

## EFFECT OF PRANAYAMA AND AEROBIC TRAINING INDUCED ADAPTATION ON RESTING HEART RATE OF SEDENTARY YOUNG WOMEN

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### ABSTRACT

In this study the influence of two independent variables namely pranayama practices and aerobic exercises on resting heart rate was investigated. To achieve the purpose of the study 45 sedentary young women were selected. The subjects' age ranged from 18 years to 23 years. The subjects were sedentary young women from various colleges affiliated to Acharya Nagarjuna University, Andhra Pradesh, India. The selected subjects were divided into three groups namely pranayama practices group (I), aerobic exercises group (II) and control group (III). The experimental groups I and II underwent twelve weeks pranayama practices and aerobic exercise respectively and group III acted as control. All the subjects of the three groups were tested before and after experimental period on selected dependent variable. To find out the changes in the selected dependent variable, due to the application of independent variables Analysis of Co-variance (ANCOVA) was applied. Whenever the obtained 'F' ratio for adjusted post test means was found significant, Scheffe's post hoc test was applied to determine which of the three paired means significantly differed. Due to the effect of pranayama practices and aerobic exercises the resting heart rate of sedentary young women was significantly reduced; however, insignificant differences were found between the experimental groups in decreasing the resting pulse rate. As a result of pranayama practice and aerobic exercises 2.92% and 2.36% of changes in resting pulse rate was found.

**Key Words:** Pranayama practices and aerobic exercises, Resting heart rate, sedentary young women.

### INTRODUCTION

Exercise is an incredibly important part of a healthy person's life. Exercising regularly helps to hone one's athletic skills by strengthening the muscles across the bodies, and also by enhancing the functioning of all internal organs. Moreover different activities make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurological process which are specific to the activities. There are plenty of different ways to exercise and all of them can be turned into a fun and entertaining outing.

The Pranayama is the central part of patanjali's astanga yoga system. The pranayama is derived from two Sanskrit words 'Prana' and 'ayama', .Where 'prana' means Energy 'ayama' means elongation. So the word meaning of pranayama is Elongation of pranic energy. Whereas, great Yogi Patanjali defines Pranayama as

‘Tasmin shwasa prashwasayor gati vichhedaha pranayamaha’. This means controlling the motion of inhalation and exhalation. By reducing the number of breathing one can extend healthy life, this one can achieve only by regular practice of breathing exercise or Pranayama.

During normal breathing we are using only half of the lungs for breathing, this one can easily understand by taking a deep breath. During the practice of pranayam we are using at least Eighty percent of our lungs. As utilization of lungs more the pure oxygen entering to blood immediately increases, so the each blood cell increases their efficiency, so the whole body gets benefitted. Normally our thoughts and breathing have direct relations, when we are angry or restless, the number of breathing per minute is increases rapidly, this everyone is experiencing in day today life. By controlling the breathing one can control the emotions and unnecessary thoughts; this is possible only by the practice of pranayam. If one practices the pranyama surely he will get control over unnecessary thoughts.

Aerobic exercise is physical activity that increases the activity of the pulmonary and cardiovascular systems. It requires an increase in oxygen to be used and transported to the muscle. Conversely, anaerobic exercise is physical activity of a short duration and of less intensity than aerobic exercise. It does not require an increase in oxygen to be used and transported to the muscle. Physiological functions of the body may be improved by exercise.

In order to assess the training impact on resting heart rate of sedentary young women, the investigator selected pranayama and aerobic training as the independent variable. Information related to the impact of pranayama and aerobic training among sedentary young women is scanty. So the present study is planned.

## **METHODOLOGY**

### **Selection of Subject**

To achieve the purpose of the study 45 sedentary young women were selected. The subjects’ age ranged from 18 years to 23 years. The subjects were sedentary young women from various colleges affiliated to Acharya Nagarjuna University, Andhra Pradesh, India. The selected subjects were divided into three groups namely pranayama practices group (I), aerobic exercises group (II) and control group (III). All the subjects selected for the experimental treatment was subjected to medical evaluation and certification from a doctor ensuring their health capacities to undergo the training program.

### **Training Programme**

The training regimen for the two experimental groups lasted for twelve weeks for six days per week. During the training period, the experimental group-I underwent pranayama practices six days a week for twelve weeks. The pranayama practices included in this training programme were Anuloma Viloma, Nadi Suddhi, Ujjai, Suryadedana, Bhastrika and Kapalabhati respectively. The training programme was conducted in the morning sessions from 6 `O`clock onwards. The experimental group-II performed aerobic exercise alternatively six days in a week for twelve weeks. In this present investigation continuous running was given as aerobic exercise. To fix the training load for the aerobic exercise group the subjects were examined for their exercise heart rate in response to different work bouts, by performing continuous running of two minutes duration for proposed repetitions and sets, alternating with active recovery based on work-rest ratio. The subject's training zone was computed using Karvonen formula and it was fixed at 60%HRmax to 85%HRmax. The work rest ratio of 1:1 between exercises and 1:3 between sets was given.

### **Collection of the Data**

The pretest data was collected prior to the training programme and posttest data was collected immediately after the twelve weeks of pranayama practice and aerobic exercises, from the experimental groups and a control group.

### **Experimental Design and Statistical Technique**

The data collected from the experimental and control groups on selected dependent variable was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated to find out the chances in selected dependent variable due to the impact of experimental treatment. In order to nullify the initial mean differences the data collected from the three groups prior to and post experimentation on selected dependent variable were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). The pre test means of the selected dependent variables was used as a covariate. Since three groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test. In all the cases the level of confidence was fixed at 0.05 level for significance.

## RESULT

The analysis of paired "t"-test on resting pulse rate of experimental and control groups have been analyzed and presented in table –I.

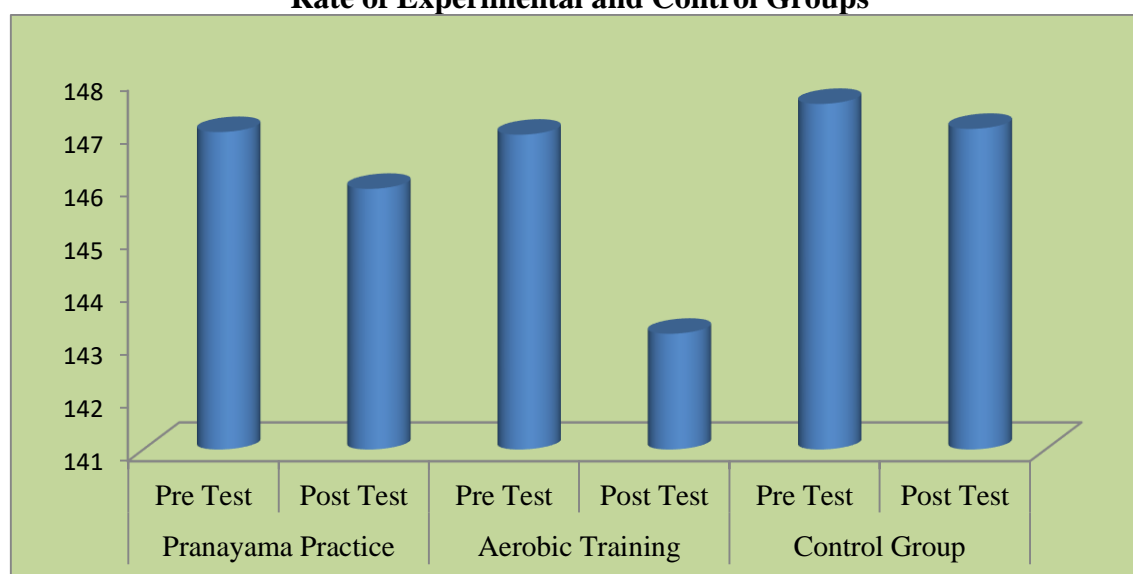
**Table – I: Analysis of ‘T’ Test on Resting Pulse Rate of Experimental and Control Groups**

Group	Test	N	Mean	SD	DM	%	‘t’ - ratio
<b>Pranayama Practice</b>	Pre Test	15	70.46	1.06	2.06	2.92	11.37*
	Post Test	15	68.40	0.98			
<b>Aerobic Training</b>	Pre Test	15	70.60	1.12	1.66	2.36	13.22*
	Post Test	15	68.93	1.09			
<b>Control Group</b>	Pre Test	15	70.80	1.26	0.30	0.42	0.48
	Post Test	15	71.10	1.00			

\* Required table value for significance at 0.05 level of confidence for df of 14 is 2.14

The pre and post test mean and standard deviation values on resting pulse rate are  $70.46 \pm 1.06$ ,  $68.40 \pm 0.98$ ,  $70.60 \pm 1.12$ ,  $68.93 \pm 1.09$ ,  $70.80 \pm 1.26$  and  $71.10 \pm 1.00$  for pranayama, aerobic and control groups respectively. Since the obtained ‘t’ value of 11.37 and 13.22 on resting pulse rate was higher than the required table value of 2.14 for significant level 0.05 with 14 degrees of freedom. It concluded that, there is significant level of difference on resting pulse rate between pre and post test mean value of pranayama practice and aerobic training groups respectively. As a result of pranayama practice and aerobic exercises 2.92% and 2.36% of changes in resting pulse rate was found.

**Figure – 1: Graph Showing the Pre and Post Test Mean Values on Resting Pulse Rate of Experimental and Control Groups**



The pre and post test data collected from the experimental and control groups on resting pulse rate were statistically analyzed by ANCOVA and the results are presented in table- II.

**Table – II: Analysis of Covariance on Resting Pulse Rate of Experimental and Control Groups**

	Pranayama Practice Group	Aerobic Exercise Group	Control Group	S o V	Sum of Squares	df	Mean squares	'F' ratio
Adjusted Post test Mean	68.47	68.94	70.91	B	49.56	2	24.78	32.10*
				W	31.64	41	0.77	

(The required table value for significance at 0.05 level of confidence with degrees of freedom 2 and 41 is 3.23) \*Significant at .05 level of confidence

The adjusted post test means on resting pulse rate of pranayama practice, aerobic training and control groups are 68.47, 68.94 and 70.91 respectively. The obtained 'F' ratio value of 32.10 on resting pulse rate were greater than the required table value of 3.23 for the degrees of freedom 2 and 41 at 0.05 level of confidence. It is observed that significant differences exist among the adjusted post test means of experimental and control groups on resting pulse rate.

Since, the adjusted post test 'F' ratio value is found to be significant the Scheffe's test is applied as post hoc test to determine the paired mean differences, and it is presented in table-III.

**Table – III: Scheffe's Test for the Difference between the Adjusted Post Test Paired Means on Resting Pulse Rate of Experimental and Control Groups**

Adjusted Post Test Means			DM	CI
Pranayama Practice	Aerobic Training	Control Group		
68.47	68.94		0.47	0.81
68.47		70.91	2.44*	0.81
	68.94	70.91	1.97*	0.81

\*Significant

Table - III shows the Scheffe's test results that there are significant differences between the adjusted post tests means of pranayama practice and control groups, aerobic training and control groups on resting pulse rate. There is no significant difference between the adjusted post tests means of pranayama practice and aerobic exercise groups

on resting pulse rate. It showed that experimental groups significantly decreased resting pulse rate than the control groups.

## **DISCUSSION**

There have been many studies to describe the effect of yogasana over cardiovascular system. Khanam et al., (1996) showed decreased heart rate and sympathetic reactivity following a brief period of yogic exercise practice in asthmatic patients. Bowman, Clayton and Murray (1997) performed a study comparing the effect of yoga and aerobic exercise on the baroreflex over healthy elderly persons. It revealed that heart rate decreased significantly following yoga. The results of the studies of Telles, Reddy and Nagendra (2000) concluded that the breath volume and heart rate were significantly decreased before and after sessions of cyclic meditation (CM) and Shavasana (SH).

Pramanik et al., (2009) found that both the SBP and DBP decreased significantly with a slight fall in heart rate after slow bhastrika pranayamic breathing for 5 minutes. Thus, the previous researches proved that yogasana and pranayama had significant influence on systolic blood pressure and the present result, is also in conformity with the previous researches done by Yang et al., (2009) and Pramanik et al., (2009). Upadhyay et al., (2008) found that Pranayama (breathing exercise) significantly decreases the PR, RR and DBP. Raub (2002) find that Practice of hatha yoga may help control such physiological variables as blood pressure, respiration, HR and metabolic rate to improve overall exercise capacity.

Physical exercise refers to the variety of exercise that stimulates heart function and lungs activity for a time period sufficiently long to produce beneficial changes in the body. The heart is always able to deliver sufficient oxygen rich blood to muscles so that they can derive energy from fat and glycogen aerobically, since it increases the efficiency of heart circulation and muscles. The above findings of the study are also confirmed by the following findings of Angelopoulos et al., (1993); and Spodaryk, (1993). Gillett and Elsenman (1987) in their study determined the effect of 16 weeks aerobic dance programme and was concluded significant improvement in the physiological variables such as breath holding time and heart rate.

## CONCLUSION

Due to the effect of pranayama practices and aerobic exercises the resting heart rate of sedentary young women was significantly reduced; however, insignificant differences were found between the experimental groups in decreasing the resting pulse rate. As a result of pranayama practice and aerobic exercises 2.92% and 2.36% of changes in resting pulse rate was found. Therefore, in order for exercise physiologists and trainers to create successful training protocols for sedentary young women, a more complete understanding of physiological benefits of pranayama practices and aerobic exercises is essential.

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