JOY: The Journal of Yoga
Spring 2009, Volume 8, Number 1

Suryanadi Anuloma Viloma Pranayama Modifies Autonomic Activity of Heart

Varun Malhotra*,OP Tandon*, Rajkumar Patil**, Tarun K Sen*, Stany W Lobo***, Nagamma T****, Rahul A, Anshul Singh, Shreekant, Sonam Motani, Atulya Choudhary

Department of Physiology*, Community Medicine**, Anatomy***, Biochemistry****, students. Manipal College of Medical Sciences (MCOMS), Pokhara, Nepal
*University College of Medical Sciences of Medical Sciences, Shahdara, Delhi.
dr_varun@yahoo.com

Abstract

Patanjali, foremost exponent of Yoga, described pranayama as the gradual unforced cessation of breathing. Pranayama is derived from two Sanskrit words-prana (life) or yama (control). Pranayam or control of prana or life force yields heart beat pulse and mind control. Yoga combines scientific technique of right behavior (Yama-Niyama), proper posture (asana), life force control (pranayama), interiorisation of the mind (pratyahara), concentration (dhyan), developing intuition (dharna) and Samadhi (ultimate realization). Suryanadisuddhi pranayama starts with closing the right nostril with the thumb of the left hand followed by exhalation through right nostril and inhaling slowly through the same nostril. This forms one round of suryanadisuddi pranayama. Pulse rate was recorded before and after twelve cycles of left nostril breathing. Thirty two readings were taken. The pulse rate dropped from 71.19±6.3 to 65.88±5.6 (Figure 1). The change is significant at $p<0.001$. The subjects felt joy, peace and were calm.

Alternate nostril breathing is a process of continuous, regularity of inhalation, holding of breath and exalation. It charges the body with an increased supply of oxygen through the lungs, this oxygen "burns" or oxidizes the waste impurities, chiefly carbon, in the venous blood. This process of purification is enhanced by an accompanying large increase in expulsion of waste carbondioxide from the lungs during exhalation. As a consequence, very little of the tissue remains in the blood as waste material. There is less need for the breath, as the flow to the lungs of blood for purification slows down. The heart and lungs are given extraordinary rest.

Introduction:

Patanjali, foremost exponent of Yoga, described pranayama as the gradual unforced cessation of breathing. Pranayama is derived from two Sanskrit words-prana (life) or yama (control). Pranayam or control of prana or life force yields heart beat pulse and mind control. Yoga combines scientific technique of right behavior (Yama-Niyama), proper posture (asana), life force control (pranayama), interiorisation of the mind

(pratyahara), concentration (dhyan), developing intuition (dharna) and Samadhi (ultimate realization).

The ancient Indian science of Yoga makes use of voluntary regulation of the breathing to make respiration rhythmic and to calm the mind (1). This practice is called Pranayama . Nadisuddhi pranayama means "purification of subtle energy paths", inhalation and exhalation are through alternative nostrils for successive respiratory cycles. Surya Anuloma Viloma Pranayama means "heat generating breathing particle" when the respiratory cycle of inhalation and exhalation is completed through the right nostril exclusively. When completed through the left nostril alone the practice is called " Chandra Anuloma Viloma Pranayam" which means a heat dissipating or cooling liberating practice. (2,3,4,5)

The study is designed to study the scientific basis of effect of pranayama on the heart

Material and Methods:

The Pranayama was performed before meals. The subjects were advised not to hold the breath for uncomfortably long periods, as this causes harmful pressure on the heart, lung, diaphragm and arteries. Subjects were excluded from the study . The subject was seated in a comfortable sitting posture with back straight (1,15).

Suryanadisuddhi pranayama starts with closing the right nostril with the thumb of the left hand followed by exhalation through right nostril and inhaling slowly through the same nostril. This forms one round of suryanadisuddi pranayama. Pulse rate was recorded before and after twelve cycles of left nostril breathing.

Results:

Thirty two readings were taken. The pulse rate dropped from 71.19±6.3 to 65.88±5.6 (Figure 1). The change is significant at $p<0.001$. The subjects felt joy, peace and were calm.

	Before	After	P value
Pulse rate	71.19±6.3	65.88±5.6	0.000

Discussion:

Nostril breathing is a process of continuous, regularity of inhalation, holding of breath and exalation. It charges the body with an increased supply of oxygen through the lungs, this oxygen "burns" or oxidizes the waste impurities, chiefly carbon, in the venous blood. This process of purification is enhanced by an accompanying large increase in expulsion of waste carbondioxide from the lungs during exhalation. As a consequence, very little of the tissue remains in the blood as waste material. There is less need for the breath, as the flow to the lungs of blood for purification slows down. The heart and lungs are given extraordinary rest. (1)

The inactivity of the muscles and limbs during meditation lessens bodily carbon production, and is conducive to the restful state of heart and lungs. rest given to the heart helps in increasing longevity. (1)

The nasal cycle is a ultradian rhythm characterized by altering patency of the left and right nares, with a periodicity of eight hours. (6,7,8) Werntz correlated right nostril dominance with the activity phase of the basic rest activity cycle (13). A decrease in pulse rate may be related to an increase in vagal tone, a decrease in cardiac sympathetic activity.(3) Following Nasisuddhi pranayama, both the components of the autonomic nervous system viz parasympathetic and sympathetic are activated. While alternating to explain the mechanisms underlying the changes, the respiratory sinus arrhythmia has to be taken into account. The heart rate increases with inspiration and decrease with expiration. (7)

Breathing exclusively through the right nostrils several times a day, for a month can significantly increase baseline oxygen consumption by 37% where as breathing through left nostril alone produces smaller increase. Right nostril breathing increases metabolism perhaps by increasing the output of adrenaline from the adrenal medulla (increasing basal oxygen consumption and heart rate) (10). Reduced mental stress or arousal cause increase in galvanic skin resistance reduced sympathetic tone to palmar sweat glands and cutaneous blood vessels. Nadisuddhi Pranayama practiced for four weeks causes decrease of the heart rate, as well as systolic and diastolic blood pressure levels. (11)

Conclusion:

The exact mechanism by which nostril breathing influences the function of the autonomic nervous system is not know, though it has been speculated that this is through a neural reflex mechanism in the superior nasal meatus. Further work is necessary to understand the mechanism as well as to record the changes during actual practice. However, the effect of pranayama practices can be used for therapeutic advantage. Several rounds Surya Anuloma Viloma Pranayama could be used to increase metabolism in overnight persons, while the effects of Chandra Nadi to decrease blood pressure in hypertensives. Nadisuddhi pranayam helps calm he restless mind. (12,14)

References:

1. Sri Paramhansa Yogananda. God Talks With Arjuna. The Bhagavad Gita Royal Science of God-Realization. The immortal dialogue between soul and spirit. A new translation and commentary 2002, chapter IV Verse 29 p 496-507.

2. Backon J. Changes in blood glucose levels induced by different forced nostril breathing, a technique which effects brain hemisphericity and autonomic activity. Med Sci Res 1988; 16: 1197-1199.

3. Bhargava R, Gogate MG, Mascarchas JF. Autonomic responses to breath holding and its variations following pranayama. Indian J Pharmacol 1988; 32(4):257-264.

4. Stoksted P. The physiologic cycle of the nose under normal and pathologic conditions. Acta Otolaryngol (Stokh) 1952;109 (Suppl):159-175.

5. Keuning J. On the nasal cycle. J Int Rhinol 1968;6:99-135.

6. Steptor A. The assessment of sympathetic nervous function in human stress research. J Psychosom res 1987; 31:141-152.

7. Saul JL, Cohen RJ. Respiratory sinus arrhythmia. In: Levy MN, SchWartz PJ (eds). Vagal control of the heart: experimental basis and clinical implications. Future Publishing, New York 1994 p 511-535.

8. Raghuraj P, Nagarathna R, Nagendra HR and telles S. Pranayama increases Grip Strength without lateralized effects. Indian J Physiol Pharmacol 1997; 41(2):129-133.

9. Kayser R. Die exacta Meissung der Luft durchangekeitder Nase. Arch Larybgol Rhinol 1895;3: 101-120.

10.Telles S, Nagarthna R and Nagendra HR. Indian J Pharmacol 1994;38(2):133-137.

11. Grossman P. Respiratory and cardiac rhythma as windows to central to central autonomic behaviour regulation selection of window frames. Keeping the panes clean and viewing neural topography. Biol Psychol 1992; 34:131-161

12.Raghraj P, Ramakrishnan AG, Nagendra HR and Telles Shirtey. Effect of two sekected yogic breathing techniques on heart rate variability. Indian J Physio Pharmacol 1998 Oct: 42(4); 467-73.

13. Fuderburke J. Science studies Yoga- a review of physiological data. Himalayan international Institute of Yoga Sciences. llinos 1977.

14. Werntz D, Bichford RG, Bloom FE, Shannahoff-Khalsa DS. Alternating cerebral hemispheric activity and lateralization of autonomic nervous function. Human Neurobiol 1983;2 :39-43.

15. Steptor A. The assessment of sympathetic nervous function in humans stress research. J Psychosom Res 1987, 31:141-152.

16.Nagendra HR, Mohan T, Shriram A. Yogi in education 1st ed. Banglore. Vivekananda Kendra Yoga Anusadhana Samsthan, 1988.

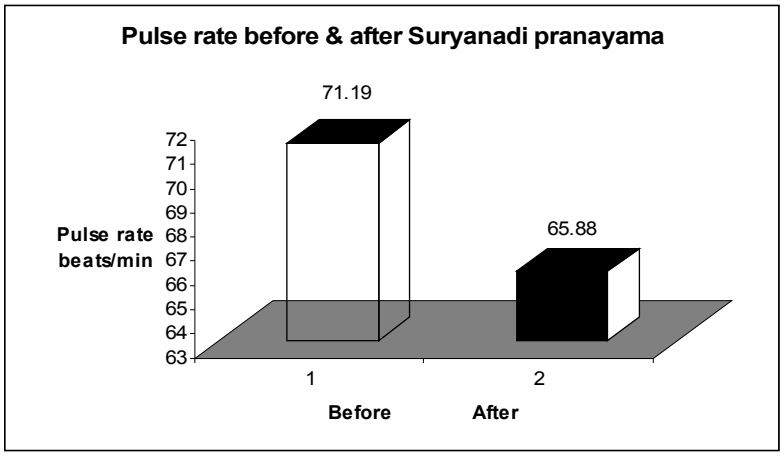

Figure 1: Pulse rate before & after Suryanadi pranayama