



P-ISSN: 2394-1685  
E-ISSN: 2394-1693  
Impact Factor (ISRA): 4.69  
IJPESH 2015; 1(6): 105-108  
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www.kheljournal.com  
Received: 24-05-2015  
Accepted: 26-06-2015

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## Effect of Endurance Training on Heart Rate at Rest and Speed

**TV Bala Krishna Reddy, I.D.V. Prasad, K. Rama Subba Reddy**

### Abstract

The aim of this study was to determine the Effect of Endurance training on Heart Rate at Rest and Speed. To achieve this purpose, thirty (N=30) Degree College girls students were randomly selected as subjects from K.V.R. College, Nandigama, Krishna Dist, Andhra Pradesh, India. They were divided into two equal groups of fifteen (n=15) in each. Group I- endurance training and Group II-control group. For both the groups, heart rate at rest (HRR) and speed were measured by using Non-invasive Automatic blood pressure monitor and a 50 metre course. The training group underwent 12-week endurance training and no specific training was given to the control group. Prior to, and after training, HRR and Speed were measured. Finally HRR and Speed was calculated for both pre and posttests, by multiplying HRR and Speed. It was found that endurance training had significantly improved the HRR and Speed in healthy untrained women.

**Keywords:** Endurance Training, Heart Rate at Rest and Speed.

### Introduction

Physical activity is as old as human life. In primitive man, never watchful of his toes had to keep himself in a very high physical condition for his survival. By the nature of his daily activities, he built a strong sinewy physique. He was highly competent and in pursuit of excellence in performance had been striving to jump higher and further, to run faster and to demonstrate greater strength and skill their search for daily food involved undesirable dangers. So the primitive man had to be an expert runner, jumper, thrower and climber for his very existence. An ideal man should be strong, healthy, broad minded and active.

In ancient times, physical training was given in the form of hunting or training for warfare. Incidentally physical education was given through physical activities, games and sports. First of all, Greece felt the necessity of imparting proper physical education to its youth and so they have included it in their education program. During the 19<sup>th</sup> century in the process of systematizing general education in many countries place in their scheme of education.

The human body is a marvel. Body is the temple of soul and to reach harmony of body, mind and spirit our body must be physically fit. Hence, where there is a sound body there we can ensure a sound mind. The development of sports throughout history has been essential to our health and helping us strong physically, mentally and spiritually Jyothi Joshi (2007) [3].

Sports is an activity that is governed by a set of rules or customs and often engaged in competitively used by itself, sports commonly refer to activities where the physical capabilities of the competitor are the sole or primary determiner of the outcome (win or lose), but the term is also used to include activities such as where mental activity or equipment quality are major factors. Sports are used as entertainment for the player and the viewer. It has also been proven by experiments that daily exercise increase mental strength and power. Sports and its inherent values such as competition, endeavour and enthusiasm have had a consistent influence on culture in our society Rafiuddin M.D. (2007) [4].

Sports have become an important part of nations is culture as well as other culture throughout the world. Sports pervade society to such an extent that it is has been described by many as a microcosm of society. In other words sports reflect characteristics of society Coakely J.J. (1988) [1].

Sports are about realizing one's potential keeping people in sports longer are a huge gain for society. Today's world is a world of computers and spaceships. As civilization advances men's desire to compete with counterpart also increases. If he want to excel in his chosen field, the result of such desire is possible through scientific discoveries and their applications.

The competitive nature of human being is as old as his origin. Competitive sports have developed very rapidly throughout the world in recent years. One of the most exciting and rewarding aspects of life is the experience of going beyond what were once thought to be limitations. As a result of advanced, systematic, scientific and continuous research in the field of physical education and sports, sportsmen have established new records in every sports activity which was previously considered as impossible.

Now a day's more and more individuals, particularly boys and girls are attracted by sports activities and increasing the number of nations that are represented in the sports arena. As prevention and curative health measures have become more successful throughout the third world war, millions of teenagers should have a chance to enjoy sports.

In the last few decades sports have gained tremendous popularity all over the globe. The popularity of sports is still increasing at a pace and one sees that the number of sports held in Olympic Games have been increasing steadily. In addition to Olympic Games indigenous sports have also become popular in each country. Sports have become an important social and cultural activity of the modern world which is being given the right place it deserves by the nations and societies. Performance can be increased to a great extent only by causing biological adaptations and this is possible only through systematic and scientific training. Specificity of exercise and overload principle should be followed in order to enhance the functioning efficiency of the various systems of the body Veadmir (1995) [5].

**Methodology**

To achieve these purpose 30 girls 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 Endurance training, 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.

**Training Programme**

To achieve the purpose of this study, the experimental group underwent endurance training programme for four days for week for 12 weeks in addition to their regular physical

education activities. Group I underwent endurance training for 12 weeks. 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.

**Testing Procedure**

Used the oscilometric method of resting heart rate measurement. Resting Heart Rate at Rest 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. Beats per minutes were recorded for each subject. To measure speed used a 50 metre course, two stop watches, pencil and paper. After a short warm-up the subject takes a position behind the starting line. Best results are obtained when two subjects runs at the same time for competitions. The starter used the command, on your mark and 'Go'. The latter accompanied by a downward sweep of the arm as a signal to the timer. The subjects run across the finish line. One trail is permitted. By using the stopwatch time was taken to the nearest one tenth of a second Harrison Clarke. H (1987) [2].

**Statistical Analysis**

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

**Results & Discussion**

The mean and standard deviation on Endurance training and control groups 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 endurance training group and control group on Heart Rate at Rest and speed.

Adjusted post-test means indicates that the endurance training has significantly reduced the Heart Rate at Rest and increased speed for experimental group when compared with the control group.

**Table I:** ANCOVA for the pre and post-test date on Heart Rate at Rest

Test		Training group	Control group	Source of variance	df	Sum of square	Means square	Obtained 'F' ratio
Pre-test	X	74.31	74.98	B	2	2.58	1.29	3.07
	σ	0.55	0.48	W	27	11.34	0.42	
Post -test	X	66.21	73.01	B	2	225.82	112.91	104.55*
	σ	0.68	0.50	W	27	29.16	1.08	
Adjusted Post-test	σ	66.53	72.85	B	2	47.12	223.56	120.19*
				W	26	48.36	1.86	

\*significant at 0.01 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 training group and control groups are 74.31, 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 training group and control groups are 66.21 and 73.01 bpm 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 training group and control groups are 66.53 and 72.85 bpm respectively. The obtained 'F' ratio of 120.19 is greater than the table value of 3.35 for 2 and 26 required for significance at 0.05 level. The results of the study indicate that there is a significance among adjusted post-test means of training group and control groups on Heart rate at rest. To determine the significance difference among the two-paired means, the Scheffe'S test was applied as post-hoc test and results are presented in table -I-A.

**Table I-A:** Scheffe's Test for the Difference between the Adjusted Post-Test Paired Means of Heart Rate at Rest

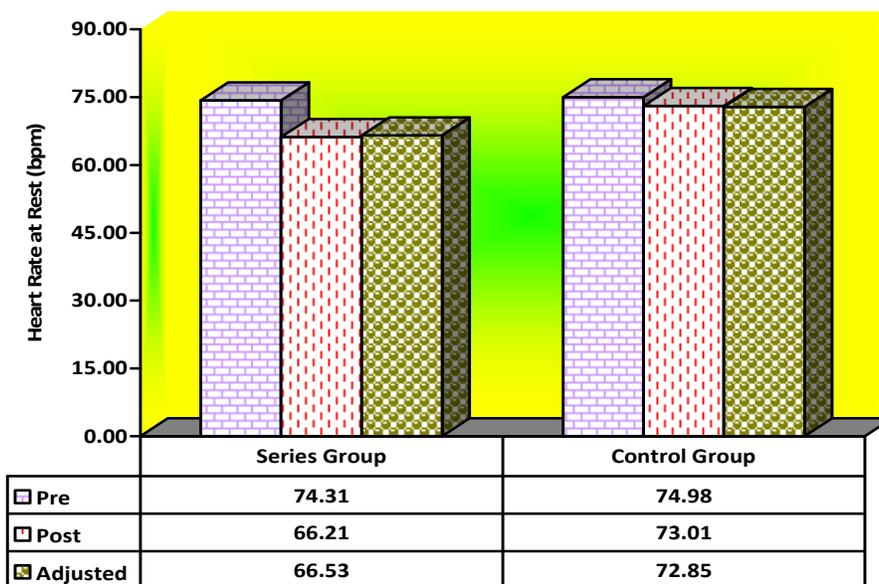
Adjusted Post test Mean		Mean differences	Confidence interval 0.05 Level
Training Group	Control Group		
66.53	72.85	6.32	1.524

\* Significant at 0.05 of confidence

The table I-A shows that the adjusted post-test mean difference on Heart rate at rest between training group and control are 6.32 respectively which are greater than the confidence interval value1.524.

It may concluded from the results that there is a significant difference between training group and control group on Heart rate at rest.

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



**Fig I:** Bar Diagram on Heart Rate at Rest of Pre, Post and Adjusted Post-Test Means of Training and Control Groups.

**Table II:** ANCOVA for the pre and post-test date on Speed Test

Test		Training group	Control group	Source of variance	df	Sum of square	Means square	Obtained 'F' ratio
Pre-test	X	7.82	7.82	B	2	0.012	0.006	0.053
	σ	0.45	0.30	W	27	3.16	0.117	
Post -test	X	6.73	7.85	B	2	12.695	6.347	74.67*
	σ	0.38	0.31	W	27	2.30	0.085	
Adjusted post-test	σ	6.74	7.86	B	2	12.845	6.423	112.68*
				W	26	1.48	0.057	

\* Significant at 0.05 level of confidence.

The table value for significance at 0.05 level with df 2 and 42 and 2 and 41 are 3.35 and 3.37 respectively.

Table II shows that the pre-test means of training and control groups are 7.82 and 7.82 sec respectively. The obtained 'F' ratio of 0.053 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 training group and control groups are 6.73 and 7.85 sec respectively. The obtained 'F' ratio of 74.67 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 training group and control groups are 6.74 and 7.86 sec respectively. The obtained 'F' ratio of 112.68 is greater than the table value of 3.35 for 2 and 26 required for significance at 0.05 level. The results of the study indicate that there is a significance among adjusted post-test means of

training group and control groups on speed. To determine the significance difference among the two-paired means, the Scheffe'S test was applied as post-hoc test and results are presented in table II-A.

**Table II-A:** Scheffe's Test for the Difference between the Adjusted Post-Test Paired Means of Speed

Adjusted Post test Means		Mean differences	Confidence interval 0.05 Level
Training Group	Control Group		
6.74	7.86	1.12	0.254

\* Significant at 0.05 of confidence

The table II-A shows that the adjusted post-test mean difference on speed between training group and control group are 1.12 respectively which are greater than the confidence interval value 0.254.

It may concluded from the results that there is a significant difference between training group and control group on speed. Table II-A shows that the adjusted post-test mean difference

on speed between training and control groups are 1.12 which is greater than the confidence interval value 0.254. Hence, the results of the study concluded that there is significant difference exists on speed between training group and control group.

The adjusted post-test mean values on speed of training group and control groups are graphically depicted in figure-II.

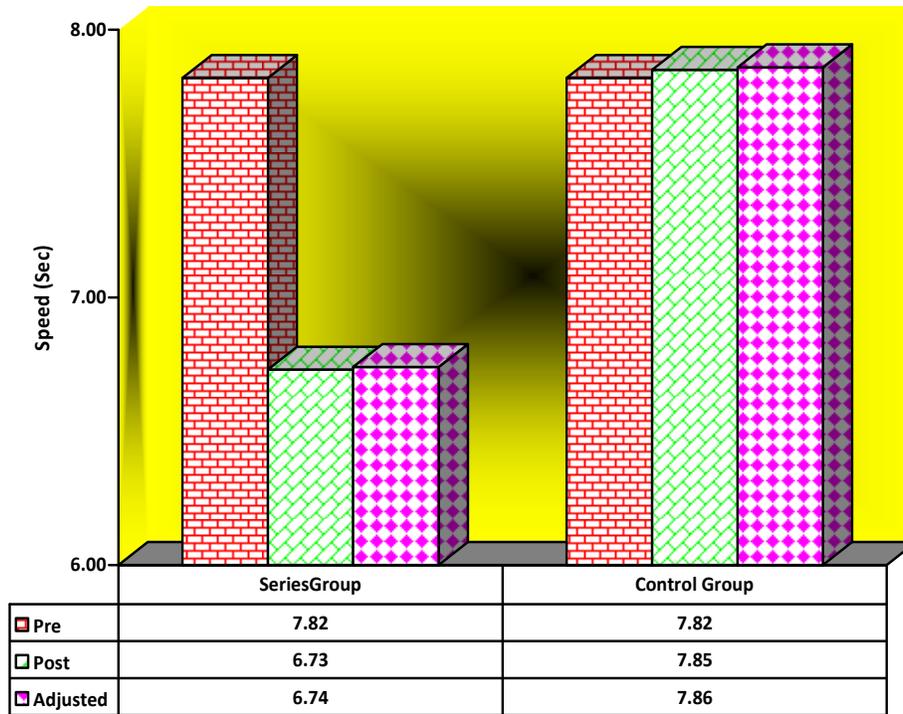


Fig II: Bar Diagram On Speed Of Pre, Post And Adjusted Post-Test Means Of Training And Control Groups.

**Conclusion**

On the whole, it was concluded that endurance training has reduced Heart Rate at Rest and improved speed for untrained women.

**Recommendations**

Endurance Training methods are very effective to reduce heart rate at rest and improved speed.

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