

# **sEFFECT OF VARIED INTENSITY OF PLYOMETRIC TRAINING ON SPEED AND CARDIO RESPIRATORY ENDURANCE AMONG WOMEN VOLLEYBALL PLAYERS**

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## **ABSTRACT**

The study's goal was to determine how different Plyometric training intensities affected certain physiological and motor fitness traits in collegiate female volleyball players. In order to fulfil the objectives of this research, sixty (N=60) female volleyball players who competed at the intercollegiate level for various Andhra Pradesh institutions were chosen. The age range of the chosen subjects was 19 to 24 years old, with a standard deviation of 2.1. The participants were split up into four groups of fifteen each at random. Groups A, B, and C were identified, with the fourth group serving as the control group. Prior to the experimental period, pre-test scores were acquired by routine assessments of specific motor fitness and physiological characteristics, including speed and cardio-respiratory endurance. The post-test results were collected right away following the twelve-week of intervention period. ANCOVA was used to statistically analysis the difference between the pre-test and post-test average, which represented the impact of different plyometric training intensities. The study's test had a constant 0.05 level in every instance.

**Key words:** Intensity, Speed, Cardio respiratory Endurance, Plyometric training, Volleyball Players.

## **INTRODUCTION**

Every student in the physical education programme gets the chance to evaluate his level of fitness and gain knowledge and skills that will help him succeed in school, in college, and in his post-collegiate life.

Physical fitness was one of physical education's main goals from the program's inception. Physical fitness was the primary goal of early childhood physical education, as it was a requirement for the residents of the day. Because of the increasing demand on the environment to be preserved in order to withstand stress, fight weariness, and possess the energy for a robust and well-rounded life, the need, importance, scope, and objectives have also changed throughout time.

## **OBJECTIVES OF THE STUDY**

The primary goal of the study was to determine the appropriate range of intensities for plyometric training. The subjects were given varying intensities of plyometric exercise over the course of twelve weeks, with the investigator classifying the intensities as low, medium, and high.

- To formulate different intensities of plyometric training for the benefit of college level volleyball players.
- To measure selected motor fitness and physiological variables of college level volleyball players.
- To compare the effect of intensities of plyometric training for 12 weeks than the control group.
- To determine which of the intensity of plyometric training, whether low or medium or high beneficially alter selected motor fitness and physiological variables of college level volleyball players.

## **STATEMENT OF THE PROBLEM**

The purpose of this study was to find out the Effect of Varied Intensity of Plyometric Training on Speed and Cardio Respiratory Endurance among College Women Volleyball Players

## **HYPOTHESIS**

- It was hypothesized that there would be significant improved due to varied intensities of plyometric training, namely, low, medium and high intensity plyometric training on variables such as, speed, cardio- respiratory endurance than the control group.
- It was hypothesized that there would not be any significant differences among different intensities of plyometric training on selected motor fitness and physiological variables of college women volleyball players.

## **LIMITATIONS**

The following factors were the scope of the research project, and these constraints would be taken into account while interpreting the data and data analysis.

- External elements such as ambient conditions, cultural influences, socioeconomic status, and the respondents' bodily structures were not taken into account throughout the study's conduct.
- There was no attempt to regulate the subjects' involvement in other extracurricular activities.
- Despite the subjects' verbal motivation, no effort was made to distinguish between their levels of motivation during training and assessment.
- When the experiment was being conducted, the location was not taken into account by the investigator.
- Based on the experts' classification, the workouts were divided into three intensity categories: low, medium, and high.

## **DELIMITATIONS**

The study was delimited to

- A mere sixty female volleyball players, representing various Andhra Pradesh colleges in intercollegiate competitions, were chosen at random to be the study's subjects.
- Only four groups, each consisting of fifteen (15) players, were included in this experimental study.
- The subjects' ages only varied from 19 to 24 years old.
- Only low, medium, and high plyometric training intensities were taken into account as different plyometric training intensities in this study.

## **METHODOLOGY**

### **SELECTION OF SUBJECTS**

This study involved 60 women volleyball players from Andhra Pradesh colleges, aged 19-24, from intercollegiate tournaments. The participants were randomly divided into four groups, with Group I, Group II, Group III, and Group IV serving as experimental and control groups.

### **SELECTION OF VARIABLES**

The variables, particularly the plyometric workouts, were selected from books, publications, and examined scientific journals on various training techniques. The following dependent and independent variables were chosen for this investigation based on reviews and consultation with the guide.

#### **Dependent Variables**

##### **Motor Fitness Variables**

1. Speed

##### **Physiological Variables**

1. Cardio- respiratory endurance

#### **Independent Variables**

1. Group A- Low Intensity Plyometric Exercises (12 weeks)

2. Group B- Medium Intensity Plyometric Exercises (12 weeks)

3. Group C- High Intensity Plyometric Exercises (12 weeks)

### STATISTICAL TECHNIQUE

The pre test and post test scores were analysed by using ANCOVA technique. When the F ratio was found to be significant, Scheffe's post hoc test was used to compare the significant differences among the means of four groups namely group A, group B, group C and control group in the development of twelve weeks of training. (Thirumalaisamy, 1989)

The test and retest correlation coefficient values on selected variables, tests conducted and the obtained 'r' are detailed in

**Table I.- Intra Class Correlation Coefficient of Test – Retest Scores**

S.No	Variables	Tests	Obtained 'r'
1	Speed	50 M sprint test	0.89*
2	Cardio respiratory Endurance	Harvard Step up test	0.82*

\* Significant at 0.01 level

Required table value (2,8) = 0.765

### COMPUTATION OF ANCOVA AND POST-HOC TEST ON SPEED

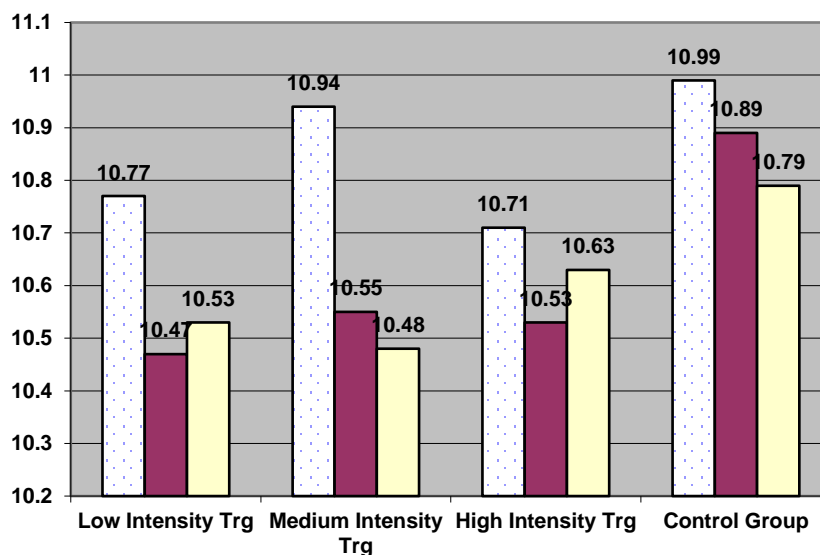
The descriptive statistics comparing the initial and final means of Speed due to varied intensities (low, medium and high intensity) of plyometric training, and control groups of college men volleyball players is presented in

**Table II.-Descriptive Statistics on Low, Medium and High Intensity Plyometric training and Control Groups on Speed**

Groups	Test	Mean	Standard Deviation	RANGE	
				Min	Max
Group A	Initial	8.01	0.18	7.80	8.30
	Final	7.81	0.18	7.60	8.10
	Adjusted Mean	7.81			
Group B	Initial	7.99	0.16	7.80	8.30
	Final	7.80	0.16	7.50	8.00
	Adjusted Mean	7.82			
Group C	Initial	8.01	0.19	7.70	8.30
	Final	7.79	0.16	7.50	8.00
	Adjusted Mean	7.79			
Control Group	Initial	8.03	0.18	7.80	8.30
	Final	8.01	0.21	7.80	8.40
	Adjusted Mean	7.99			

In Table II reveals that the pre-test mean speed of low intensity plyometric training was 8.01, medium intensity was 7.99, high intensity was 8.01, and the control group was 8.03. Post-test mean speed was 7.81, medium intensity was 7.80, high intensity was 7.79, and the control group was 8.01. The adjusted mean speed was 7.81, 7.82, 7.79, and 7.99, respectively.

**Figure I.-Bar Diagram Showing Pre, Post and Adjusted Means on Speed due to Low, Medium and High Intensity Plyometric Training and Control Group**



The results on descriptive statistics proved that there exist differences in different intensities of plyometric training compared to control group of variable Speed.

**Table III-- Computation of Analysis of Covariance Due to Low, Medium and High Intensity Plyometric Training and Control Group on Speed**

	Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
<b>Pre Test Mean</b>	Between	0.01	3	0.00	0.10
	Within	1.79	56	0.03	
<b>Post Test Mean</b>	Between	0.49	3	0.16	5.27*
	Within	1.74	56	0.03	
<b>Adjusted Post Test Mean</b>	Between	0.40	3	0.13	29.82*
	Within	0.25	55	0.00	

Required  $F > (0.05)$ , (df 3,56) = 2.77

\* Significant at 0.05 level of confidence

As shown in Table III, The study found no significant difference in means between groups at the initial stage, but a significant difference was observed at the post-test stage, with an F ratio of 5.27, exceeding the required table F value of 2.77. Adjusted post-test means showed a F value of 29.82, exceeding the required value of 2.77, indicating significant differences in subjects' speed.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Plyometric test. The results were presented in

**Table IV-Multiple Comparisons between Low, Medium, and High intensity plyometric training and Control Groups and Scheffe's Post Hoc Analysis on Speed**

Group A	Group B	Group C	Control Group	MEAN DIFF	C.I
7.81	7.82			0.00	0.07
7.81		7.79		0.03	0.07
7.81			7.99	-0.18*	0.07
	7.82	7.79		0.03	0.07
	7.82		7.99	-0.18*	0.07
		7.79	7.99	-0.21*	0.07

\* Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence plyometric was 0.07. The following paired mean comparisons were greater than the required confidence plyometric and were significant at 0.05 level.

Low intensity plyometric training Vs Control Group (MD: -0.18)

Medium intensity plyometric training Vs Control Group (MD: -0.18)

High intensity plyometric training Vs Control Group (MD: -0.21)

### RESULTS ON CARDIOVASCULAR ENDURANCE

The descriptive statistics comparing the initial and final means of Cardiovascular Endurance due to varied intensities (low, medium and high intensity) of plyometric training, and control groups of college men volleyball players is presented in

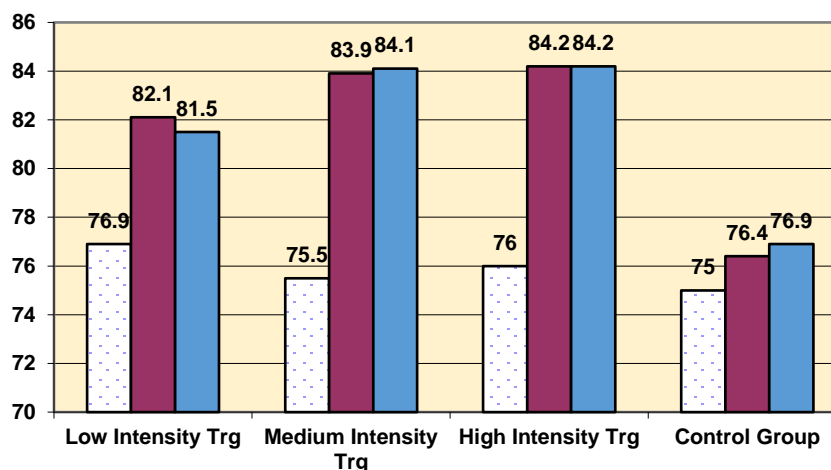
**Table V- Descriptive Statistics on Low, Medium and High Intensity Plyometric training and Control Groups on Cardiovascular Endurance**

Groups	Test	Mean	Standard Deviation	RANGE	
				Min	Max
Group A	Initial	76.86	6.26	67.11	90.11
	Final	82.08	7.78	66.56	96.11
	Adjusted Mean	81.53			
Group B	Initial	75.49	8.50	63.33	95.78
	Final	83.87	7.53	73.11	98.44
	Adjusted Mean	84.06			
Group C	Initial	76.01	7.55	62.44	89.56
	Final	84.25	5.88	76.44	94.67
	Adjusted Mean	84.15			
Control Group	Initial	74.99	9.04	64.44	99.11
	Final	76.44	7.63	65.00	96.11
	Adjusted Mean	76.89			

Table V shows that the pre test mean and S.D on Cardiovascular Endurance group A was  $76.86 \pm 6.26$  for group B was  $75.49 \pm 8.50$ , for group C was  $76.01 \pm 7.55$ , and control group was  $74.99 \pm 9.04$ . The descriptive statistics on post test mean and S.D on Cardiovascular Endurance of group A was  $82.08 \pm 7.78$  for group B was  $83.87 \pm 7.53$ , the group C was  $84.25 \pm 7.53$ , for control group was  $76.44 \pm 7.63$ . The adjusted mean on Cardiovascular Endurance on group A was 81.53, group B was 84.06, group C was 84.15 and control group was 76.89.

The obtained mean values on the experimental and control groups were presented in

**Figure II- BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON CARDIOVASCULAR ENDURANCE DUE TO LOW, MEDIUM AND HIGH INTENSITY PLYOMETRIC TRAINING AND CONTROL GROUPS**



Descriptive statistical results demonstrated that plyometric training intensities differed from the control group in terms of cardiovascular endurance variables. Additionally, the data on cardiovascular endurance acquired using ANCOVA was shown below in order to test the statistical significance of the differences.

**Table VI-COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO LOW, MEDIUM AND HIGH INTENSITY PLYOMETRIC TRAINING AND CONTROL GROUP ON CARDIOVASCULAR ENDURANCE**

	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F
<b>Pre Test Mean</b>	Between	28.66	3	9.55	0.15
	Within	3500.58	56	62.51	
<b>Post Test Mean</b>	Between	585.77	3	195.26	3.72*
	Within	2941.09	56	52.52	
<b>Adjusted Post Test Mean</b>	Between	519.81	3	173.27	4.97*
	Within	1918.40	55	34.88	

Required  $F(0.05)$ , (df 3,56) = 2.77

\* Significant at 0.05 level of confidence

The study found no significant difference in pre-test means of the groups, as the F ratio was 0.15. However, a significant difference was observed at post-test stage, with an F ratio of 3.72. Adjusted post-test means were determined, and the adjusted F value was 4.97, which exceeded the required value of 2.77, indicating significant differences in the subjects' cardiovascular endurance.

Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Plyometric test. The results were presented in

**Table VII-Multiple Comparisons between Low, Medium, and High intensity plyometric training and Control Groups and Scheffe's Post Hoc Analysis on Cardiovascular Endurance**

Group A	Group B	Group C	Control Group	MEAN DIFF	C.I
81.53	84.06			-2.53	5.28
81.53		84.15		-2.62	5.28
81.53			76.89	4.64	5.28
	84.06	84.15		-0.10	5.28
	84.06		76.89	7.16*	5.28
		84.15	76.89	7.26*	5.28

\* Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that to be significant at 0.05 level confidence the required confidence plyometric was 5.28. The following paired mean comparisons were greater than the required confidence plyometric and were significant at 0.05 level.

Medium intensity plyometric training Vs Control Groups (MD: 7.16)

High intensity plyometric training Vs Control Groups (MD: 7.26)

## FINDINGS

Based on the results it was found that varied intensities of plyometric training, namely, low, medium and high intensity plyometric training can significantly alter selected motor fitness variables, speed, and physiological variables, cardiovascular endurance compared to control group.

## CONCLUSIONS

Within the limitations and delimitations of the study, the following conclusions were drawn.

1. It was determined that, when compared to the control group, college women volleyball players who received twelve weeks of plyometric training at varying intensities significantly increased physiological variables like cardiovascular endurance and motor fitness variables

like speed. College women volleyball players' speeds did not significantly differ from one another, as seen by comparisons between the experimental groups.

2. The research findings indicate that college women volleyball players who underwent twelve weeks of varying intensities of plyometric training experienced a substantial change in cardiovascular endurance, a physiological characteristic, as compared to the control group. Examining the experimental groups in comparison demonstrated that there were no notable variations in the experimental groups' cardiovascular endurance among collegiate women's volleyball players.

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