 level of confidence.

The results of the study indicate that there was significant differences among the adjusted post-test means of Plyometric training with handheld weights group, Plyometric training without handheld weights group and Control group on the improvement of Anaerobic power.

To determine which of the paired means had a significant difference, the Scheffe’s post hoc test was applied and the results are presented in Table III.

**Table III:** The Scheffe’ s Test for the Differences between the Adjusted Post-test Paired Means on Anaerobic Power

<b>Adjusted Post-test means</b>			<b>Mean Difference</b>	<b>Confidence Interval</b>
<b>Plyometric Training with hand held weights Group – (I)</b>	<b>Plyometric Training without hand held weights Group – (II)</b>	<b>Control Group - (III)</b>		
110.47	98.94		11.53*	6.61
110.47		87.61	22.86*	6.61
	98.94	87.61	11.03	6.61

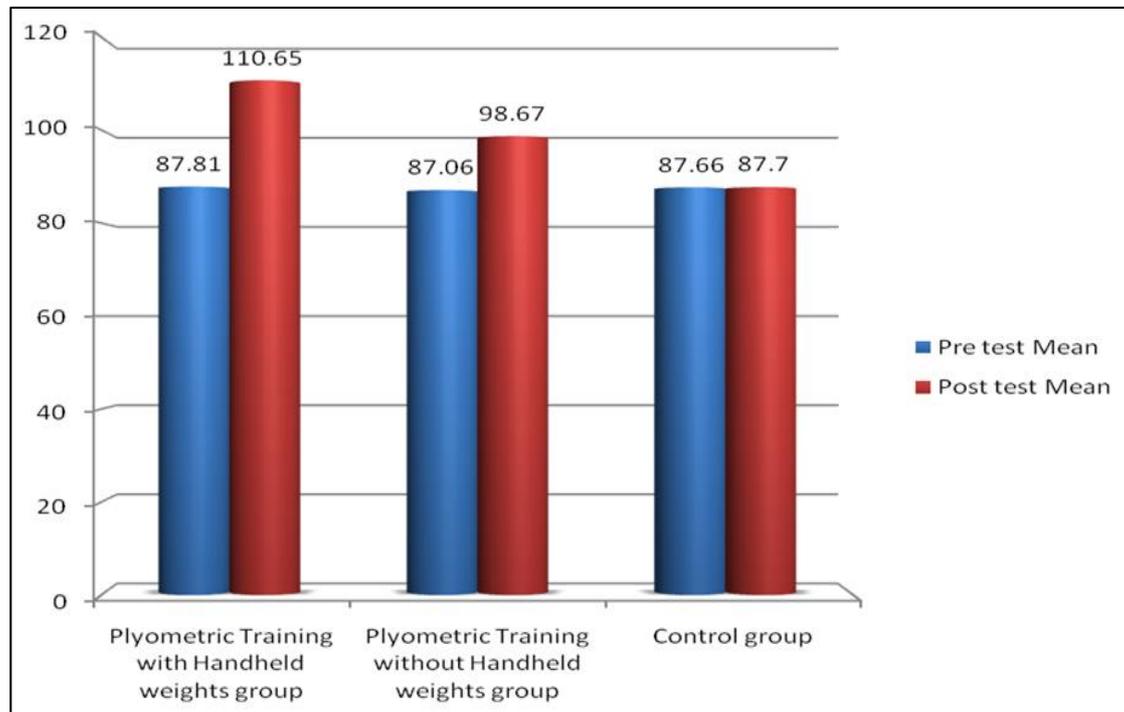
\* Significant at.05 level of confidence

Table III shows that the adjusted post-test mean difference on Plyometric training with handheld weights group and Plyometric training without handheld weights group, Plyometric training with handheld weights group and Control group, Plyometric training without handheld weights group and Control group are 11.53, 22.86 and 11.03 respectively. The values are greater than the confidence interval value of 6.61, which shows significant differences at.05 level of confidence.

It is inferred from the results that there is a significant difference in Anaerobic power between the adjusted post-test means of Plyometric training with handheld weights group and Plyometric training without handheld weights group, Plyometric training with handheld weights group and Control group, Plyometric training without handheld weights group

and Control group. However, the improvements of Anaerobic power are significantly higher for Plyometric training with handheld weights group than Plyometric training without handheld weights group and Control group. It may be concluded that Plyometric training with hand held weights is better than Plyometric training without hand held weights in improving Anaerobic power.

The mean values of Plyometric training with handheld weights group, Plyometric training without handheld weights group and Control group on Anaerobic power are graphically represented in Figure -I.



**Fig I:** Mean Values of Plyometric Training with Handheld Weights Group, Plyometric Training without Handheld Weights Group and Control Group on Anaerobic Power

### Conclusion

The experimental groups, namely, Plyometric training with handheld weights and Plyometric training without handheld weights had significantly increased anaerobic power but comparatively plyometric training with hand held weight shows better improvement than other groups

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