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Physiological Review of Qualitative Impact of Pranayama on Respiration

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***Abstract* — Life has become very busy the changed life style pattern is not allowing people take a deep breath also, which is further leading to rapid progress of different respiratory disease. Thousands of years ago yoga original in India, and in present day and age, an alarming awareness was observed in health and natural remedies among people by yoga and pranayama which has been proven an effective method for improving health and prevention and management of diseases. The science of pranayama deals with control and enrichment of this vital force which results in rhythmic respiration calm and alert state of the mind. Pranayama is an art of controlling the life force of breath. It produces many systemic psychophysical effects in the body, besides its specific effects on the respiratory functions. Yogic breathing would form a very good exercise in one's daily routine, if one does not find much time to be devoted to physical exercise. Respiratory rate, rhythm of respiration, lung volume and capacities, breath holding time will get significantly and positively influenced with practice of pranayama. Certain pranayama exercise like Anulom-Vilom (alternate nostril breathing technique), Bhastrika (Bellows Breath), kapalbharti (frontal lobe cleansing technique), and Ujjayi (Hissing Breath), Shitali Pranayama (cooling breath) are carried out for good results. it cat improves respiratory system. The purpose of this article to present a comprehensive review of the literature regarding the impact of Pranayama to bring balance and health to the physical, mental, emotional and spiritual dimensions of the individual & Pranayama has been shown to have immediate physiological and psychological beneficial effect of body.**

***Keywords* — Yoga, Pranayama, Lung Volume, Respiratory Rate, Anulom-Vilom, Bhastrika, Kapalbharti, Ujjayi and Shitali Pranayama.**

I. Introduction

Yoga is a psychosomatic spiritual discipline for achieving union & harmony between our mind, body and soul .Yoga is mind body technique which involves relaxation, meditation and a set of physical exercises performed in sync with breathing. Yogic breathing is fundamental practice in the study of yoga. As one of the limbs of patanjali's eight limbed path yogic breathing or pranayama, is defined as the "control of life force'' and is aimed at increasing vital energy in the body and mind. Pranayam means control of ''prana", ''prana'' in Indian philosophy refer to all forms of energy in the universe. Life force in an individual is symbolized by breathing. Breath is a dynamic bridge between the body and mind. Regular practice of pranayam is found to improve the lung volumes and capacities there by helping in prevention and management of different respiratory diseases. Different types of pranayama along with asana produce different physiological responses in normal person individuals.

II. Aim and Objective

To understand the physiological changes and beneficial effect of different types of pranayam on respiration.

III. Material and Method

Respiration

Respiration comprises of inspiration and expiration. During normal quite breathing inspiration is the active process involving contraction of diaphragm and external intercostal muscles. On the contrary, expiration is the passive process involving elastic recoiling of lungs and thoracic cages. During inspiration thoracic cages enlarges and lungs expands so that air enters the lungs easily. During expiration thoracic cages and lungs decrease in size and attain the preinspiratory position so that air leaves the lunges easily. During inspiration, due to the enlargement of thoracic cage, the negative pressure is increased in the thoracic cavity. It causes expansion of lungs. During expiration thoracic cavity decreases in size to the preinspiratory position. The pressure in the thoracic cage also comes back to preinspiratory level. It compresses the lungs tissues so that, the air is expelled out of lungs. Lungs surfactant is present epithelium of alveoli in lungs. It is responsible for lowering the surface tension of a fluid and avoids the collapse of alveoli. Prostaglandins are the chemicals secreted by parenchyma cells of lungs. Which reduce the bronchiolar smooth muscles tone. Respiration is a reflex process but it can be controlled voluntarily. Respiration is subjected to variation even under normal physiological conditions. Emotions and exercise increases the rate and force of respiration. But the altered pattern of respiration is brought back to normal within a short time by some regulatory mechanisms in the body. Respiration is regulated by nervous and chemical mechanism. Nervous mechanism regulates respiration by reflex process. This mechanism includes respiratory centers afferent nerves and efferent nerves. The chemical mechanism of regulation of respiration is operated through the chemoreceptor's, which gives response to chemical changes in blood.

Pranayama (control over breath)

Pranayama comprises of two words prana means breath, life and ayama means lengthen, expand. This means control over the breath. The word pranayam which literally means control of prana, has thus come to be associated in practice

with control of act of respiration. Every living being is invariably observed to respire air (pran vayu) in and out of its body, throughout its life. Pranayama (yogic breathing) is control pran-vayu and enhance the longevity of life. Pranayama has three components puraka (inrpiration), kumbhaka (with holding breath /retention)and recaka (expiration) Many intricate posture techniques of yogic breathing and mudras ,bandha are describing in hatha-yoga. Further pranyama is subdivided into 8 types like suryabhedana and ujjayi (Hissing breath) sitkari, sitali (cooling breath) , bhastrika(bellows breath)bhramari, Murcha and plavini. Another type of pranayam like anulom vilom (alternate nostril breathing technique) and kapalbhati (frontal lobe cleansing technique).

Effect of Pranayam

Pranayam has three components *Puraka, Kumbhaka and Recaka*

Puraka (Inspiration): During inrpiration the heart rate is slowed, with slower rate the resting period of the heart ,the diastole is prolonged heart muscles receive more rest but the cavities of heart are filled with blood. During next contraction (systole), more blood is pushed into circulation with a better force, thus improve general circulation.

Kumbhaka(breath retention): During kumbhaka fresh air does not enter circulation, leading to lowered oxygen tension in blood. Thus some of the dormant capillaries a lying in collapsed state open up The cerebral anoxia leads to cerebral vasodilatation and circulation improves. Kumbhaka stops vital body rhythms and affects the brain waves control of the brain waves is the key to controlling all brain rhythms It also affects the body physiologically by causing the mental process to stop because of vacum created inside the body.

Recaka(Expiration): During Recaka the slow expiration involves conscious effort with the help of cerebral cortex of brain . These inhibitory impulses from cortex overflow the adjoining area of hypothalamus is concerned with emotions, and quieten this area. Thus producing soothing effect.

The effects of different type of pranayama are follows:-

- **Surya Bhedana Pranayama:** There pranayama aerates the lungs, removes phlegm, enhances lung compliance. There was significant increase in 0_2 consumption (17%) systolic blood pressure (mean increase 9.4 mmHg) and significant decrease in digit pulse volume (45.7%) .
- **Ujjayi pranayama (Hissing breath): U**ijjayi or psychic breath increases the pressure of air in the lungs and expands the effective use of lungs. It increases 0_2 transfer in lungs enhances blood flow throughout the body while the body is in a relaxed state. The contraction of throat caused by uijjayi affects the carotid sinuses which regulate blood pressure in arteries. Uijjayi exerts a slight pressure on the carotid sinuses which over time lowers the blood pressure which leads to reduced tension and slows the thought processes of the mind. This type of technique can open the alveoli in lungs thus allowing the lungs to absorb more 0_2 . It improves the lung capacities, removes the excess of Kapha & Soothens the nerves.
- **Sitkari Pranayama:** The proper practice of Sitkari pranayama makes one beautiful like Kamadeva . Practice destroys appetite thirst, sleep, laziness .It enhances body strength & destroys all complications.
- **Shitali Pranayama (Cooling breath):** This breathing technique provides a cooling effect in the body.
- **Bhastrika Pranayama (Bellows breath):** It is type of pranayama where in fast breathing is employed. This pranayama can also improve the lung capacity and can make the respiratory system strong and efficient. In Bhastrika, diaphragm the principle respiratory muscle is exercised which renews the residual air in the lungs .It is a process of hyperventilation, thus produce slight alkalosis leading to soothing effect in respiratory center. Rapid exchanges of gases at cellular level remove accumulated toxins and re energies the cells. It helps to expel the excess mucous.
- **Bhramari Pranayama:** Regular Practice of this pranayama relieves stress, tensions, anxiety and blood perssure . It is also beneficial for voice throat ailments.
- **Murcha Pranayama:** This pranayama beneficial excellent preparation for meditation helps to in draw the mind .It alleviates anxiety, tension, anger, neurosis and raises the level of prana.
- **Palavani Pranayama:** It enhances the capacity to swim.
- **Kapal-Bharti (Frantal lobe cleansining technique) -** In Kapalbhati, the nostrils get flared up and the air is expelled get pushed through the nose. The constant pushes can improve the efficiency of the muscles that are involved in breathing. It can also remove the impurities from breathing tube. It increases the breath control, stretching it to the unit and dramatically affects the CO_2, chemical, acid and alkalis in the blood.

IV. DISCUSSION

Pranayama involves manipulation of breath movement and the breath is a dynamic bridge between body and mind . The psychosomatic effects of different pranayama are believed to derive from difference in duration of phases of the breathing cycle, tidal volume and other factors including the use of mouth , nostrils and constriction of the laryngeal muscles and position of the glottis . In all the pranayam procedure will reduce is the rate of respiration but lung volumes and capacities will increase depending on the regularity of practice. Regular practice of pranayam improve muscle strength & flexibility due to work hypertrophy. It increases thoracic- pulmonary compliances by more efficient use of diaphragmatic and abdominal muscles. Pranayam cleansing of air way secretions thereby decreasing the resistance to the air flow which will aid in full & free utility of alveoli. Pranayam act as a major

physiological stimulus for the secretion of lung surfactant and prostaglandins. lung surfactant increases lung compliance & prostaglandins reduce bronchiolar smooth muscle tonicity there by allowing more and more air enter into lungs which leads to increase of lungs volumes and capacities. Stimulation of stretch receptors due to maximum inflation of the lungs reflexly relaxes smooth muscles of larynx and tracheo-bronchial tree which modulates the caliber of airways and reduces airway resistance .Regular practice of pranayam increases maximum expiratory pressure &flow rate. A regular practice of pranayam decreased rate of respiration & extended expiratory period .It is due to dorsal group of neurons may be inhibited by Apneusstic & Pheumotaxic centers leading to extended expiratory period. Pranayam increases in the voluntary breath holding time. This may be due to acclimatization of chemoreceptor of lungs to hyper apnea and hypoxia or decreased responsiveness of respiratory centre or increased development of respiratory musculature leading to increased muscles endurance and delayed fatigue. Pranayama along with meditation has calming effect on mind and reduces emotional stress.

V. CONCLUSION

Pranayama helps in bringing conscious awareness to breathing and the reshaping of breathing habits and patterns. The essence of the pranayama practice is slow and deep breathing which is economical as it reduces dead space ventilation. It also refreshes air throughout the lungs in contrast with shallow breathing that fresh air only at the base of lungs. The regular practice of pranayama integrates the mind and the body. Pranayama thus acts directly on the various physiological function of body and affords benefits in a positive way. Regular practice of different types of pranayama leads to strengthening of the respiratory muscles. Pranayama improvement in the expiratory power and decreases the resistance to the air flow in the lungs. Pranayama training causes an increases in the voluntary breath holding time. This may be due to acclimazation of the chemoreceptor to hyper apnea. Different type of pranayama helps to detoxify lungs and respiratory tracts ,boosts and supply of oxygen and purifies blood .Pranayama is a type of yogic breathing exercise . This resultant effect of pranayamma beneficial for the lungs strengthening, improvement of lung volumes and capacities in healthy person and some stage control other physiological functions and finally control manifestation of prana even outside the body.

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