

Effect of Resistance Training and Endurance Training in Parallel on Heart Rate at Rest and Explosive Power

T V Bala Krishna Reddy*

Research Scholar, University College of Physical Education & Sports Sciences Acharya
Nagarjuna University, Guntur, Andhra Pradesh, India

Dr. I. Devi Vara Prasad**

Assistant Professor, Coordinator, B.P.Ed. Course Acharya Nagarjuna University Ongole Campus
Ongole, Andhra Pradesh, India

Dr. K. Rama Subba Reddy***

Asst. Director, coordinator, Department of Physical Education & Sports Sciences, Yogi Vemana
University, Kadapa YSR District Andhra Pradesh, India

Abstract: *The aim of this study was to determine the Effect of Resistance training and Endurance training in parallel on Heart rate at rest and Explosive Power. To achieve this purpose, thirty (N=30) Degree College women students were randomly selected as subjects from K.V.R.College, Nandigama, Krishna Dist, Andhra Pradesh, India. They were divide into two equal groups of fifteen (n=15) each. Group-I underwent resistance training and endurance training in parallel and Group-II control group. For both the groups, Heart rate at rest and Explosive Power were measured by using of Bio monitor and measure the explosive power in terms of horizontal jump. The training group underwent 12-week resistance training and endurance training in parallel (12 weeks) and no specific training was given to the control group. Prior to and after training, researcher has concluded that Heart rate at rest and Explosive Power are significantly improved among healthy untrained women.*

Keywords: *Resistance Training, Endurance Training, Parallel, Heart rate at rest and Explosive power (horizontal).*

1. INTRODUCTION

Frank W. Dick (1980) the athletes express force through the body's lever system by converting chemical to kinetic energy and by neuromuscular coordination. In all physical activities the athletes express this force against external force (resistance). Resistance may take the shape of weights, throwing implements, water, air, the athletes own body weight, momentum and so on.

According to **Steven .J. Fleck & Williams . J (1997)** training is specific. The body attempts to adapt to the imposed demands. The understanding of the exercise training compatibility has focused on endurance training. **H. Clarke (1976)** the efficiency of an individual in performing physical activities depends basically on his/her cardio respiratory efficiency. Through training the efficiency of the circulatory and respiratory systems are improved.

Haradaya Singh (1991) points out the positive effect of endurance activity on various physiological systems that is cardio respiratory, digestion and metabolism. He also states that these activities have a preventive and curative effect on a number of health problems. Resisting heart rate, resting respiratory rate and cardiovascular endurance are certain parameters or external signs of human health and physical fitness.

A great deal of information exists regarding the effects and prescription of endurance exercise. The ability to prescribe aerobic exercise is necessary to address the cardiovascular endurance requirements of a conditioning program. Such aerobic endurance programs can be either continuous or intermittent. According to **Willmore.J.H. et.al., (1996)** the heart rate can decrease markedly by as a result of training. In sedentary individuals the resting heart rate would be 80 beats per minute, resting heart rate decreased by approximately 1 beat per minute each week for the first ten weeks of training. So after 10 weeks of moderate endurance training resting heart rate could drop from 80 to 70 beats per minute.

2. METHODOLOGY

To achieve these purpose 30 (N=30) women of 15 each students from K.V.R.College, Nandigama, Krishna District, Andhra Pradesh , India were randomly selected as subjects and their age ranged from 19 to 21 years. They did not participate in any systematic fitness training previously. The subjects were successfully completed the minimum strength requirement test recommended by **Voight and Draovitch (1991)**, Which consisted of five push-ups, five squat thrust, standing long jump and skipping rope for thirty seconds. The subjects were randomly divided into two groups and each group contained fifteen (n=15) subjects. Group I underwent Resistance training and Endurance training in parallel (for 12 weeks), group II acted as control. The subjects were free to withdraw their consent in case they feel any difficulty during experiment and testing period. However, there were no dropouts in the study and all the volunteered subjects cooperated well throughout the period of experimentation. A written informed consent has been taken from the subjects.

3. TRAINING PROGRAMME

To achieve the purpose of this study, the experimental group underwent resistance training and endurance training program for 4/12 week in addition to their regular physical education activities. Group I underwent resistance training and endurance training in parallel for 12 weeks on both Heart rate at rest and Explosive power (horizontal). Every training session workout lasted for about 45-60 minutes including warm-up and limbering down exercise. Group II (control group) did not participate in any specific training. However, they performed regular physical education activities. The subjects were verbally motivated to perform better in training. All the training sessions were fully supervised and none of them reported any injury. However, muscle soreness, discomfort and fatigue were reported in the early weeks which subside later and there were no dropout in the study.

4. TESTING PROCEDURE

4.1. Resting Heart Rate

To measure Resting Heart rate at rest used “Non-invasive Automatic blood pressure monitor”. Uses the oscilometric method of resting heart rate measurement. Resting heart rate of each subject was recorded in the morning time between 6.00 am and 7.00am. Ten minutes before taking the heart rate the subject was asked to sit and rest himself comfortably on a chair. The investigator wraps the cuff around the arm by placing arm on a table so that the cuff will be at the level of the heart. Just pres start/stop button and the cuff will start to inflate automatically. When the measurement is complete the arm cuff automatically deflates and the resting heart rate and blood pressure systolic/diastolic are displayed. To measure the explosive power in terms of horizontal. Used an outdoor jumping pit, measuring steel tape mat and marking with lime powder. The subjects stand behind a take-off line with feet several inches apart. Before jumping the subjects dips at the knee and swings the arms forward. Indoor administration is the best accomplished by placing a tape measure on the floor at right angles to take-off line and permitted the subjects to jump along the line. Measurement can be made by extending the tape to the point of the jump. Students must take-off from both feet simultaneously jump as long as possible and land on both feet. Try not to fall backward after the landing. They can jump further by crouching before the jump and swing your arms. The scoring is given by distance to the nearest point from the take-off line to the closest heel position. The best out of three trails were recorded.

5. STATISTICAL ANALYSIS

The data were collected from the two groups prior to and after the experiment period. Heart rate at rest and Explosive power was statistically examined by employing analysis of covariance (ANCOVA). To find out significant difference level of confidence was fixed at 0.01.

6. RESULTS & DISCUSSION

The mean and standard deviation on Resistance training and Endurance training in parallel on Heart rate at rest and Explosive power are presented in Table-I and Table-II. The ‘F’ value of adjusted post-test was numerically higher than table ‘F’ value. Hence, there exists a significant difference between resistance training and endurance training in parallel on Heart rate at rest and Explosive power group and control group.

Adjusted post-test means indicates that the resistance training and endurance training in parallel on Heart rate at rest and Explosive power (horizontal) has significantly improved when compared with the control group. It has shown clearly in table –I and table-II.

Effect of Resistance Training and Endurance Training in Parallel on Heart Rate at Rest and Explosive Power

Table1. Ancova for the Pre and Post-Test Data on Heart Rate at Rest

Test		Parallel group	Control group	Source of variance	df	Sum of square	Means square	Obtained 'F' ratio
Pre-test	X	75.00	74.98	B	2	2.58	1.29	3.07
	σ	0.43	0.48	W	27	17.85	0.42	
Post -test	X	65.21	73.01	B	2	225.82	112.91	104.55*
	σ	0.15	0.50	W	27	45.36	1.08	
Adjusted Post-test	X	65.04	72.85	B	2	47.12	223.56	120.19*
				W	26	76.26	1.86	

* Significant at 0.05 level of confidence.

The table value for significant at 0.01 level with df 2 and 27 and 2 and 26 are 3.35 and 3.37 respectively.

Table - I shows that the pre-test means of parallel and control groups are 75.00 and 74.98 bpm respectively. The obtained 'F' ratio of 3.07 for pre-test means is less than the table value of 3.35 for df 2 and 27 required for significance at 0.05 level. The post-test means of parallel and control groups are 65.21 and 73.01bpm respectively. The obtained 'F' ratio of 104.55 for post-test means is greater than the table value of 3.35 for df 2 and 27 required for significance at 0.05 level. The adjusted post-test means of parallel and control groups are 65.04 and 72.85bpm respectively. The obtained 'F' ratio of 120.19 is greater than the table value of 3.37 for 2 and 26 required for significance at 0.05 level.

The results of the study indicate that there is significance among adjusted post-test means of parallel training group and control groups on Heart rate at rest.

The adjusted post-test mean values on Heart rate at rest of parallel training group and control groups are graphically depicted in **figure-I**.

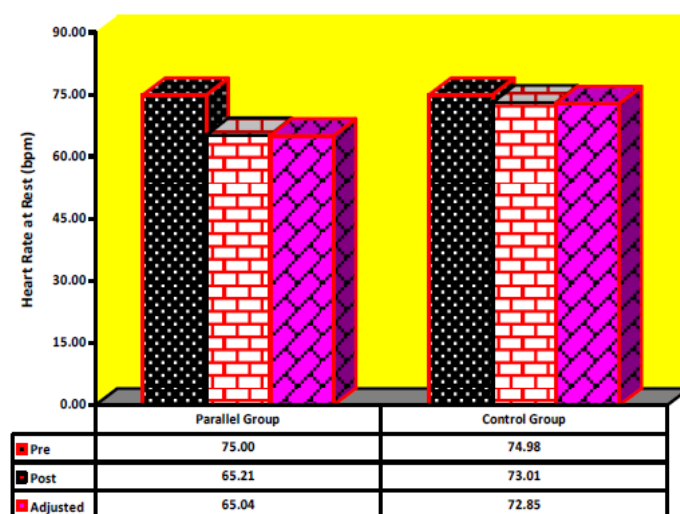


Fig1. Bar Diagram on Heart Rate at Rest of Pre, Post and Adjusted Post-Test Means of Parallel and Control Groups.

Table2. Ancova for the Pre and Post-Test Data on Explosive Power (Horizontal)

Test		Parallel group	Control group	Source of variance	df	Sum of square	Means square	Obtained 'F' ratio
Pre-test	X	1.62	1.59	B	2	0.006	0.003	0.333
	σ	0.07	0.08	W	27	0.358	0.009	
Post -test	X	1.99	1.60	B	2	1.303	0.651	40.69*
	σ	0.17	0.07	W	27	0.673	0.016	
Adjusted post-test	X	1.97	1.61	B	2	6.64	3.32	55.33*
				W	26	2.46	0.06	

* Significant at 0.05 level of confidence.

The table value for significant at 0.01 level with df 2 and 27 and 2 and 26 are 3.35 and 3.37 respectively.

Table-II shows that the pre-test means of parallel and control groups are 1.62 and 1.59 mtr respectively. The obtained 'F' ratio of 0.333 for pre-test mean is less than the table value of 3.35 for df 2 and 27 required for significance at 0.05 level. The post-test means of parallel and control groups are 1.99 and 1.60mtr respectively. The obtained 'F' ratio of 40.69 for post-test means is greater than the table value of 3.35 for df 2 and 27 required for significance at 0.05 level. The adjusted post-test means of parallel and control groups are 1.97 and 1.61 mtr respectively. The obtained 'F' ratio of 55.33 is greater than the table value of 3.37 for 2 and 26 required for significance at 0.05 level.

The results of the study indicate that there is a significance difference is existed among adjusted post-test means of parallel training group and control groups on explosive power (Horizontal). The adjusted post-test mean values on explosive power (Horizontal) of parallel training group and control groups are graphically depicted in **figure-II**.

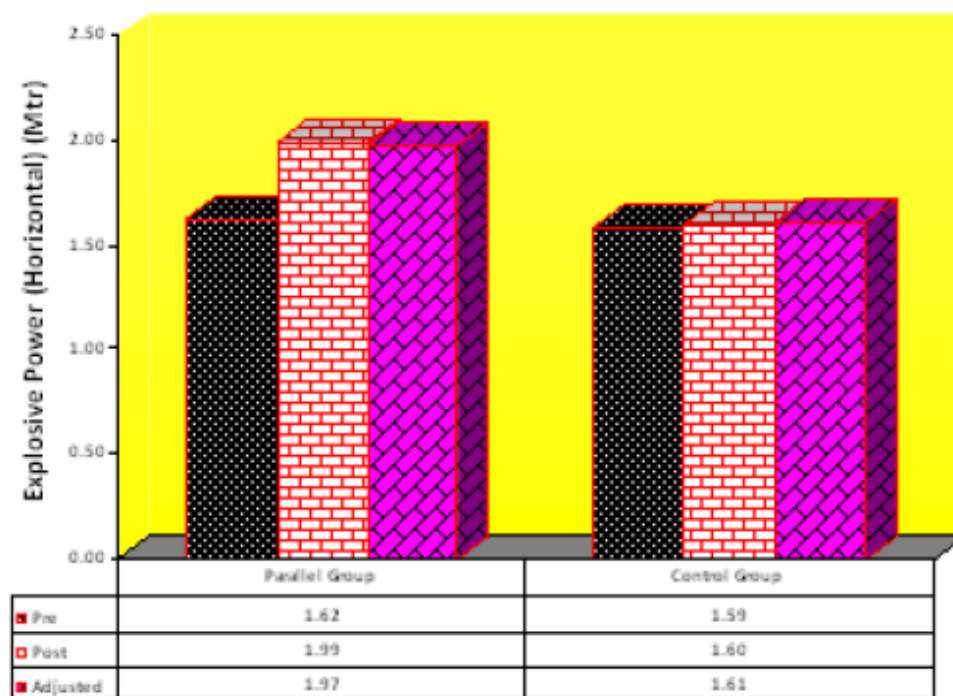


Fig2. Bar Diagram on Explosive Power (Horizontal) of Pre, Post And Adjusted Post-Test Means of Parallel And Control Groups.

7. CONCLUSION

- Heart rate at rest is increased by Resistance training and Endurance training in parallel for untrained women.
- Explosive power (Horizontal) is significantly increased by Resistance training and Endurance training in parallel for untrained women.

RECOMMENDATIONS

- Parallel type of Resistance training and Endurance training is recommended to improve Heart rate at rest.
- Parallel type of Resistance training and Endurance training is recommended to improve explosive power in terms of horizontal distance.

REFERENCES

- Frank W.Dick (1980), **Sports Training Principles**”, (Henry Kimpton Publishers: London), 193.
- Hardayal Singh (1991), **“Science of Sports Training”**, New Delhi, DVS Publications, 130.
- Steven J. Fleck and Williams J. Kraemer (1997), **“Designing Resistance Training Programs”**,

Human Kinetics, Champaign, Illinois, 66-67.

Willmore, J.H, Stanforth, P.R. et.al. (1996), “**Endurance Exercise training has a minimal effect on Resting Heart Rate: The Heritage study**”, medicine and science in Sports and Exercise. 28:829-835.