

Effect of Regular Pranayama Practice in Prevention of Non-Communicable Disease-A Swasthavrutta Perspective

Dr. Minal Gurnule¹, Diksha Ambhore², Dr. Shamal Mohanrao Paturde³

¹Assistant Professor, Dept of Swasthavrutta and Yoga SMBT Ayurveda College, Dhamangaon, Nashik

²Assistant Professor, Dept of Rognidan Evum Vikruti Vigyan, SMBT Ayurveda College, Nashik

³Assistant Professor, Dept of Rachana Sharir, SMBT Ayurved College & Hospital Dhamangaon Nashik

ABSTRACT

Non-communicable diseases (NCDs), including cardiovascular diseases, diabetes, chronic respiratory diseases, and cancer, are the leading cause of morbidity and mortality in India. Rapid urbanization, lifestyle changes, and increasing stress levels contribute to their rising prevalence. While conventional medical approaches play a crucial role in managing NCDs, there is growing interest in integrative therapies like yoga for prevention and management. Yoga is a multi-faceted spiritual tool enhancing health and well-being. Physical postures (Asana), regulated breathing (Pranayama), and meditations (Dhyana) are its main components. Breathing exercises of various types, particularly diaphragmatic breathing, alternate nostril breathing (anulom vilom), and kapalbhati have been noted to be useful in chronic asthma, chronic obstructive pulmonary disease (COPD), gastroesophageal reflux disease (GERD), post-operative management in head & neck surgery, cardiovascular surgery, and upper abdominal surgery. Its calming effect reduces blood pressure and agitation in various psychiatric disorders also. Common types of breathing exercises which are easy to learn and practice for day to day fitness and prevention of disease are: equal breathing (bhasrika), clavicular breathing, costal breathing, and diaphragmatic breathing. kapalbhati, alternate nostril breathing (anulom vilom), bhramari pranayama, and tribandh breathing. These require proper learning under guidance. This review explores the prevalence of NCDs in India, identifies key risk factors, and evaluates the scientific evidence supporting pranayama as a complementary approach for their prevention and management.

Keywords: India, pranayama, lifestyle diseases, non-communicable diseases, , prevention, cardiovascular health, diabetes

INTRODUCTION

The word Yoga is derived from the Sanskrit word “to join” or “unity.” It is described in spiritual terms as union of the individual consciousness with the universal consciousness. In another term, Yoga is the “union of mind and body” for balancing and harmonizing the physical and mental functions of body. This is done through the practice of physical postures (asana), breathing control (pranayama), and meditation. Yoga is a way of life, which originated thousands of years ago from India. Patanjali described

eight steps or “limbs” of Ashtanga Yoga. Yoga has an important role in prevention and treatment of lifestyle-related diseases. One of the important components of Yoga is Pranayama. Physiologically, the benefits of pranayama can be described by more oxygen availability to all tissues of body by an increase in alveolar ventilation and improvement of respiratory muscle’s strength and lung volumes by its regular practice. There are five ‘Ts’ of non-communicable diseases (NCDs) which act as risk factors for these diseases. These ‘Ts’ are Tummy, tobacco, tension, trans fats, and life full of sedentary activities. Yoga by its very inherent nature is helpful to make the body active, introspective, and calm. It discourages tobacco and trans fats, thus reducing the risk factors of NCDs. There are enough data that suggest Yoga is effective in cardiovascular diseases (CVD), stroke, diabetes mellitus, mental disorders, etc., The coronary artery disease (CAD) risk in the offspring can also be reduced by doing appropriate Yogasana and avoidance of smoking by expectant mother.

Non-communicable diseases (NCDs) have become the leading cause of mortality and morbidity in India, accounting for approximately 63% of total deaths (World Health Organization [WHO], 2021) ^[1]. These diseases, including cardiovascular diseases (CVDs), diabetes mellitus, chronic respiratory diseases, and cancers, are primarily driven by lifestyle and environmental factors (India State-Level Disease Burden Initiative, 2017) ^[2]. The increasing burden of NCDs is attributed to rapid urbanization, sedentary lifestyles, unhealthy dietary patterns, tobacco and alcohol consumption, and rising psychosocial stress (Mohan *et al.*, 2020) ^[3]. Recent epidemiological data indicate that cardiovascular diseases alone contribute to nearly 28% of total deaths in India, followed by chronic respiratory diseases (12%), cancers (9%), and diabetes (3%) . The prevalence of diabetes has surged from 7.1% in 2009 to approximately 10.1% in 2021, particularly affecting urban populations ^[4]. Additionally, India has one of the highest rates of hypertension, with nearly 30% of adults affected ^[5]. Ujjayi pranayama, shitali, and surya bhedan pranayama also require proper training and have a calming effect on the body. Various types of breathing produce their beneficial effects on the body when they are done regularly for the minimum recommended period. These exercises can be practiced in any comfortable posture on the floor or sitting on a chair. Regulation of rate and rhythm during its practice helps

towards achieving meditation. Pranayama and Yoga have proven their utility in various diseases as noted in studies done in various medical canterers. The western world also recognizes its importance and recommends it to their people. In India, health is given a low priority and outdoor physical activities are becoming less popular. In these conditions of living, Yoga and Pranayama (breathing exercises) are recommended for persons of all ages because these are easy to learn, simple to practice, and do not require any separate space or instruments. Regularity and execution in a proper way for the optimum time alone are needed for general well-being, better lung functions, and as a preventive measure for various respiratory and psychiatric disorders.

MATERIALS AND METHODS

Proper nutrition of the body is necessary for the development and growth of body and mind. An infant if fed properly with nutritious food in the required amount grows to become a healthy adult with a positive state of physical, mental, and social well-being. An undernourished child, on the other hand, may develop multiple diseases and negative feelings. The importance of nutrition in disease prevention has been highlighted in many studies. Healthy family and social environment is needed to develop a positive mental and social well-being. Physical Exercises similarly have a significant role in the development of body and mind in human beings. Exercises not only help in the growth of a child, but these also keep internal body organs in a fully functional state. Besides, exercises prevent the onset of many diseases and help in rehabilitation in orthopaedic, neurological and post-operative conditions. Exercises could be of multiple types. Swimming, cycling, team sports, brisk walking, running and athletics, aerobics, triathlon, high intensity interval training, specific muscle strengthening and stretching, muscle contraction, joint mobilization etc. are some examples of exercises. Gymnastic training, tread mill walking, various individual sports, skiing, surfing are other forms of exercises. Many exercises are adventurous in nature while others are targeting at specific objective of body building, muscle strengthening or joint mobilization.

Thousands of years ago yoga originated in India, and in the present day and age, an alarming awareness has been observed in health and natural remedies among people for yoga and pranayama. Yoga has proved to be an effective method for improving health in addition to prevention and management of diseases. Yoga includes its various physical postures known as Asanas, breathing patterns better identified as Pranayama and meditation or Dhyana. Yoga has emerged as a useful tool for lay persons and sick persons. Though known in India for many centuries, it has spread like a fast storm after its benefits were popularized and number of demonstration camps were organized to teach various Asanas and Pranayama including breathing exercises. All its aspects need proper training and involvement for getting its maximum benefit.

Pranayama and other breathing exercises have gained more importance these days due to its definite role in improving blood oxygenation and utilization of the greater capacity of lungs, thereby helping in the prevention of many diseases. Pranayama is an art consisting of techniques to make the respiratory organs to move and expand intentionally, rhythmically, and intensely. It consists of the long, sustained subtle flow of atmospheric air (inhalation / puraka) into the lungs, the outflow of deoxygenated air from lungs to the atmosphere (exhalation / recheka), and retention of breath in between (kumbhaka). As per yoga, inhalation stimulates the body system, causes inflow of oxygenated air through the nostrils into the lungs. Exhalation throws out the deoxygenated air and makes the lungs ready to receive fresh air. kumbhaka (holding breath) distributes the energy through the body by permitting the oxygenated air to transfer its oxygen into the blood. Thus inhalation, holding the breath and exhalation are the three basic steps of yogic breathing exercises. Normally inhalation and exhalation are done for the equal time while breath hold is for twice the duration of inspiration or expiration. In the present days, breath holding step has been taken out, thereby making breathing cycle consisting of only inspiration and exhalation. During Pranayama lungs and the rib cage (thorax) undergo horizontal expansion (dairghya), vertical ascension (aroha), and circumferential expansion (vishalata). This ensures expansion of both the lungs in all its lobes in the front as well as back aspect.

Proper breathing helps oxygenation of blood, removal of carbon dioxide thereby mental concentration, good health, and longevity. It provides oxygen to the cells of various organs including brain, heart and kidney. Oxygen gives life to the cells and keeps them alive. That is the reason air is known as pranavayu, giving life to the human body. Breathing exercises have probably been labelled as Pranayama, as these are responsible for providing the life energy to our body. Breathing exercises are useful not only in maintaining good health and prevention of various systemic diseases, they keep us alert, active and socially compatible and maintain a positive state of physical, mental, social wellness. Exercises have been studied extensively regarding their role in different medical diseases. Its role in asthma, chronic obstructive pulmonary diseases, systemic hypertension, post-operative management in general surgery, cardiovascular surgeries, and head and neck surgeries has been documented.^{6,7,8}

Pranayama with slower rhythm and manipulation of the nostrils mainly with breaths by the left nostril have shown a significant reduction in blood pressure in both acute and chronic cases, in 13 trials. In acute cases, there was a reduction of 20 - 30 mmHg of mean systolic blood pressure (SBP), and 1 mmHg of diastolic blood pressure (DBP). In chronic

hypertension patients, a reduction of 4 – 20 mmHg in SBP and 4 – 7 mmHg in DBP was noted.^{9,10}

Yoga has been noted to improve visual, mental and neurological functions also. The article attempts to outline various types of breathing exercises and their role in overall human well-being.

Prevalence of Major NCDs in India

Cardiovascular diseases are the leading cause of death in India, responsible for nearly 28% of total mortality. Hypertension and coronary artery disease have seen a sharp rise due to increasing obesity and metabolic disorders. Diabetes prevalence has also escalated, with approximately 101 million adults in India diagnosed with the condition¹¹. Chronic respiratory diseases, including chronic obstructive pulmonary disease (COPD) and asthma, are another major concern, largely linked to air pollution and smoking. Cancer incidence is on the rise as well, with breast, lung, and cervical cancers being the most common types affecting the population.

BREATHING EXERCISES AND ITS TYPES

Breathing exercises should normally be done in a sitting and comfortable position of lower limbs, either in 'padmasana' or 'vajrasana' or in sitting cross-legged position. In case of hip and knee joint diseases causing difficulty in sitting cross-legged or extreme flexed position, one can do these while sitting on a chair. One should be sitting comfortably with erect spine. Breathing exercises should not be done after meals and at least an interval of three hours should elapse between the last meal and exercises. Preferred time is early morning after bowel emptying or a minimum of three hours after meals. Exercises should be learned properly and chosen each type should be done at least 5 - 10 times in the beginning, which can be increased gradually every week.

Based on the Indian Yoga concepts, breathing exercises can be classified in the following types –

Bhramari (Humming Bee) Pranayama

It is the slow exhalation from the nose with mouth closed, after a deep inhalation, creating a humming sound from the closed mouth. In its modified form, exhalation can also be done through the softly closed mouth and creating a sound of 'Ohm' continuously. It should be done at least for 5 times. This is supposed to help in concentration and relaxation after doing vigorous bhasrika, anulom vilom and kapalbhata breathing exercises.

Ujjayi (Victorious) Pranayama

It is a technique that helps calm the mind and warm the body. In this breathing, deep inhalation is done, and with slightly contracting the throat, the air is exhaled out through the nose. This breathing technique is used throughout Ashtanga and Vinyasa yoga practices. It is supposed to be useful for correcting hormonal imbalance.

Tribandha Pranayama

It is special pranayama, in which air is exhaled out forcefully and breath is held. Then perineal muscles are

contracted (mula bandh), followed by upper abdominal muscles contraction (uddiyana bandh), and chin is lowered down contracting neck muscles (jalandhara bandh), causing tribandha. It is held as such for a half to 1 minute, and then air is inhaled deeply, and all the three contracted group of muscles are relaxed, releasing the tribandha. It can be repeated a few times. It is necessary to learn and do it under supervision before independent execution.

Surya Bhedan Pranayama (Right Nostril Breathing)

It is a type of breathing in which inspiration is done from the right nostril only and expiration is done from the left side. Its repetition is done in the same way. It is different from anulom vilom, in which both the nostrils are used alternatively for inspiration and expiration. It increases the metabolism and helps in weight loss.

Shitali Pranayama (The Cooling Breath, Purses Lip Breathing)

In this type of breathing, inhalation is done through the mouth, while rolling the tongue into semi-tubular shape. The air going in causes a cooling and calming effect on the nervous system. Expiration is done from both the nostrils.

The above breathing types are commonly practiced types. There are many other types serving specific function. Breathing exercises in combination with Asanas and dhyana provide complete route to positive health. A combination of all the three components in proper proportion is fruitful for overall benefit.

Pranayama means control of our life force using various breathing exercises, dhyana and concentration. It harnesses the power of human brain to a higher degree. It requires to be done initially under the supervision of the trainer or Guru to avoid mistakes in technique and obtain the maximum benefits. Yoga therapies are noted to improve the quality of life, decreased inflammatory markers, and helped peak-maximal oxygen intake in heart failure patients with a reduced ejection fraction.¹² Ujjayi (victorious) pranayama and tribandha pranayama should be learned and practiced before doing independently¹³. Other types of breathing exercises may be learned relatively easily. These breathing exercises are maximally beneficial on doing these regularly, and for adequate time. For a normal person of either sex exercises like, equal breathing, clavicular breathing, costal breathing, diaphragmatic breathing (kapalbhata), alternate nostril breathing (anulom vilom) and bhramari pranayama for adequate duration regularly helps in disease prevention and positive health maintenance. Due to simultaneous diet control, better oxygenation of body cells and positive thought process, these are supposed to prevent genesis of cancerous growth also.

Breathing exercises and Pranayama also help in rehabilitation of person suffering from physical or

mental illness. Due to various physical postures adopted, joints become lax and mobile. Physical exercises can be done better and strength & range of movement can be gained easily. Due to the calming effect on mind mental status and concentration also improves. Sambhavi mahamudra Kriya is especially useful in controlling behaviour of psychiatric patients.

The stress and stress-induced disorders like hypertension and angina are fast growing epidemics and bane of “modern” society. The holistic science of yoga is the best method for prevention as well as management of stress and stress-induced disorders. Numerous studies have shown yoga to have an immediate down-regulating effect on both the HPA axis responses to stress. Effectiveness of yoga against stress management is well established.¹⁴

several psychological benefits of Pranayama practice, including improved emotional responses, fatigue, stress, and reduced anxiety in cancer patients, as well as in patients with cardiovascular disease. Increased melatonin production after a regimen of slow breathing pranayama exercises has been attributed to pranayama’s tendency to create a sense of relaxation and well-being in the subject. Breath-holding, an essential part of pranayama, is known to induce theta waves in the electroencephalography. The particular contribution of pranayama to stress/anxiety reduction might also be contributed by the sympathetic-parasympathetic shift. Vagal afferents from peripheral receptors are connected with the nucleus tractus solitarius from which Fibers ascend to the thalamus, limbic areas, and anterior cortical areas. During controlled breathing exercises, stretch of lung tissue produces inhibitory signals in the vagus nerve, which ultimately shifts the autonomic nervous system into parasympathetic dominance, that results in a calm and alert state of mind

Impact of Yoga on NCDs -

Scientific evidence highlights yoga’s effectiveness in managing and preventing NCDs. Yoga-based interventions have been shown to improve cardiovascular health by reducing blood pressure, improving endothelial function, and enhancing autonomic balance . In diabetic populations, yoga improves glycaemic control by enhancing insulin sensitivity and reducing oxidative stress . Studies on chronic respiratory diseases indicate that yoga enhances pulmonary function, reduces inflammation, and improves quality of life in COPD and asthma patients . Additionally, yoga has been found to support cancer patients by reducing fatigue, improving sleep, and enhancing psychological well-being .

DISCUSSION

Human body is composed of trillions of microscope cells which are the building blocks of body organs and systems. The cells get tired and exhausted after daily wear and tear and a time comes when they die. The dead cells are to be regenerated or replaced so that our vitality is restored. Exercise and Yoga are the most economical and easy method of charging the tired and exhausted cells. It looks

anachronistic to think that exercise would energize the tired body. It is something such as charging the mobile phone battery, cameras, or watch routinely when they are discharge completely and rendered useless for any operations.

Exercise and Yoga charges the body cells in the same way so that our physical, mental, and spiritual faculty remains active and agile all time and it is an efficient adjuvant for management of NCDs

Pranayama is considered as an add-on-therapy to ‘Pharmacologically recommended treatment’ of childhood Asthma. In chronic asthma cases, many studies have noted improvement in “Quality of life and change in asthma symptoms. Modifications in breathing reduce hyperventilation and help normalization of the CO₂ level. It also causes a reduction in bronchospasm and restlessness. Relaxation achieved by proper breathing decreases anxiety, improves the immunological parameters and endurance of respiratory muscles. In cases of chronic obstructive pulmonary diseases after 12 weeks of pranayama, parameters like 6 MWD (Minute Walk Distance) and LFT (Lung Function Tests) showed significant improvement. In this study, pranayama training was given by a layperson only . Diaphragmatic breathing and Shitali pranayama (pursed-lip breathing) done 10 minutes every day have been noted to improve breathing, daily activity levels, and decrease the use of a rescue inhaler. Breathing exercises have been taken as a complementary treatment in asthmatic patients.

Pranayama along with breathing exercises has been effective in the treatment of mood disorders and stress. A special yogic practice “Sambhavi Mahamudra Kriya,” including both deep breathing and meditation technique, done for 21 minutes daily for 6 weeks, reduced the level of stress, and improved general well-being, compared to baseline in 142 individuals.¹³ Yoga brings about an integration of mind, body, and soul. Mindfulness (dhyana) emphasizes on focused awareness and accepting the internal experiences, without being judgmental. Due to the calming effect of Dhyana and meditation, along with relaxation achieved after various physical postures and breathing, yoga therapy has been found ameliorating, and as add-on therapy in severe mental illnesses like schizophrenia, bipolar and depressive disorders.

CONCLUSION

Non-communicable diseases (NCDs) pose a significant public health challenge in India, with rising prevalence rates linked to lifestyle factors, urbanization, and environmental stressors. Conventional medical treatments, while effective, often fail to address the underlying behavioural and physiological contributors to these conditions. This review highlights the growing body of evidence supporting yoga as a complementary intervention for managing and preventing NCDs. Yoga

has been shown to regulate autonomic function, reduce stress, improve metabolic health, and enhance overall well-being. Studies demonstrate its effectiveness in managing hypertension, diabetes, respiratory disorders, and even cancer related symptoms. The integration of yoga into healthcare policies, such as India's National Health Mission, reflects its recognition as a viable and cost-effective approach to public health. However, challenges remain in terms of accessibility, adherence, and the need for more rigorous, large-scale randomized controlled trials to validate its long-term benefits.

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