

Physiological Effectiveness of Pranayama



Medical Science

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ABSTRACT

The energy in the body is prana. By controlling the motion of the lungs or respiratory organs one can control the prana. By the control of prana the mind can be easily controlled. The practices of pranayama or breathing technique considered to be the highest form of purification and self discipline for the mind and the body. The practices produce an actual physical sensation of heat, or the inner fire of purification. It is taught that this heat is part of the process of purifying the nadis or subtle nerve channels of the body. This allows a more healthful state to be experienced and allows the mind to become more calm. As one follows the proper rhythmic patterns of slow breathing the patterns strengthen the respiratory system, soothe the nervous system and reduce desires and the mind attains concentration.

Introduction

Yoga came to the attention of an educated western public in the mid 19th century along with other topics of Indian philosophy. The first teacher to actively advocate and disseminate aspects of yoga to a western audience was Swami Vivekananda who toured Europe and the United States in the 1890s. (Shaw and Eric.2010). Pranayama is the measuring, control and directing of the breath. Pranayama controls the energy within the organism in order to restore and maintain health and to promote evolution. When the inflowing breath is neutralized or joined with the out-flowing breath, then perfect relaxation and balance of body activities are realized.

In Yoga Sutra text book practices of pranayama is considered to be the highest form of purification and self discipline for the mind and the body respectively. The practices produce the actual physical sensation of heat or the inner fire of purification. It is taught that this heat is part of the process of purifying the nadis or subtle nerve channels of the body. This allows a more healthful state to be experienced and allows the mind to become more calm. As the yogi follows the proper rhythmic patterns of slow breathing, the patterns strengthen the respiratory system, soothe the nervous system and reduce craving for desires and the mind is set free and becomes a fit vehicle for concentration.

Prana is the vital force which pervades the whole cosmos. It is in all things and is the bioenergy that activates the human organism. It is related to the air we breathe which is our main source of prana. Prana links body and mind. The word pranayama is formed by two words prana and ayama. Prana means a subtle life force which provides energy to different organs including mind and controls many life processes. Ayama signifies the voluntary effort to control and direct prana. Breathing is one of the vital activities governed by prana at gross level and linked with the nervous functions. (Gore1991).

Pranayama are the group of techniques that aims at stimulating or balancing the vital energy. They purify the physical body and remove blockages allowing energy to flow freely. The breath and heart are linked together when we speed up our breathing, we speed up our heart. The control of breath can therefore influence the heart rate by decreasing it. Practice of pranayama requires a conscious control over the breathing. One remains fully aware of what he is doing during difference phases of pranayama. By controlling the motion of the lungs or respiratory organs one can control the prana that is vibrating energy inside. Those who have brought to experience the equalization of prana in exhalation and inhalation will enjoy infinite bliss.

Characteristics of Prana.

Correct posture is indispensably requisite for the successful practice of pranayama. An easy comfortable posture is asana. That pose is the best which continues to be comfortable for the greatest length of time. Chest, neck, and head must be in one vertical line. Pranayama begins with the regulation of the breath for having control over the life-currents or inner vital force. In other words pranayama is the perfect control of the life-currents through control of breath. Breath is external manifestation of the gross prana. A correct habit of breathing must be established by the regular practice of pranayama.

Mechanism of pranayama

There are three steps in pranayama practice. Puraka is inhalation. Kumbhaka is retention. Rechaka is exhalation. The ratio between Puraka, Kumbhaka and Rechaka is 1:4:2. In Hatha Yoga Pradipika (M.L.Gharote 2001) mentioned eight varieties of pranayama. Nadishodhana pranayama is alternate nostril breathing, the nostril is changed after each inhalation. This pranayama is preparation for other pranayama practice.

Puraka phase : During the phase of inhalation the lungs are expanded considerably and the walls of the alveoli are stretched maximum. After a particular degree of stretching the stretch receptors situated in the alveolar walls are stimulated. The normal stretch reflex is inhibited and therefore no exhalation is possible. The chest continues to get expanded under cortical control. This helps to hold the breath for a longer time easily.

As inhalation continues, the intra-pulmonary pressure is also raised. The diaphragm does not move freely as the abdomen is kept inward and controlled. Therefore the alveoli in the upper pulmonary part are filled with air. One uses his inspiratory capacity for prolonged phase of puraka. This has a beneficial effect on the gaseous exchange which then takes place efficiently throughout the day. During the puraka phase which is a conscious act, the filling of the lungs is done as per one's limit and is well attended. Thus puraka is not merely a mechanical prolongation of inspiration but it is done with full concentration of mind.

Kumbhaka phase : The duration of retention is gradually increased over a long practice so that respiratory center is gradually acclimatized and trained to withstand higher carbon dioxide concentrations in the alveoli and in the blood. The ratio between inspired air and the blood is changed. Obviously the exchange of oxygen and carbon dioxide across the thin walls of alveoli and blood capillaries would take place more efficiently as they get more time.

During kumbhaka one has to apply Jalandhara bandha or chin lock. Due to this sharp bend of the neck there will be pressure on the jugular notch, pressure on internal and external carotid arteries, Carotid sinuses and Sinus nerves. The specific neuromuscular action around the neck will influence the circulation, nervous function and glandular secretion. It is claimed that heart rate and blood pressure are reduced. Chin lock induces trance like awareness which helps for inward projection of mind. There will be stimulation of Vagus nerve which brings about soothing effect on higher nerve centers. As a result there is balanced autonomic functions and no thoughts in the mind, or conscious control on the mind.

Rechaka phase : During exhalation chin lock is released and voluntarily controlled exhalation takes place. The intra pulmonary pressure is slowly reduced and the alveoli are also deflated, the percentage of carbon dioxide is still increasing in the blood. It may be noted that carbon dioxide has got a calming effect on the nervous system up to certain limits and has been found to reduce anxiety when administered in the form of a mixture containing 65% carbon dioxide and 35% oxygen. This would help mind to undergo the meditational state.

During the practice of pranayama we tackle all the respiratory reflexes an account of our volitional control on respiration. The impulses from both the Central nervous system and Autonomic nervous system are better integrated due to rhythmic and proportionate stimulation of the proprioceptors and visceroreceptors as well as the Vagus nerve. The emotions are positively influenced due to this rhythmic and smooth breathing pattern adopted every day. Like emotions the mental activities are also related with the breathing. As the mind is fully engaged in the breathing, unnecessary thought processes are checked. As the cognitive, intellectual and ego based analytical processes of the mind are minimal or even absent, the mind becomes more balanced which enables us to experience higher levels of consciousness or to get in to the meditational state as the power of concentration also increases. Panayama has not been developed to supply oxygen. It is meant for controlling and balancing and influencing other autonomic functions as well.

The mind is relaxed by decreasing sympathetic arousal. The oxygen level of blood increases and the efficiency of oxygen utilization by the tissues is maximized leading to deeper relaxation and more energy. The carbon in the system slowly increases and this has the effect of strengthening the nervous system leading to better overall health. (Shankara Devananda Saraswati 1984)

Method of pranayama practice

One should practice harmonious rhythmic breathing along with diaphragmatic breathing observing the rate of breathing per minute on both inhalation and exhalation is highly therapeutic and brings more air and oxygen into the air sacs of lungs and in to blood stream it increased return of venous blood to the lungs and sends an increased blood supply to the capillaries of alveoli.

Practice of rhythmic diaphragmatic breathing is done with gradual and equal prolongation of inhalation and exhalation. While inhaling expand the abdomen while exhaling contract the abdomen, normally abdominal breathing. So, the body will experience a sense of deep relaxation and rest. In anxiety and stress conditions breathing is called as paradoxical breathing, while inhaling contract the abdomen, while exhaling expand the abdomen, shallow and rapid, heavy and labored. Breathing pattern expresses inner emotional situation. Inability to breathe normally is the main obstacle to recovery of emotional health. Slight changes in respiration induces changes of the Autonomic nervous system. We find that in yogic literature the word Prana has a wide range of application from mere breath to cosmic principle. So breath is respiratory impulse which causes inhalation and exhalation by which nervous impulse or sensation passing through different parts of the body. So, life process characterized by Autonomic nervous system functions throughout the body. Breathing and thinking are inter related and they influence one another. So when breathing is regulated thoughts are controlled, when breath is held mind attains stability. So pranayama is meant for controlling and balancing Autonomic nervous system functions.(Gore 1991)

The most important aspect of breathing is diaphragmatic breathing. The average person uses his chest muscles rather than his diaphragm. When he breathes and such breathing is usually shallow, rapid and irregular. As a consequence the lower lobes of the lungs which receive an abundant supply of blood, are not adequately ventilated and gas exchange which takes place between air in the lungs of the blood is inadequate with breathing such inequalities between ventilation and perfusion are minimized. Diaphragmatic breathing is beneficial as it increases suction pressure created in the thoracic cavity and improves the venous returns blood, thereby reducing the load on the heart and enhancing circulatory function chest breathing has now become natural and involuntary for most of us, it is really a part of the flight, fight Syndrome aroused when the organism is challenged by some external stress or danger. Because of the reciprocity between breath and mind, chest breathing in turn gives rise to the tension and anxiety associated with flight fight syndrome with chest breathing the breath is shallow, jerky and unsteady, resulting in similar unsteadiness of mind. All the techniques aimed at providing relaxation of body, nerves and mind will be ineffective unless chest breathing is replaced by deep even and steady diaphragmatic breathing.(Swami Rama1979)

Conclusion

The regular practice of Pranayama can be quite effective in not only overcoming anxiety and depression among the elderly but also help them in promoting mental health which will help them develop a sort of resilience to any kind of mental or physical illness. Pranayama has been reported to be beneficial in treating a range of stress related disorders, improving autonomic functions, relieving symptoms of asthma and reducing signs of oxidative stress. Pranayama establish a positive body-mind relationship. Removal of negative thoughts and tensions leads to a positive and healthy physiology.(Gupta et al 2010). Practitioners report that the practice of pranayama develops a steady mind, strong will-power, and sound judgment, and also claim that pranayama practice extends life and enhances perception.

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