

Comparative Study of Respiratory Parameters in Savitri Pranayama & Alternate Nostril Breathing Practitioners



Medical Science

KEYWORDS : Savitri Pranayama, Alternate nostril breathing, Respiratory Parameters

Dr.Rajesh Desai

Dept. of Physiology, Smt. NHL Municipal Medical College, Ahmedabad.

Dr.Kena Jasani

Dept. of Physiology, Smt. NHL Municipal Medical College, Ahmedabad.

ABSTRACT

Aim: Present study was undertaken to compare the effect of Savitri Pranayama and Alternate nostril breathing on respiratory parameters.

Method: The study groups (group 1&2) consisted of 30 healthy adults doing yoga at the Aum yoga center, Ahmedabad. They were motivated to undergo either Savitri Pranayama or Alternate nostril breathing. 1st phase of reading was taken before commencement of pranayama practice and 2nd phase of reading at the cessation of pranayama practice (12 weeks). Peak Expiratory Flow Rate & Maximum Breathing Capacity were determined by using a digital spirometer. Expiratory pressure and 40 mm endurance test were determined by using a Mercury Manometer. Breath Holding Time was determined by using a stop-watch.

Result: There was significant increase in all the respiratory parameters recorded in group 1 and 2 in second phase of reading when compared with first phase respectively. But there was no significant change in second phase of reading between group 1 and 2.

Conclusion: It is concluded that respiratory parameters increase with either practice of any one type of Pranayama.

Introduction:

Yoga is a science practiced in India over thousands of years. It is the best life-style ever devised in the history of mankind. Pranayama is a type of yogic practice. Prana means breath, respiration or energy and Ayama means stretching or expansion. Besides spiritual achievements, the practice of yoga and pranayama is accompanied by a number of beneficial physiological effects in the body. Savitri pranayama is one of the unique pranayama techniques which involves slow, rhythmic, and deep breathing in a 2:1:2:1 pattern incorporating a safer and milder form of breath holding. The duration of the held in (kumbhaka) and held out (shunyaka) phases is only for half that of the inspiration (puraka) and expiration (rechaka) phases. This pranayama is usually taught as a relaxing and rejuvenating practice and can be done in either sitting or supine position. [1] So Savitri Pranayama or rhythmic breathing is the practice of harmonizing breath to relax and rejuvenate the body, emotions and mind. Alternate nostril breathing is also called Nadi-shuddhi Pranayama, in which person starts puraka (inspiration) through left nostril & rechaka (expiration) through right nostril, then puraka through right nostril & rechaka through left nostril. This completes 1 cycle. It promotes balance between the two nostrils apart from cleansing the nasal tract. This pranayama helps strengthen the lungs and increases overall lung capacity. So alternate Nostril breathing can be helpful to treat disorders of the respiratory system.[2]

Materials & Methods:

The study groups (group 1 & 2) consisted of 30 healthy adults doing yoga practice at the Aum yoga center, Ahmedabad. All the subjects were healthy and did not have any cardio- respiratory diseases and were not under any medications. All were non-smokers and were of same socioeconomic status. They were motivated to undergo either Savitri Pranayama or Alternate nostril breathing for 20 minutes daily, for 6 days a week, minimum for 12 weeks. Anthropometric measurements of both the groups were taken. Weight was measured in kilograms. Height was measured in meters while standing erect.

Subjects of group 1 practiced Savitri Pranayama in sitting position (either in a lotus posture i.e. *Padmasana* or a comfortable sitting posture i.e. *Sukhasana*). A held in and a held out breath were added to the breath technique so that the incoming and the outgoing breath were done for an equal count, while the held in and the held out breath were for only half of that duration. Breathing was through both nostrils. In this study, we have used a six count for inspiration and expiration and a three count for the retained and held out breaths (6:3:6:3).

Subjects of group 2 practiced Alternate nostril breathing in sitting position-either *Padmasana* or *Sukhasana*. The subjects

were asked to close one of their nostrils (say right nostril) by thumb and slowly breathe in upto maximum, through left nostril. Then they were asked to close other nostril (left) by ring finger and open the right nostril to exhale slowly upto maximum. After which they were instructed to inhale through same right nostril (with left nostril closed) and then to open left nostril and exhale as stated above.

Two phases of reading were taken. 1st phase of reading was taken before commencement of pranayama practice and 2nd phase of reading at the cessation of pranayama practice that is after 12 weeks.

Peak Expiratory Flow Rate & Maximum Breathing Capacity were determined by using a digital spirometer-MEDSPIROR. The subjects were familiarized with the set up and detailed instructions and demonstrations were given to their satisfaction. The subjects were made to breathe out forcefully following deep inspiration into the mouthpiece attached to the digital spirometer. Expiration was maintained for a minimum period of 3-4 seconds. Three to four trials of maximal inspiratory and expiratory efforts were made and only the highest reading was taken for data processing. All the readings were taken in standing position. Maximum effort from the subjects was assured by adequately motivating them to perform at their optimum level.

Expiratory pressure and 40 mm endurance test were determined by using a Mercury Manometer. For measurement of expiratory pressure subjects were instructed to take deep inspiration through nostrils and after pinching the nose with one hand they were asked to blow into the rubber tube of mercury manometer. Reading of maximum rise in mercury column was noted. In the similar manner for measurement of 40mm endurance test, maximum time upto which subject can maintain steady level of 40mm Hg was noted.

Breath Holding Time was determined by using a stop-watch. After normal expiration, subjects were instructed to hold their breath and maximum time upto which they held breath was noted. All tests were carried out at the same time of the day (7am to 8am) in both test groups to avoid possible influence of circadian rhythm. Data analysis was done using Independent sample *t-test* and *paired t-test* and P value < 0.005 was considered as statistically significant.

Results: There was significant increase in all the parameters recorded in group 1 and 2 in second phase of reading, when compared with first phase respectively. But there was no any significant change in second phase of reading between group 1 and 2.

Table-1: Comparison of first and second phase of readings of respiratory parameters in test group 1.

	PEFR (L/sec)	MBC (L/min)	Expiratory Pressure (mmHg)	40mm Endurance test (sec)	BHT (sec)
First	4.54±1.12	90.50±5.12	86.14±4.22	21.15±3.91	22.52±0.49
Second	6.25± 0.41	117.25±4.42	110.35±3.71	29.82±2.78	31.71± 0.55
P value	<0.005	<0.005	<0.005	<0.005	<0.005

Table-2: Comparison of first and second phase of readings of respiratory parameters in test group 2.

	PEFR (L/sec)	MBC (L/min)	Expiratory Pressure (mmHg)	40mm Endurance test (sec)	BHT (sec)
First	4.84±0.31	93.82±3.22	84.11±2.61	22.24±2.35	21.86±0.56
Second	6.06±2.12	116.84±4.45	113.22±6.35	29.91±3.25	30.95±3.34
P value	<0.005	<0.005	<0.005	<0.005	<0.005

Table-3: Comparison of second phase of readings of respiratory parameters in both the test groups.

	PEFR (L/sec)	MBC (L/min)	Expiratory Pressure (mmHg)	40mm Endurance test (sec)	BHT (sec)
Group 1	6.25± 0.41	117.25±4.42	110.35±3.71	29.82±2.78	31.71±0.55
Group 2	6.06±2.12	116.84±4.45	113.22±6.35	29.91±3.25	30.95±3.34
P value	0.759	0.601	0.702	0.704	0.691

Discussion: PEFR is the expiratory flow rate during the peak of FVC. Its measurement helps to assess the degree of opening of small airway passages. Pranayama involves using of lung spaces, which is not used up in normal shallow breathing, so increased PEFR might be a consequence of small airway opening in lungs.[3] The work of Yadav and Das attributed the increase in PEFR by yogic exercise due to following changes in respiratory dynamics: increased respiratory muscle strength by the exercises of these muscles, cleansing of airways secretions and efficient use of diaphragmatic and abdominal muscles, thereby emptying and filling the respiratory apparatus more efficiently and completely.[4] Possible explanation for increased MBC & EP could be regular deep inhalation and exhalation of the lungs for prolonged period has lead to strengthening of respiratory muscles. Increase in BHT & 40mm endurance test may be due to increase in tolerance to high PCO₂ and low PO₂ achieved due to training of pranayama.[3] By regular practice of pranayama respiratory centre in medulla oblongata is brought under volition. In pranayama the individual continues the phase of inhalation with his strong voluntary control so that lungs are

expanded considerably and the walls of the alveoli are stretched to the maximum thus the chest continues to get expanded under cortical control. The stretch receptors are thus trained to withstand more and more stretching this helps us to hold the breath for a long period. The duration is gradually increased so that respiratory centre is gradually acclimatized to withstand higher pCO₂ and lower pO₂. The CO₂ stimulates the chemo receptors located in the medulla oblongata that are sensitive to the amount of CO₂ concentration in blood, which in turn send the impulses to the respiratory centre. The respiratory centre which could have otherwise started exhalation is now helpless against the strong voluntary control from the cortex, so in many ways the individual practicing pranayama is training the chemoreceptor to tolerate more and more tensions. Voluntary slow deep breathing stretches the lung tissue, which produces inhibitory signals from 2 sources - by the action of slowly adapting receptors and by hyperpolarizing currents. These inhibitory signals coming from the cardio respiratory regions are believed to synchronize neural elements in the brain leading to changes in the autonomic nervous system and a resultant condition characterized by reduced metabolism and parasympathetic dominance.[5] Yogic asanas and Pranayama have been shown to reduce resting respiratory rate. They increase the vital capacity, maximum voluntary ventilation, breath holding time, maximum inspiratory and expiratory pressures. In a study involving comparison of routine National Defence Academy training, athletics and yogic exercises, Commander H.S. Nayar and his colleagues found that yogic exercise group showed maximum improvement in respiratory function.[6]

Conclusion: There is significant increase in Peak Expiratory Flow Rate, Maximum Breathing Capacity, Expiratory pressure, 40 mm endurance test & Breath Holding Time in both the test groups after 12 weeks of pranayama practice, but no significant change is noticed when all above mentioned respiratory parameters were compared in 2nd phase of reading between the test groups, which suggests that both pranayama are equally beneficial. Therefore, it is concluded that Respiratory parameters increase with either practice of any one type of Pranayama. This resultant effect of Pranayama can be used as a lung strengthening tool to treat many lung diseases like asthma, allergic bronchitis and many occupational diseases.

REFERENCE

- Bhavanani, A.B., & Meena, R. (2012). Immediate cardiovascular effects of Savitri Pranayama in sitting and supine positions in female volunteers. *Yoga Mimamsa*, 44(2), 101-112 | 2. Dhungel, K., Malhotra, V., Sarkar, D., & Prajapati, R. (2008). Effect of alternate nostril breathing exercise on cardiorespiratory functions. *Nepal Med Coll J*, 10(1), 25-27 | 3. Mamatha, S.D., & Gorkal, A.R. (2012). Effect of Savitri Pranayama practice on peak expiratory flow rate, maximum voluntary ventilation and breath holding time. *IJRRMS*, 2(1), 9-10. | 4. Yadav, R.K., & Das, S. (2001). Effect of yogic practice on pulmonary functions in young females. *Indian J Physiology & Pharmacology*, 45, 493-496. | 5. Best & Taylor's (2012). *Physiology basis of medical practice* (13th edition). Haryana, Wolters Kluwer (India) Pvt. Ltd. | 6. Bijlani, R.L. (2004). *Understanding medical physiology* | (3rd edition). Noida, Jaypee brothers.