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ORIGINAL ARTICLE

ASSESSMENT OF CARDIO-PULMONARY PARAMETER RESULTS AFTER 8 WEEKS OF NADI-SHODHANA PRANAYAMA TRAINING

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ABSTRACT

The aim of the study is to assess the effects of a 8-week nadi-shodhana pranayama training on cardiopulmonary parameters. A group of 30 male healthy subjects were selected from department of physical education, Lucknow University (Uttar Pradesh, India), aged 18 – 24 years, volunteered to participate in the study. Subjects were assigned into two groups: A (experimental: N-15) and B (control: N-15). The subjects from Group A (experimental: N-15) were subjected to a 6-week nadishodhana pranayama training programme. This lasted 8 weeks and consisted of daily sessions, lasting 30 min. Heart rate was measured by counting radial pulse for a minute. Vital capacity was measured by spirometer. Both systolic and diastolic blood pressures were measured with the auscultatory method by using sphygmomanometer and stethoscope. Results showed that the vital capacity significantly improved (P<0.01) in experimental group compared with the control one. A significant decline in basal heart rate (P<0.01) and systolic blood pressure (P<0.05) was observed. In contrast, control subjects did not show any significant change in these parameters. 'Nadi-shodhana Pranayama training programme may be recommended to improve vital capacity and control heart rate and blood pressure and may contribute to enhance health status and wellness.

KEYWORDS: *Nadi-shodhana pranayama, heart rate, vital capacity, systolic, diastolic, blood pressure.*

INTRODUCTION

Yoga practices have a strong scientific foundation and consistently alter the body's physiology. There aren't many reports on the impact of different pranayams, or yoga breathing, on bodily processes.

Yoga is a philosophical word that describes the fusion of the personal self and the collective self. Ayurvedic medicine has been introduced alongside asana and pranayama as the

cornerstone of a system of medical care. Yoga breathing exercises specifically heighten the respiratory experience, possibly as a result of their continued conditioning of the breathing rhythm. Yoga has been practiced for thousands of years. It is based on ancient theories, observations and principles of the mind-body connections. Substantial research has been conducted to look at the health benefits of yoga –yoga postures (asanas), yoga breathing (pranayama) and meditation. These yoga practices might be interacting with various somatic and neuro-endocrine mechanisms bringing about therapeutic effects. The overall performance is known to be improved by practicing yoga techniques and their effects on physical functions were reported. A study indicates that pranayama training produces a decrease in basal sympathetic tone. Yoga practices can also be used as psycho-physiological stimuli to increase the secretion of melatonin which, in turn, might be responsible for perceived well-being. Yoga breathing, or pranayama, is the science of breath control. Pranayama (breathing exercise), one of the yogic techniques can produce different physiological responses in healthy individuals. Raghuraj have reported that pranayama increases parasympathetic activity. Slow and deep breathing itself has a calming effect on the mind and helps an individual to de-stress. The physiological and psychological benefits of yoga have been demonstrated in several studies. These studies have shown that regular practice of yoga leads to improvement in physiological functions and human performance. Yoga and paranyam may be as effective as or better than exercise at improving a variety of health-related outcome measures and as a result this study was undertaken to find out the effects of a 8-week nadi-shodhana pranayama training on cardio-pulmonary parameters.

MATERIAL AND METHODS

SUBJECTS

Thirty randomly selected male students of department of physical education, Lucknow University (Uttar Pradesh, India) aged 18 – 24 years, volunteered to participate in the study. A written consent was obtained from the subjects. They were randomly assigned into two groups: A (experimental N=15) and B (control N=15). The subjects from Group A were subjected to a 8-week nadi-shodhana pranayama training programme. This lasted for 8 weeks with consistent daily 30 min session, was conducted for continuous six days in a week with Sunday as a relaxing day. Studies parameters included heart rate, vital capacity, systolic and diastolic blood pressure.

SELECTION OF VARIABLES AND TESTS

The Subjects were tested on the following physiological test variables:

1. Physiological Variables Test / Equipments.
2. Heart Rate – Stethoscope and Digital Stop Watch.
3. Vital Capacity -Spiro meter.
4. Blood Pressure (Both systolic and diastolic) – sphygmomanometer and stethoscope.

STUDY PROTOCOL

The trainer involved in this study addressed the group of 15 students on the purpose of this study, the procedure to be followed, and willingness of the subjects to participate in this investigation. After the address, the trainer demonstrated the mode of Nadishodhana pranayama to the subjects. Each subject was studied separately and twice at the same time (6.15 A.M. to 7.00 A.M).

After an initial warm-up, all subjects were put through Nadishodhana pranayama for 30 min. They were asked to assume 'Sukhasana' (the comfortable posture) and regulate the alteration of breathing as follows:

1. Open the right hand and bend index and middle fingers against the palm. The thumb was used for closing the right nostril while the fourth and fifth fingers were used for the left nostril.
2. Place the right thumb against the ala at the end of the nostril to close it and similarly press the fourth and fifth fingertips against the left nostril.
3. Start the exercise in the 'Sukhasana posture', with relaxed attitude and concentration as follows:

i. Exhale slowly and deeply without closing the nostrils but being ready to do so.
ii. Inhale slowly and quietly through the left nostril while closing the right.
iii. At the end of the inhalation, close both nostrils and hold the breath for a while (not more than 1-2 seconds).
iv. Keep the left nostril closed and exhale through the right as quietly as possible.
v. After exhaling completely, inhale slowly and quietly through the right nostril.
vi. Close both nostril and wait for a while, then open the left nostril and exhale slowly and silently.
vii. Inhale through the same nostril and continue.

PHYSIOLOGICAL PARAMETER MEASUREMENTS

Radial pulse was counted for one minute to determine heart rate. The average of the three readings was calculated. A spirometer was used to measure vital capacity. The individual was instructed to take a deep breath and then blow forcefully and sharply into the Spiro meter's mouthpiece.

Three recordings were taken at one-minute intervals and the average of the three highest readings was noted do Subjects asked to following a maximum inspiration, all the air possible was forcibly exhaled through the mouthpiece. Both systolic and diastolic blood pressures were measured with the auscultatory method by using sphygmomanometer and stethoscope. Three readings were taken and their average was recorded.

DATA ANALYSIS

Values are presented as mean values and SD. The Student t' test was used to compare parameters within groups. Data was analyzed using SPSS Version 16.0 (Statistical Package for the Social Sciences, version 16.0, SPSS Inc, Chicago, IL, USA).

RESULTS

The mean, standard deviation and t-test values of cardio pulmonary parameters of experimental group and control group during Pre Test and Post Test are presented in Tables 1, 2, 3 and 4. A significant decline in basal heart rate ($P<0.01$) and systolic blood pressure ($P<0.05$) was observed. The vital capacity significantly improved ($P<0.01$) in experimental group. No significant differences were observed for diastolic blood pressure. No significant changes were noted in the control group.

DISCUSSION

Pranayama practices are known to significantly improve health status, reduce stress and anxiety. In his study, in addition to nadi-shodhana pranayama, other types of pranayama were

also included and the training period was of three months. Our study showed reduction in heart rate which is similar to the finding of. Further it showed significant improvement in the vial capacity which helps in the well being of the subjects, which is in accordance with Bal. From the results it is evident that the 6-week of pranayama training programme showed significant improvement in vital capacity. The findings are supported by the study conducted by Upadhyay showed a significant increment in pulmonary parameter such as Peak expiratory flow rate (PEFR L/min) and

TABLE 1.
MEAN, SD AND T –TEST VALUES OF HEART RATE (BEATS/MINUTE) OF EXPERIMENTAL GROUP AND CONTROL GROUP DURING PRE TEST AND POST TEST.

Group	Test	N	Mean	SD	t-value
Experimental	Pre –Test	15	78.33	1.82	
	Post-test	15	68.2	7.07	6.39**
Control	Pre –Test	15	78.33	2.87	
	Post-test	15	79.33	3.06	1.62

**Significant at p<0.01 level.

TABLE 2.
MEAN, SD AND T –TEST VALUES OF VITAL CAPACITY (LITERS) OF EXPERIMENTAL GROUP AND CONTROL GROUP DURING PRE TEST AND POST TEST.

Group	Test	N	Mean	SD	t-value
Experimental	Pre –Test	15	4.21	0.3	6.35**
	Post-test	15	4.37	0.27	
Control	Pre –Test	15	3.29	0.2	0.16
	Post-test	15	3.91	0.26	

**Significant at p<0.01level.

TABLE 3.
MEAN, SD AND T –TEST VALUES OF SYSTOLIC BLOOD PRESSURE (MMHG) OF EXPERIMENTAL GROUP AND CONTROL GROUP DURING PRE TEST AND POST TEST.

Group	Test	N	Mean	SD	t-value
Experimental	Pre –Test	15	126.2	9.79	2.24*
	Post-test	15	121.26	1.62	
Control	Pre –Test	15	124.4	7.68	0.09
	Post-test	15	124.33	7.12	

*Significant at p>0.05 level.

TABLE 4.
MEAN, SD AND T–TEST VALUES OF DIASTOLIC BLOOD PRESSURE (MMHG) OF EXPERIMENTAL GROUP AND CONTROL GROUP DURING PRE TEST AND POST TEST.

Group	Test	N	Mean	SD	t-value
Experimental	Pre –Test	15	76.26	4.16	1.53NS
	Post-test	15	74.86	3.39	
Control	Pre –Test	15	77.26	4.25	0.91NS
	Post-test	15	75.80	5.2	

*Significant at p< 0.05 level.

Pulse pressure (PP). The findings are also supported by the study conducted by Bal. (2008) The training program of bhastrika and anulom vilom pranayama significantly improved vital capacity and maximal ventilatory volume, according to the study. Although the results of the current study show a considerable decrease in systolic blood pressure of Bhargava et al. (1988) who evaluated the Nadi-Shodana Pranayama effect after 4 weeks of regular practice. Diastolic blood pressure mainly varies with the degree of peripheral resistance (Guyton, 1996) and heart rate. The non-significant change in diastolic blood pressure observed in the present study suggests that 'Nadishodhana Pranayama' might have no any long term effect on peripheral vascular resistance or it has some roles, but is obscured by a slow heart rate. Since yogaaims at perfection of the body and mind, it is natural to ask whether the progress towards perfection is reflected in objective reproducible changes in physiological variables. Results of this study also supported by (Nayar et al., 1975; Joshi et al., 1992) who suggest that Yogic asanas and pranayama have been shown to reduce the physiological parameters such as resting respiratory rate and increase vital capacity, timed vital capacity, maximum voluntary ventilation, breath holding time and maximal inspiratory and expiratory pressures. The results of the present study demonstrated the beneficial effect of Nadi shodhana pranayama on cardio pulmonary function.

CONCLUSION

The 8-week pranayama training programme had significant effect on heart rate, vital capacity and blood pressure. Thus, such training may be recommended to improve physical and physiological fitness-based performance. The positive results found in the present study might apply to sports persons to improve physiological efficiency. A few minutes practice daily may help in maintain healthy life. The daily practice could also be parts of physical fitness and life style modification programs in maintaining better physical and mental health.

PRACTICAL APPLICATIONS

The present data will serve as a reference to provide more evidence to support the beneficial effect of pranayama training on physiological variables. Although the present study suggests some applications, further studies with larger number of subjects from different lifestyles need to establish the beneficial effects of pranayama practice.

REFERENCES

Bal BS (2010). Effect of anulom vilom and bhastrika pranayama on the vital capacity and maximal ventilatory volume. J. Phy. Educ. Sport Manage., 1(1): 11-15.

Bal BS, Singh K (2010) Effects of 4-week rope mallakhamb training on respiratory indices in adolescent girls. Biomed. Hum. Kinetics, 2: 70-73.

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

Chhina CS (1974). The voluntary control of autonomic responses in Yogis. Proc Int. Union Physiol. Sci., 10: 103-104.

Florence V, Melody Y, Pierre B, Yves J (2005). Training to yoga respiration selectively increases respiratory sensation in healthy man, Respir. Physiol. Neurobiol., 146(1): 85-96.

Gopal KS, Bhatnagar OP, Subramaniam N, Nishits SD (1973). Effects of Yogasanas & Pranayamas on blood pressure, pulse rate and some respiratory functions. Indian J. Physiol. Pharmacol., 17: 273-276.

Guyton AC (1996). Textbook of Medical Physiology, 9th edition. Philadelphia: W.B. Saunders, pp. 161- 169.

Hadi N (2007) Effects of hatha yoga on well-being in healthy adults in Shiraz, Islamic Republic of Iran. East. Mediterr. Health J., 13: 829-837.

Harinath K, Malhotra AS, Pal K, Prasad R, Kumar R, Kain TC, Rail L, Sawhney RC (2004). Effects of hatha yoga and omkar meditation on cardiorespiratory performance, psychological profile, and melatonin secretion. J. Altern. Complement. Med. 10: 261-268.

Joshi LN, Joshi VD, Gokhale LV (1992). Effect of short-term 'pranayama' practice on breathing rate and ventilatory functions of lung. Indian J. Physiol. Pharmacol., 36: 105-108.

Malhotra V, Singh S (2002). Study of yoga asanas in assessment of pulmonary function in NIDDM patients. Indian J. Physiol. Pharmacol., 46: 313-320.

Nayar HS, Mathur RM, Sampath Kumar R (1975). Effects of Yogic exercises on human physical efficiency. Indian J. Med. Res., 63: 1369-137.

Pathale JD, Mehrotra PP, Joshi SD, Shah AH (1978). Aplea for Pranayam for elderly. Ind. J. Pharmacol., 22(4 Suppl): 77

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

Ross A, Thomas SJ (2010). The health benefits of yoga and exercise: a Review of Comparison Studies. J. Altern. Complement. Med., 16: 3-12.

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

Selvamurthy W, Nayar HS, Joseph NT, Joseph S. (1983). Physiological effects of yogic practice. NIMHANS J., 1: 71-80.

Telles S, Desiraju T (1993). Autonomic changes in Brahmakumaris Raja Yoga meditation. Int. J. Psychophysiol., 15: 147-152,

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

Udupa KN, Singh RH. (1972). The scientific basis of Yoga. JAMA, 220: 1365

Upadhyay DK, Malhotra V, Sarkar D, Prajapati R (2008) Effect of alternate nostril breathing exercise on cardiorespiratory functions. Nepal Med. Coll. J., 10: 25-27.