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Physiology

TO STUDY THE EFFECT OF SAVITRI PRANAYAMA PRACTICE ON PEAK EXPIRATORY FLOW RATE.

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ABSTRACT

Introduction: Yoga is a science which has been practiced in India from over thousands of years. Yoga is mind-body technique which involves relaxation, meditation and a set of physical exercises performed in sync with breathing. Being holistic, it is the best means for achieving physical, mental, social and spiritual wellbeing of the practitioners. Besides its spiritual achievements, the practice of yoga is accompanied by a number of beneficial physiological effects in the body. Pranayama is one of the yogic practices, which is an art of controlling the life force of breath. It produces many systemic psycho-physical effects in the body, besides its specific effects on the respiratory functions. The present work was taken to see the effect of Savitri pranayama alone on peak expiratory flow rate (PEFR).

Aim and objective: To know whether there is any change in PEFR in the subjects practicing savitri pranayama and with those who are not practicing any type of yoga.

Materials and methods: Total 60 subject were enrolled in the study, consisting of 30 male volunteers from Yoga training center of Aurangabad of age between 18 to 28 years and practicing savitri pranayama for 30 minutes daily for 16 weeks were selected. And the control group consisting of age and sex matched 30 students of MGM'S Medical College. PEFR was determined by using Sprowin a computerized Spirometer. Data analysis was done using Independent students't' test to find out the significance of differences between groups selected. Differences in means were considered statistically significant when the two-tailed P value is <0.005.

Results: The study group showed significant increase in PEFR when compared to control group.

Conclusion: Present study leads to the supposition that Savitri Pranayama breathing exercise strengthens respiratory muscles and control it by overriding the usual excitatory stimuli to respiratory centers. Hence there is increase in PEFR.

KEYWORDS : Savitri Pranayama, Yoga, PEFR

Introduction:

Yoga is a science practiced in India over thousands of years.[1]Yogic practices, an ancient culture of Indian heritage, have led to ideal physical, mental, intellectual, and spiritual health. Yoga has a number of beneficial physiological effects on various systems in our body. Regular yogic practices have been shown to cause profound improvement in cardiorespiratory[2], thermoregulatory[3] and psychological functions in healthy individuals[4]. Yogic practices have been also found to be most useful in alleviating hypertension[5], bronchial asthma,[6]diabetes mellitus[7], and coronary artery disease[8].

The science of yoga speaks of "pranayama", which is a controlled breathing exercise. The word 'prana' in pranayama is translated as respiration which determines breath of life, vitality and energy. The word 'ayama' means stretch, expansion, prolongation, restrain or control [9]. Thus pranayama is the art of prolongation and control of breath. Pranayama is an art of controlling the life force of breath. [10] It is an ancient yoga technique, a spiritual and physical practice which integrates the mind and body. Pranayama is a type of yogic practice which produces many systemic psycho-physical effects in the body, besides its specific effects on the respiratory functions.

There is a need to know the effect of Savitri Pranayama (which can be done in Savasana position) training alone on respiratory system, so that benefits, if any, could be obtained by its practice and can be advised in non-ambulatory patients to strengthen respiratory muscles. Thus, the present work was taken to see the effect of Savitri pranayama alone on peak expiratory flow rate (PEFR).

Aim and objective:

To know whether there is any change in PEFR in the subjects practicing savitri pranayama and with those who are not practicing any type of yoga.

Materials and methods:

Study was conducted in the department of Physiology MGM'S Medical college Aurangabad. Written informed consent of all the subjects those participated in the study was taken after obtaining ethical clearance from the Institutional ethical clearance committee.

Total 60 young healthy subjects were enrolled in the study, consisting of 30 male volunteers from Yoga training center of Aurangabad of age between 18 to 28 years and practicing savitri pranayama for 30 minutes daily for 16 weeks were selected. And the control group consisting of age and sex matched 30 students of MGM'S Medical College. They were not practicing or involved in any type of sports or gymnastic activities regularly. The subjects in the test and control group had no history of allergic disorders, respiratory disorders, chest deformities and systemic diseases in the past as well as during the present study. Test group practiced Savitri Pranayama for 30 minutes in the early morning between 6:00 am to 6:30 am, 6 days per week for 16 weeks under the guidance of trained yoga instructor.

The details of Savitri Pranayama procedure is as follows: Shavasana i.e., lying supine on a flat surface with the head preferably to the north or east so as to be in alignment with the earth's magnetic field. The upper limbs relaxed and placed by the sides of the thighs with the palms facing upwards. Feet were relaxed with heels touching each other lightly. Air was breathed in through the nose for 6 numeral counts and held in for 3 numeral counts. Again air was breathed out through the nose for 6 numeral counts and then held out for 3 numeral counts. Breathing was done in and out through both nostrils. This was repeated for several rounds.[11]

PEFR was determined by using Sprowin a computerized Spirometer. Data analysis was done using Independent students't' test to find out the significance of differences between groups selected. Differences in means were considered statistically significant when the two-tailed P value is <0.005.

Result:

Table 1: Showing effect of savitri pranayama training for 16 weeks on PEFR.

	Age N=30	Before PEFR (L/sec)	After PEFR (L/sec)
Test	21.06 ± 1.42	4.35± 0.42	5.872 ±0.98
Control	20.83± 1.35	4.35± 0.42	4.32 ±0.37
't' value	0.379	0.00	8.058
'p' value <0.005	0.706 (NS)	1.00(NS)	0.000(S)

Shows significant increase in PEFR in test group

Discussion:

Pranayama is a type of yogic breathing exercise. It is a form of physiological stimulation. The regular practice of Pranayama is a form of adaptation to a repeated stimulus. Breathing is the only autonomic function that can be consciously controlled and it is the key in bringing the sympathetic and the parasympathetic nervous system into harmony [12].

Our study showed significant increase in PEFR after undergoing savitri pranayama training for 16 weeks. These results were consistent with those of other studies which were done by Yadav A et al. [13], Upadhyay KD et al.[14] ,Chanavirut et al. [15],Shankarappa etal,[16] C Abhaya Prakash etal[17] and Mamatha S D etal.[11]

The peak expiratory flow rate is generally considered as a sensitive indicator of changes in elastic recoil pressure or of the resistance of small airways. PEFR is subject of wide variability and is effort dependent.[18]

Usually breathing is not a conscious event and is regulated automatically by the nervous system through the respiratory centers located in the medulla oblongata and pons. These are the dorsal and ventral group of neurons located in the medulla, the pneumotaxic center and the apneustic center located in the pons. The activity of these respiratory centers is in turn modified by supra-pontine influences, in a conscious human being. While the basic respiratory rhythm in normal situations is maintained by the impulses discharged by the dorsal group of neurons, the pneumotaxic center indirectly controls the duration of inspiration helps in relaying the suprapontine impulses which promote voluntary inspiration and expiration.[19]

During daily practice of pranayamic breathing the basic activity of the bulbo-pontine complex is modified in such a way as to slow down its rhythm. Also by voluntarily prolonging the phase of inspiration and expiration, the respiratory muscles are stretched to their full extent and the respiratory apparatus is able to work to their maximal capacity. Thus after continuous practice of pranayama for few weeks, the bulbo-pontine complex is adjusted to the new pattern of breathing which is slower than its basal rhythm.[20] The cyclic waning of sensitivity of RC is determined by impulses from higher centres, afferent rhythmic discharges modified by pO2 and pCO2 in blood, and impulses from stretch receptors in lungs and thorax.[11]

PEFR is the maximum flow rate attained during forced vital capacity manoeuvre measured in litres. 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. Therefore, the increased peak expiratory flow rate might be a consequence of small airway opening in lungs.[2]

During pranayama training, regular inspiration and expiration for prolonged period leads the lungs to inflate and deflate maximally and that it causes strengthening and increased endurance of the respiratory muscles [21,22,23,24]. This maximum inflation and deflation is an important physiological stimulus for the release of surfactants and prostaglandins into the alveolar spaces, which thereby increase the lung compliance [25,26].

Results of our study showed that practice of Savitri pranayama is an effective way to develop the strength of respiratory muscles and to bring respiration under volition.

Conclusion :

Pranayama is a type of yogic breathing exercise. In the test group there is statistically significant increase in PEFR after 16 weeks of practice when compared to control group. Savitri pranayama training causes increase in lung and thorax compliance, respiratory muscle strength and tolerance of RC against higher pCO2. As this pranayama can be done in savasana position, practice of savitri pranayama may be beneficial in non-ambulatory patients to improve respiratory musculature and bronchial tone.

This resultant effect of pranayama can be used as lung strengthening tool to treat many lung diseases like asthama, allergic bronchitis, post pneumonia recoveries, tuberculosis and many occupational diseases.

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