



# Effect Of Pranayama On Stress And Physiological Parameters Among Senior Citizens

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## ABSTRACT

Yoga is a traditional practice from the ancient Indian culture and is considered to be the science of holistic living. Pranayamas are breathing techniques that exert profound physiological effects on pulmonary, cardiovascular, and mental functions. It deals with the knowledge, control, and enrichment of this vital force. As a deep breathing technique, pranayama reduces dead space ventilation and decreases the work of breathing. It also refreshes air throughout the lungs, in contrast with shallow breathing which refreshes air only at the base of the lungs. Older people may face worsening health or dwindling finances or simply the challenges of retaining their independence. Unfortunately, the body's natural defenses against stress gradually break down with age. Psychological stress has frequently been associated with a broad spectrum of negative health outcomes. Regular practice of pranayama improves cardiovascular and respiratory functions, improves autonomic tone towards parasympathetic system, decreases the effect of stress and strain on the body, and improves physical and mental health.

**Keywords:** Effect, Pranayama, Stress, Physiological Parameters, Senior Citizens

## INTRODUCTION

Good health is the greatest asset of human life. A Proper diet, adequate exercise, and stress-free life are essential to maintain good health. Rapid industrialization, environmental pollution, overcrowding, and sedentary lifestyles are responsible for the deterioration of the health of a person. WHO predicts that physical or mental stress will become the second leading cause of disability and cardio-respiratory disease morbidity by the year 2020. Continuous mental pressure can lead to irritability, insomnia, anxiety, and depression. Mental stress can change the set point of the hypothalamic–pituitary axis leading to sympathovagal imbalance. It may cause immediate harmful effects on the respiratory rate, and thus, respiratory diseases may set in.<sup>1</sup>

Yoga is an ancient science, which originated in India and many studies have found that yoga and pranayama can be practiced to combat stress.<sup>2</sup> Various practices involved in the tradition of Yoga include a disciplined lifestyle (Yama and Niyama), cleansing procedures (Kriya), physical postures (Asana), breath regulation (Pranayama), concentration (Dharana) and meditation (Dhyana). In recent years, there has been greater interest in exploring the benefits of various practices described in Yoga. There have been scientific studies on the effects of individual Yoga practices or their combinations on healthy individuals as well as in people suffering from various ailments.<sup>3</sup>

Yoga breathing or pranayam is the science of breath control. It consists of series of exercise especially intended to meet the body's needs and keeps it in vibrant state.<sup>4</sup> Pranayama or breath regulation has been greatly emphasized in Yoga and has drawn special attention from the scientific community. Breath regulation includes modulation of the pace of breathing, viz. slowing down or pacing the breath, manipulation of nostrils, chanting of humming sounds, retention of breath etc.<sup>3</sup>

Pranayama is defined as a manipulation of one's own breathing movement. In yoga "Prana" means life force/energy and "Ayama" means to control. So Pranayama Practice will help us control the life force or energy and make our system more healthy and energetic.<sup>5</sup> Prana is the vital power or force which is motivating every element on the earth and is the origin of the force of thought. There is a deep affinity between Prana and mental force, between mental force and intellect, between intellect and soul, and between soul and God. The Prana not only ensures the proper functioning of the body but is also the regulator and animator of the Physche. It is a remedy for several physical and psychic disturbances of which modern man is the victim (Swami Sivanandha, 2001).

Pranayama is an exact science. It is the fourth anga or limbs of asthanga yoga. "**tasmin sati svasa prasvasayorgatvicchedah pranayamah**"- regulation of breath or the control of prana is the stoppage of inhalation and exhalation , which follows after securing that steadiness of posture or seat , asana. This is pranayama defined in patanjali yoga sutras.<sup>6</sup>

Alternate nostril breathing (ANB) is one of the best and easiest breathing exercises (pranayama) of yoga that are good for health and physical fitness. ANB exercise has beneficial and therapeutic effects on respiratory function in both normal as well as diseased humans.<sup>7</sup> Consciously controlled breathing or pranayama is widely admired as a promising technique. It enhances the mental and physical power of the human body. It also provides oxygen and expires out carbon-di-oxide and other unwanted toxic gaseous substances from the body.<sup>1</sup>

Stress is a huge problem in today's society. Although stress has a psychological origin, it affects several physiological processes in the human body: increased muscle tension in the neck, change in concentration of several hormones and a change in heart rate (HR) and heart rate variability (HRV). The brain innervates the heart by means of stimuli via the Autonomic Nervous System (ANS), which is divided into sympathetic and parasympathetic branches. The sympathetic activity leads to an increase in HR (e.g. during sports exercise), while parasympathetic activity induces a lower HR (e.g. during sleep).<sup>8</sup>

Old age is an emergent population that has been increasing in the society and may have a critical impact on the mental health of many old age people due to concept of the nuclear family, the burden on the family, dependence on their children; these causes psychological problems. Stress is a part of life, old age people have faced many problems and various situations and overcome challenges. Older people may face failing health or dwindling finances or simply the challenges of retaining their independence. Unfortunately, the body's natural defenses against stress gradually break down with age. The old-age population suffers both

physical as well as mental changes in life like biological or bodily changes, loss of a partner, change in family structure and role, economic dependency, all of which contribute to the mental health problems.<sup>9</sup>

## Effects of yogic breath regulation/ Pranayama

### 1.1. Changes due to pace of breathing

The earliest studies reported assessing the effects of yogic breathing on neurocognitive abilities evaluated the effect of 15 min of high frequency yogic breathing, described as Kapalabhati on EEG activity. The study demonstrated increased alpha activity during the initial 5 min of Kapalabhati. Theta activity was observed to be enhanced, mostly in the occipital region during later stages of 15 min Kapalabhati compared to the pre-exercise period. Beta 1 activity increased during the first 10 min of Kapalabhati in occipital and to a lesser degree in parietal regions. Another study assessing the cognitive abilities demonstrated increase in the number of errors following 1 and 5 min of practice of Kapalabhati, in a letter cancellation task.

A study comparing the effects of slow and fast paced Pranayama reported effects of 35 min/day of fast and slow Pranayama practiced for 10 weeks. Executive functions, perceived stress scale (PSS) and reaction time improved significantly in both fast and slow Pranayama groups, except reverse digit span, which showed an improvement only in fast Pranayama group.

### 1.2. Changes with Bhramari Pranayama

A form of yogic breathing called Bhramari (female honeybee humming breath), which is said to modify the brain responses through resonance produced by the humming sound, has shown to cause non-epileptic paroxysmal gamma waves in the EEG.

### 1.3. Changes due to manipulation of nostrils

Uninostiril and alternate nostril breathing has been of special significance in Yoga, since the nostrils are said to represent the subtle energy channels known as Nadis. Right nostril corresponds to Pingala Nadi, and the left to Ida, respectively. Breathing through a single specific nostril is said to affect the human system differently. A study compared alternate nostril breathing with breath awareness. A significant increase was noted in the P300 peak amplitudes at different scalp sites along with a decrease in the peak latency at frontal scalp region, following alternate nostril Yoga breathing. Following breath awareness there was a significant increase in the peak amplitude of P300 at vertex region alone. Healthy experienced Yoga practitioners demonstrated an increase in Na-wave amplitude and decrease in latency during the period of Pranayama practice, whereas no alterations were observed in the Pa-wave. The Pranayama practice in the study involved consciously controlled rhythmic breathing with breath holding. A three arm randomized controlled trial done on patients with essential hypertension, comparing the effects of Nadishuddhi Pranayama and breath awareness with control session for 10 min elucidated reduction in systolic and diastolic blood pressure following Nadishuddhi and improvement in Purdue pegboard task performance with both hands and right hand.

### 1.4. Psychophysiological effects of yogic breathing

Human respiration is the only physiological system that is under both autonomic and voluntary nervous control and thus it is also given special emphasis in yogic texts. The effects of yogic breath regulation on modulation of autonomic functions (AFT) have been studied extensively. The studies on yogic breathing assessing the AFT include various assessment measures like blood pressure (BP) e systolic (SBP) and diastolic (DBP), heart rate (HR), heart rate variability (HRV), respiratory rate (RR), galvanic skin resistance

(GSR), pulse rate (PR), etc. Both short and long term effects of yogic breathing have been assessed using AFT.<sup>3</sup>

## EFFECTS OF PRANAYAMA ON STRESS

Stress can be considered as a state of mental or emotional strain or tension resulting from adverse or demanding circumstances.<sup>10</sup>

### Mechanisms Pranayam on Stress

The relationship is the autonomic nervous system, which governs the body's sympathetic (stress or fight-or-flight) and parasympathetic (rest-and-relax) responses, and controls the actions and reactions of the body's systems, including the cardiovascular, respiratory, and digestive systems. Breath rate directly affects the vagus nerve, which is central to the nervous system response. During the stress response, the sympathetic nervous system is triggered and we are thrust into survival mode and all the physical and mental states that go with that: the heart rate increases to send more blood rushing to the muscles, the muscles tense in preparation, and stress hormone production increases. However, humans have the capability of initiating an opposite response with the use of behavioral strategies including meditation and slow breathing. When the relaxation response is activated, we see virtually the opposite physiological changes to those of the stress response.<sup>11</sup>

## EFFECTS OF PRANAYAMA ON PHYSIOLOGICAL PARAMETERS

Human physiological parameters, such as blood pressure, body temperature, breathing rate, heart rate, blood oxygen saturation, and various electrophysiological signals, represent the operation of a human body and are thus useful as reference values in human health monitoring.<sup>12</sup>

The prolonged exhalation phase of pranava pranayam was hypothesized to mimic Valsalva maneuver resulting in decreased venous return, cardiac output and SBP. Pranayam has been shown to decrease oxygen consumption as well as the basal metabolic rate. Hence, the set of pranayam techniques may be a useful adjuvant to medical therapy in patients of hypertension and aid in cardiac rehabilitation post-myocardial infarction. Pranayam is relatively easier to perform than asan and requires less space than asan that involves different body postures requiring greater space for performance.<sup>13</sup>

## CONCLUSION

In conclusion, the Pranayama or yogic breathing practices were found to influence the neurocognitive abilities, autonomic and pulmonary functions as well as the biochemical and metabolic activities in the body pranayama is easy to instruct, can be performed in virtually all circumstances without cost or equipment, has significant psychophysiological effects that may be specific to different types of pranayama (e.g., fast vs. slow, left vs. right nostril), is free of side effects, and is a simple behavioral strategy suitable for virtual any medical condition, it is likely that we will see a continued application of pranayama in clinical settings and an associated growing body of biomedical research to validate its effectiveness.

## CONFLICT OF INTEREST: None

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