

EFFECT OF NADISHODHANA PRANAYAMA ON SELECTED CARDIORESPIRATORY PARAMETERS AND CARDIORESPIRATORY FITNESS AMONG HIGH SCHOOL BOYS

P. KUMARAVELU

Associate Professor,

Department of Physical Education

Tamilnadu Physical Education and Sports University Chennai-600 127

ABSTRACT

Pranayama incorporates right nostril breathing (RNB or surya anuloma viloma), left nostril breathing (LNB or chandra anuloma viloma) as well as alternate nostril breathing (ANB or nadishudhi). It is of interest to note that when all the three techniques were practiced for the same frequency and duration, interesting results were obtained (Satendra Singh, 2009). Keeping this in view, the present study is designed to determine whether Nadi-shodana pranayama practice for 30 minutes duration has any influence on the selected cardiorespiratory parameters and cardiorespiratory fitness among the high school boys. To achieve the purpose of this study 30 high school boy's age ranged from 13 to 16 years were selected from a Higher Secondary School - Chennai. They were divided into two equal groups namely the experimental and control groups. They did not have any previous training in Pranayama. They were highly motivated to involve in the training. The experimental group was treated with Nadishodhana pranayama training for five days a week with thirty minutes duration in the evening session for a period of six weeks. The control group was left to follow regular routine. All the selected cardiorespiratory parameters and cardiorespiratory fitness were measured before and after six weeks of Nadi-shodhana Pranayama' training. The analysis of covariance revealed that the experimental group namely the nadishodhana pranayama training group has shown significant improvement on cardio respiratory parameters and cardio respiratory fitness variables namely resting heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, VO₂ max and cardio-respiratory endurance, when compared to the control group. From this study, it is concluded that Nadi-shodhana Pranayama practice can be advocated to improve cardiorespiratory parameters and cardiorespiratory fitness among high school boys. Further, the positive results found in the present study can be applied to all school students to improve the pulmonary functions of the students. A few minutes practice daily may help in setting the mind better on work and studies. The daily practice could maintain better physical and mental health to have a better future.

INTRODUCTION

Patanjali in his Yoga Sutra describes- Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana and Samadhi as eight angas (parts) of yoga. Amongst them, in the present materialistic world, the third and fourth part, Pranayama and Asana (Postures) are considered as very important part and prescribed by modern medicine too. Many physicians now recommend yoga to patients at risk for heart diseases. as well as those with back pain, arthritis, depression and other chronic diseases. In Nadi Shodhana Pranayama, due to the deep penetration of prana, the blood receives a larger supply of oxygen than in other types of pranayama. The nerves are calmed and purified, and the mind becomes still and lucid. Its practice keeps the body warm, destroys diseases, gives strength and brings serenity. The vital energy drawn in from the cosmic energy through inhalation, passes close to vital chakras and feeds the glands The respiratory control center of the brain is stimulated and becomes fresh, clear, and tranquil.

As a technique, pranayama can assume rather complex forms of breathing, but the essence of the practice is slow and deep breathing. Such breathing is economical because it reduces dead space ventilation. It also refreshes air throughout the lungs, in contrast to shallow breathing that refreshes an only at the base of the lungs (Bijlani, 2004). Pranayama breathing has been shown to alter autonomic activity. A study by Udupa et al. (1975) indicates that pranayama training produces a decrease in basal sympathetic tone. Raghuraj et al. (1998) have reported that Nadi-shodhana pranayama increases parasympathetic activity. Slow and deep breathing itself has a calming effect on the mind and helps an individual to de-stress (Sandeep et al, 2002). This calming effect may also exert profound physiological effects on pulmonary, cardiovascular, and mental functions of the brain. This study investigated the immediate effect of a type of slow pranayama called as "Nadishodhana" on resting heart rate, blood pressure, peak expiratory flow rate, and simple problem solving ability in young healthy subjects.

Nadi Shodhana Pranayama: The purpose of Pranayama is to purify the nerves and thereby to strengthen the nervous system. It is easy to do and useful too. Increase the duration gradually after attaining the concentration of mind. Sit in any comfortable posture: Padmasana, Siddhasana or Sukhasana. Make your breathing normal. Close your right nostril with your thumb and fill in the breath through the left nostril. When inhaled completely, close the left nostril with your third finger and stay in this state of Antrik Kumbhaka for a few seconds. Then lift the thumb from the right nostril and exhale slowly, keeping the left nostril closed. Repeat the process by inhaling through the left nostril and exhaling through the right nostril. This will complete one full round of Nadi Shodhana Pranayama

METHODS

Study Participants

To achieve the purpose of this study 30 high school boy's age ranged from 13 to 16 years were selected from a Higher Secondary School, Chennai. They were divided in to two equal groups namely experimental (NPG, n=15) and Control Group (CG, n=15). They did not have any previous training in Pranayama. They were highly motivated to involve in the trainings.

Study Protocol

- | | | |
|--------------------------------|---|------------------------------------|
| a. Resting heart rate | - | Radial pulse |
| b. Systolic blood pressure | - | sphygmomanometer |
| c. Diastolic blood pressure | - | sphygmomanometer |
| d. Breath holding capacity | - | Stop watch |
| e. Vo ₂ max | - | Queens college step test |
| f. Cardiorespiratory endurance | - | Cooper 12 minutes run or walk test |

'Nadishodhana Pranayama' training

The Nadishodhana pranayama training for five days a week with thirty minutes duration in the evening session for a period of six weeks.

Week	Set	Repetition	Days / Week	Duration
1st week	2	5 repetition	5	30 minutes
2 nd week	3	5 repetition	5	30 minutes
3 rd week	4	5 repetition	5	30 minutes
4 th week	5	5 repetition	5	30 minutes
5 th week	6	5 repetition	5	30 minutes
6 th week	7	5 repetition	5	30 minutes

Control Group (without training CG=15)

The control group was left to follow regular routine.

DATA ANALYSIS

The collected data was analyzed using analysis of covariance (ANCOVA). ANCOVA was used to examine significance between testing groups (Nadishodhana Group, & Control Group). Statistical significance was set to a priority at $p < 0.05$ level. All statistical tests were applied using the statistical package for the social science (SPSS).

RESULTS**Table-1**

Changes in resting heart rate, systolic and diastolic blood pressure, breath holding time, VO₂, max and Cardiorespiratory Endurance in Nadishodhana Pranayama Training are listed below:

	Nadishodhana Pranayama	Control Group	Source of Variance	df	Sum of squares	Mean Square	F-Ratio
Resting Heart Rate							
Pr T M	78.53	78.13	B	1	1.20	1.20	0.18
			W	28	185.47	6.62	
Po T M	75.00	77.60	B	1	50.70	50.70	6.97
			W	28	203.60	7.27	
Apo T M	74.81	77.80	B	1	66.54	66.54	31.31
			W	27	57.39	2.13	
Systolic Blood Pressure							
Pr T M	109.33	110.33	B	1	7.50	7.50	0.18
			W	28	316.67	11.31	
Po T M	102.33	109.66	B	1	403.33	403.33	21.86
			W	28	516.67	18.45	
Apo T M	102.77	109.23	B	1	306.21	306.21	29.76
			W	27	10.29	10.29	
Diastolic Blood Pressure							
Pr T M	79.47	79.73	B	1	0.53	0.53	0.38
			W	28	394.67	14.10	
Po T M	75.60	78.87	B	1	80.03	80.03	5.73

			W	28	391.33	13.98	
Apo T M	75.71	78.75	B	1	69.29	69.29	17.02
			W	27	109.91	4.07	
Breath Holding Time							
Pr T M	42.13	40.27	B	1	26.13	26.13	2.37
			W	28	308.67	11.02	
Po T M	46.47	41.07	B	1	218.70	218.70	16.26
			W	28	376.67	13.45	
Apo T M	45.51	49.18	B	1	83.94	83.94	43.99
			W	27	51.52	1.91	
Vo2 Max							
Pr T M	48.83	48.83	B	1	0.00	0.00	0.000
			W	28	194.18	6.94	
Po T M	51.07	49.18	B	1	27.00	26.99	5.40
			W	28	140.04	5.00	
Apo T M	51.07	49.18	B	1	27.00	27.00	9.53
			W	27	76.51	2.83	
Cooper 12 min Run/Walk							
Pr T M	1690.00	1683.33	B	1	333.33	333.33	0.04
			W	28	254333.33	9083.33	
Po T M	1683.33	1683.33	B	1	30083.33	30083.33	4.31
			W	28	195666.67	6988.10	
Apo T M	1686.16	1686.16	B	1	24927.44	24927.44	50.40
			W	27	13352.99	494.56	

***Significant at 0.05 level**

Pr T M - Pretest Mean

Po T M - Posttest Mean

Apo T M - Adjusted Posttest Mean

DISCUSSION ON FINDINGS

The results of the study indicate that the experimental group namely nadishodhana pranayama had significantly improved the selected dependent variables namely resting heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, vo2 max and cardio-respiratory endurance when compared to the control group. From the results of the present investigation, it is also concluded that significant difference exists between experimental group and control group in developing all dependent variables. The Nadishodhana pranayama training had significantly improved resting heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, VO₂, max and cardio-respiratory endurance. The Nadishodhana pranayama training had significantly improved on resting heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, VO₂, max and cardio-respiratory endurance (subbalakshmi NK, et.al.). The subjects in the Nadishodhana pranayama training improves resting heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, vo2 max and cardio respiratory endurance (4.50%, 6.40%, 4.37 %, 10.28%, 4.59% and 3.35) respectively by finding significant improvements were noted from the heart rate, systolic blood pressure, diastolic blood pressure, breath) holding time, vo2 max and cardio-respiratory endurance between the pre and post-test scores. Therefore, Nadishodhana pranayama training is indeed effective in enhancing heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, vo2 max and cardio-respiratory endurance.

CONCLUSIONS

From analysis of the data, the following conclusions were drawn.

1. The experimental groups namely the nadishodhana pranayama training groups have significantly improved on selected (cardio respiratory parameters and cardio respiratory fitness) variables namely resting heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, VO₂ max and cardio-respiratory endurance, when compared to the control group.
2. Significant difference was found between nadishodhana pranayama training group and control group towards the improvement on (cardio respiratory parameters and cardio respiratory fitness) variables namely resting heart rate, systolic blood pressure, diastolic blood pressure, breath holding time, VO₂ max and cardio-respiratory endurance, when compared to the control group.

REFERENCE:

Bijlani RL. The Yogic Practices: Asanas, Pranayamas and Kriyas. In: Bijlani RL (ed). Understanding Medical Physiology, 3rd edition: New Delhi-India: Jaypee Brothers Medical Publishers (P), p 883-889, 2004.

Udupa KN, Singh RH, and Settiwar RM. Studies on the effect of some yogic breathing exercises (pranayama) in normal persons, Indian J Med Res 63:1062-1065, 1975.

Raghuraj P, Ramakrishnan AG, Nagendra HR, and Telles S. Effect of two selected yogic breathing techniques on heart rate variability, Indian J Physiol Pharmacol 42:467-472, 1998

Sandeep B, Pandey US, and Verma NS. Improvement in oxidative status with yogic breathing healthy males, Indian J Physiol Pharmacol 46:349-354, 2002.

Satendra Singh, Savita Singh, Shikha Gautam. PRANAYAMA-THE YOGIC SCIENCE OF BREATHING. Pakin young Journal of Physiology 2009;5(1)

Bhargava R, Gogate MG, and Mascarenhas JF. Autonomic responses to breath holding and its variations following pranayama Indian J. Physiol, Pharmacol 32:257-264, 1988.

Udupa K, Madanmohan, Ananda BB, Vijayalakshmi P, and Krishnamoorthy N. Effect of pranayama training on cardiac function in normal young volunteers. Indian J Physiol Pharmacol 47:27-33, 2003.