

ROLE AND IMPACT OF YOGA IN PREVENTION AND MANAGEMENT OF NON COMMUNICABLE DISEASES (NCDS)

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ABSTRACT

Non Communicable Diseases (NCDs) are the leading cause of premature death and disability worldwide. Death rates due to this particular group of diseases are accelerating globally (67.85%), especially in developing countries (28 million each year). It is predicted that NCDs will be causing seven out of every ten deaths in developing countries in next 5-6 years. Indian Traditional Medicine System, like *Ayurveda* and *Yoga*, has the potential to offer solutions to these challenging health issues. Lifestyle related problems have brought with them an increased risk of developing chronic NCDs such as- cardiovascular diseases, obesity, HTN and DM. *Yoga* is an art of righteous living or an integrated system for the benefit of body, mind and inner spirit. *Yoga* balances tripods of life, gets the body & mind

benefitted by stimulation of parasympathetic and suppression of sympathetic nervous system and helps in controlled secretion of neurohormones which play an important role in maintenance of health and cessation of diseases. *Yoga* practices like *Asanas*, *Ujjayi Pranayama*, *Bhrasrika Pranayama* and *Shatkarma* have been proved to be very beneficial in management of NCDs like DM, PCOS as they help in eliminating the root causes like lack of physical activity, stress and less self control.

KEYWORDS: *Ayurveda*, lifestyle, NCDs, neurohormones, *Pranayama*, premature death, *Shatkarma*, *Yoga*.

INTRODUCTION

A non-communicable disease is a medical condition or disease that is non-infectious or non transmissible. NCDs can refer to chronic diseases which last for long periods of time and

progress slowly. Sometimes, NCDs result in rapid deaths such as seen in certain diseases such as autoimmune diseases, heart diseases, stroke, cancers, diabetes, chronic kidney diseases, Osteoporosis, Alzheimer's disease, Cataracts and others. NCDs are distinguished only by their non-infectious cause, not necessarily by their duration (so should not be incorrectly called as chronic diseases as there are certain diseases which are chronic but are infectious e.g. HIV/AIDS).^[1] Every year, at least 5 million people die because of tobacco use and about 2.8 million die from being overweight. High cholesterol accounts for roughly 2.6 million deaths and 7.5 million die because of high blood pressure. Risk factors such as a person's background, sedentary lifestyle, stress, environment and altered immunity increase the likelihood of certain NCDs. They include age, gender, genetics, exposure to air pollution, and behaviors such as smoking, unhealthy diet and physical inactivity which can lead to hypertension and obesity, in turn leading to increased risk of many NCDs like cardiovascular disorders (CVD), diabetes mellitus (DM), bronchial asthma etc. most NCDs are considered preventable because they are caused by modifiable risk factors and for that various *Yoga* practices such as *Asanas*, meditation, *Pranayama*, *Shavasana* which reduces stress and regular *Yoga* practice helps in weight management, e.g. *Suryanamaskar*, *Naukasana* *Pavanmuktasana* for obese, *Pranayama* for bronchial asthma.

Yoga is one of the most ancient cultural heritages of India. The word *Yoga* in *Sanskrit* means "to unite" and so *Yoga* can be said to connote a unities discipline. In this sense it is an exercise in moral and mental cultivation that generates good health (*Arogya*), contributes to longevity (*Chirayu*), and the total intrinsic discipline culminates into positive and perennial happiness and peace. In Indian thought, everything is permeated by the supreme universal spirit (*Paramatma* or God) of which the individual human spirit (*Jivatma*) is a part. A *Yogi's* ultimate aim is to be able to attain this "union" with the eternal through certain mental and physical exercises. It is often said that *Hiranyagarbha* (The Cosmic Womb) himself had originally advocated the traditional system of *Yoga*, from which all other *Yoga* schools evolved. But for all extant knowledge of *Yoga* and its practices, such as *Yogasanas* and *Pranayama*, the entire credit goes to *Maharshi Patanjali*. And now *Yoga* has rapidly emerged out of traditional spiritualism, mysticism and cobwebs of mystery, it is now standing as a scientific discipline and its main stream of prospective development being in the direction of health and therapy.

AIMS AND OBJECTIVES

1. To study the prevalence, causes and risk factors of NCDs.
2. To explore the role and impact of *Yoga* in the management of NCDs.

MATERIALS AND METHODS

The texts of *Yoga, Samhitas* related to *Yoga* were mainly referred for this study. Supportive texts of contemporary sciences were also utilized to comprehend the concepts. References from journals and internet were also considered in the study. Due to altered lifestyle patterns and stress there has been developed a bunch of diseases which can be dealt by the fact that-“Prevention is better than cure.” So, for highlighting this fact as *Yoga* being the key to this prevention technique this study was initiated.

REVIEW ON LITERATURE

Prevalence of NCDs: Current global mortality from Non communicable diseases (NCDs) remains unacceptably high and is increasing. Thirty-eight million people die each year from NCDs, mainly from cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. Over 14 million deaths from NCDs occur between the ages of 30 and 70, of which 85% are in developing countries. The 2012 population estimates from the most recent United Nations Population Division World Population Prospects,^[2] are reported in each profile for both total population as well as the population proportion between ages 30 and 70 years. World Bank income group data are based on 2012 gross national income (GNI) per capita, calculated using the World Bank Atlas method.^[3] The 2011 percentage of population living in urban areas was taken from the UN World Urbanization Prospects: The 2011 Revision.^[4]

Mortality: Age- and sex-specific all-cause mortality rates were estimated for 2000-2012 from revised life tables, published in World Health Statistics 2014.^[5] Total number of deaths by age and sex were estimated for each country by applying these death rates to the estimated resident populations prepared by the United Nations Population Division in its 2012 revision.^[2] Causes of death were estimated for 2000-2012 using data sources and methods that were specific for each cause of death.^[6] Vital registration systems which record deaths with sufficient completeness and quality of cause of death information were used as the preferred data source. Mortality by cause was estimated for all Member States with a population greater than 250,000.

Remedies for Cure and Prevention: Other than the respective medicinal treatment for the diseased condition of the patient below said measures can be taken to prevent the NCDs^[7]:-

CATEGORY	WHAT CAN BE DONE
Physical Activity	<ul style="list-style-type: none"> Organize and facilitate structured programs. Help patients set realistic goals. Reinforce importance of exercise. Outline and specify exercise prescription clearly to patient.
Medical Nutrition Therapy(MNT)	<ul style="list-style-type: none"> A trained nutritionist/Dietician should be the one giving MNT. Reinforce the importance of meal timings and following a healthy diet plan.
Stress Management	<ul style="list-style-type: none"> Help patient to identify and assess their stress. Suggest simple ways to cope. Refer to specialist/counselors when required.
Overall	<ul style="list-style-type: none"> Help patients identify barriers to noncompliance. Regularly counsel and motivate patients to comply to non-drug measures.

Yoga for prevention of NCDs: As mentioned in above said categories *Yoga* can be considered as the modality of prevention as all the things like physical activity, stress buster and non drug measures everything is followed as a whole by it only. Some *Asanas* stimulate sluggish glands to increase their hormonal secretions all of these virtues of *Yoga* makes it a systematic methodology for an all round personality development i.e. physical, mental, intellectual, emotional and spiritual build up of a man. Thus *Yoga* is considered as a science of life and the art of living. In contrast to physical exercise, the *Yogic* practices influence various vital organs and make them more active, probably due to improved microcirculation in vital organs and endocrine glands, resulting into improved metabolic and neuro physiological responses. So, nowadays, *Yoga* is accepted and practiced for fitness in terms of prevention and cure of diseases worldwide.^[8]

YOGA –ITS ETYMOLOGY AND HISTORY: In *Vedic Sanskrit*, *Yoga* (from the root *Yuj*) means "to add", "to join", "to unite", or "to attach" in its most common literal sense. All further developments of the sense of this word are post-*Vedic*. More prosaic moods such as "exertion", "endeavour", "zeal", and "diligence" are also found in Indian epic poetry. There are many compound words containing *Yoga* in *Sanskrit*. *Yoga* can take on meanings such as "connection", "contact", "union", "method", "application", "addition" and "performance". In simpler words, *Yoga* also means "**combined**". For example, *Gunayoga* means "contact with a cord"; *Chandrayoga* has the astronomical sense of "conjunction of the moon with a constellation"; *Pumyoga* is a grammatical term expressing "connection or relation with a

man", etc. But the same compound is also given a technical meaning in the *Yoga Sutras*, designating the "practical" aspects of the philosophy, i.e. the "union with the supreme" due to performance of duties in everyday life.^[9]

The origin of *Yoga* is a matter of debate. There is no consensus on its chronology or specific origin other than that *Yoga* developed in ancient India. Suggested origins are the Indus Valley Civilization (3300–1900 BCE) and pre-Vedic Eastern India, the *Vedic* period (1500–500 BCE), and the *Sramaṇa* movement.^[10] *Yoga* is one of the six orthodox systems of Indian Philosophy. It was collated, coordinated and systematized by saint *Patanjali* in his classical work. The *Yoga Sutras*, which consists of 185 verse aphorisms. He said *Yoga* is the blocking (*Nirodha*) of mental modifications (*Chitta vritti*) so that the seer (*Drashta*) re-identifies with the (higher) self. *Patanjali's* system has come to be the epitome of classical *Yoga* philosophy.

Bronchial Asthma and its management through *Yoga*- Asthma is considered to have a multi-dimensional etiology which includes allergy, climatic factors, stress, occupational hazards, endocrinal and emotional factors mental stress is known to trigger asthma by stimulating vagus nerve. Pathologically, there is mucosal inflammation, collection of inflammatory mediators, bronchial constriction, air trapping and later on remodeling of airways. Presently, it is difficult to control all the triggers in a patient, so it is better to improve the lung functions by the exercises focus should be on expiratory exercises as in bronchial asthma expiration is difficult so exercises that support expiration are beneficial as forceful exhalation helps to open closed airways in asthma and prolonged exhalation helps to expel more trapped air in asthma. *Yogasanas* and *Pranayama* for bronchial asthma- *Bhujangasana*, *Shalabhasana*, *Dhanurasana*, *Ardhamatsyendra asana*, *Trikonasana*, *Shavasana*. *Pranayama* being *Anuloma vilom* deep breathing, *Ujjaiyi Pranayama* without *kumbhak*, *Nadishodhan Pranayama*, *Bhastrika Pranayama*, *Bhramri Pranayama*.^[11]

Diabetes Mellitus and its management through *Yoga*- Types of Diabetes- Type 1, where there is no production of insulin and type 2, where the pancreas does not produce enough insulin. The practice of *Yoga* is effective measure and also to treat type 2 diabetes, where the causes are attributed to life style and stress. Every organ in system can be affected by diabetes. There could be several associated problems- heart attacks, high blood pressure, diminished vision, kidney infection, brain hemorrhages, decrease susceptibility to all infections leading to abscesses and gangrenes. Regular *Yoga* practice can help reduce the sugar level in blood, along with lowering blood pressure, keeping your weight in check,

reducing the severity of the symptoms and slowing the rate of progression of disease. It also lessens the possibility of further complications. Stress is one of the major reasons for diabetes. It increases the secretion of glucagon in the body. The consistent practice of *Yoga*, *Asanas*, *Pranayama* and a few minutes of meditation can help reduce stress in the mind and protect the body from its adverse effects. This in turn reduces the amount of glucagon and improves the action of insulin. The practice of *Yoga* is also proven to lose weight and slow the process of fat accumulation. *Suryanamaskar* and *kapalabhati Pranayama* are some of the most effective *Yoga* poses that aid weight loss as obesity is a major contributing factor for diabetes. The *Pranayama* helps to oxygenate the blood and improves circulation, it also calms mind and gives rattled nerves, some needed rest. The *Asanas* which are effective for diabetes are-*Vajrasana* (relaxes mind), *Setubandhasana* (controls blood pressure, improves digestion and stretches the neck and spine), *Balasana* (great stress buster, calms mind, and fatigue), *Sarvangasana* (regulates working of thyroid gland as this gland is responsible for functioning of digestive, nervous and reproductive system also it regulates metabolism), *Mandukasana*, *Halasana* (stimulates thyroid gland, parathyroid and abdominal organs and keeps the hormonal level in check), *Supta Vajrasana*, *Halasana*, *Chakrasana*, *Natrajasana*, *Purna Shalabhasana*, *Triyak Bhujangasana*, *Dhanurasana*, *Udiyan /Bandh*.^[12]

Obesity and its management through Yoga- Obesity is becoming a common health hazard and leads to many other diseases like coronary heart diseases, high blood pressure, diabetes and shorter life span. The main cause of obesity is excessive eating. Weight can increase because of digestive problems. Useful part of the blood is absorbed in blood during the digestion. If there are some problems in this process then it may result in accumulation of fats. If the digestive problem is cured then obesity can be reduced. Regular *Yoga* practice can help in weight management. Firstly some of the *Asanas* stimulate the sluggish glands to increase their hormonal secretions, then the thyroid gland gets activated which has big effect on body fat metabolism, and as the fat metabolism increases fat is in turn converted into energy which means as well as patient will loose fat he will have better muscle tone and a higher vitality level. –*Yogasanas* for Obesity are- *Paschimotannasana*, *Saral Hasta Bhujangasana*, *Sarvangasana*, *Halasana*, *Dhanurasana*, *Veerasana*, *Trikonasana*, *Ardha matasyedrasana*, *Uttanapada chakrasana*, *Ushtrasana*, *Udarasanchalana* etc. Along with *yogasanas*, *Suryanamaskaar* is very effective for obesity reduction, also *Pranayama* (*Suryabhedana*, *Bhrasrika* and *Kapala bhati*), cleansing processes like *Agnisar*, *Uddiyanbandha*, *Vaman dhauti*, *Shankhprakshalana* etc help in reducing the obesity.^[13]

PCOS (Polycystic Ovarian Syndrome) and its management through Yoga- One in every ten women suffer from PCOS, an emerging lifestyle style disorder that is the leading cause of female infertility and also a risk factor for diabetes type-2, cardiovascular diseases, endometrial cancer etc. PCOS is a combination of disorders characterized by excessive androgens production by the ovaries which interferes with the reproductive, endocrinal and metabolic functions. Mostly women know that PCOS is an endocrinal disorder but they are unaware of it that lifestyle also affects it. Obesity and stress both acts as trigger factor for PCOS. PCOS is characterized by Obesity, Anovulation associated with primary or secondary infertility, hirsutism, abnormal menstrual pattern, increased incidence of pregnancy loss and pregnancy related complications. PCOS results of Stress, disturbed HPO axis or hyperandrogenaemia. Insulin resistance is a common finding in PCOS that is independent of Obesity. In today's pattern of lifestyle stress is bound to be generated. So *Yoga* is one of the important refreshing and rejuvenating modalities which can contend and even root out stress completely. Since stress plays an important factor in exaggerating PCOS, so *Yoga* therapy is effective in PCOS. *Yoga* helps to regulate the endocrine glands thereby balancing the hormones. *Yoga* aids in keeping ovary and uterus healthy and solves issues like infertility, weight gain and psychological problems. There are many *Yoga* postures, which are good for PCOS, some of important *Yoga* postures are- *Mayurasana*,^[14] (it rapidly destroys all the diseases of the glands, abdomen etc. and balances the humors of *Vata* and *Pitta*, stimulates the *Jatharagni* and completely digests the food), *Suryanamaskaar* (controls hormonal imbalance, balances HPO axis, brings cortisol level to normal, controls weight, detoxifies and de-stresses the entire system), *Bhujangasana* (exerts pressure on stomach and helps to stimulate ovarian function), *Navukasana* (this posture puts excess pressure on the abdominal region), *Nadishodhana Pranayama* (helps to soothe mind and refreshes brain nerves, lowers the production of stress hormone cortisol which is major cause of visceral adiposity and weight gain thus cures PCOS naturally), *Bhramri Pranayama* (controls all the negative domain such as stress, strain, anxiety, tension, depression etc. so helpful in controlling mood swings), *Bhadrasana* (helps to open up pelvic area and relieves menstrual discomfort).

Stress and its management through Yoga- Stress is a general word termed to various mental and bodily pressures experienced by people throughout life. It is only in the last half century that the role of stress in every ailment from the common cold to AIDS has been emphasized, and the mechanisms involved in this process have been studied. The word stress is derived from Latin word 'stringer' which means to be drawn tight. It is defined as a state of

psychological and physiological imbalance resulting from the disparity between situational demand and the individual's ability and motivation to meet those needs. Stress can be classified in two types-positive stresses called Eustress another one is negative stress called as Distress. Eustress challenges to adapt and grow while distress can deplete or destroy the energy for life. Yoga is an antidote for stress and a potentially powerful complement to living a healthy, balanced life. In *Yoga* breathing using the diaphragm stimulates the Vagus nerve and helps reduce the stress, Vagus nerve is the main nerve of parasympathetic nervous system, extends from the medulla through the diaphragm to abdomen, and responsible for slowing respiration reducing heart rate, lowering blood pressure stimulating digestive activity. *Yogasanas* for stress are *Adhomukhashvanasana* (energizes the body and offers relief from indigestion problems, pose is known to relax the body), *Shavasana* (relaxes completely, brings breathing to normal levels and helps to soothe down stress levels), *Dhanurasana* (stress and fatigue buster), *Uttanasana* (helps in preserving proper functioning of nervous system by improving blood supply throughout the body), *Marjaryasana* (helps in stretching the spine and toning the muscles and organs of the abdomen).^[15]

Gastrointestinal tract disorders and their management through Yoga- Gastrointestinal (GI) disorders is one of the most common long-term illnesses of the population. The anorectal complicacy is another associated suffering. Upset of stomach can also be caused by life style factors such as eating too fast or eating on the run, emotional stress, smoking, too much alcohol or caffeine, travel (motion sickness) and medical reasons may be due to gastro esophageal reflux disease. The *Yogic* techniques revive the disorder of the body physiology due to the *Pranic* flush. *Yoga* is the only mean by which one can really expand consciousness by which it can alter the state of mind. The control of hormones and the reflexes of the nervous system are possible. *Yoga* helpful for GI tract disorder are-*Bhramari Pranayama*,^[16] (improves autonomic functions of the body), *Shankha Prakshalana* (is a thorough cleansing technique, by which various metabolic wastes and chemical wastes causing stiffness, lethargy and heaviness such as lactic acid and uric acid are washed away), *Kunjla kriya* (is one of the *Yogic* technique that removes the mental roots of many diseases: hate, jealousy, fear and insecurity. Also it cures acidity and gas in stomach, nausea, food poisoning, indigestion, hyperacidity, asthma, bronchitis, headaches) and *Ashwini mudra* (gives control of the anal muscles and conserves the *Prana* that moves down and escapes the body and turn upwards for spiritual purpose).^[17]

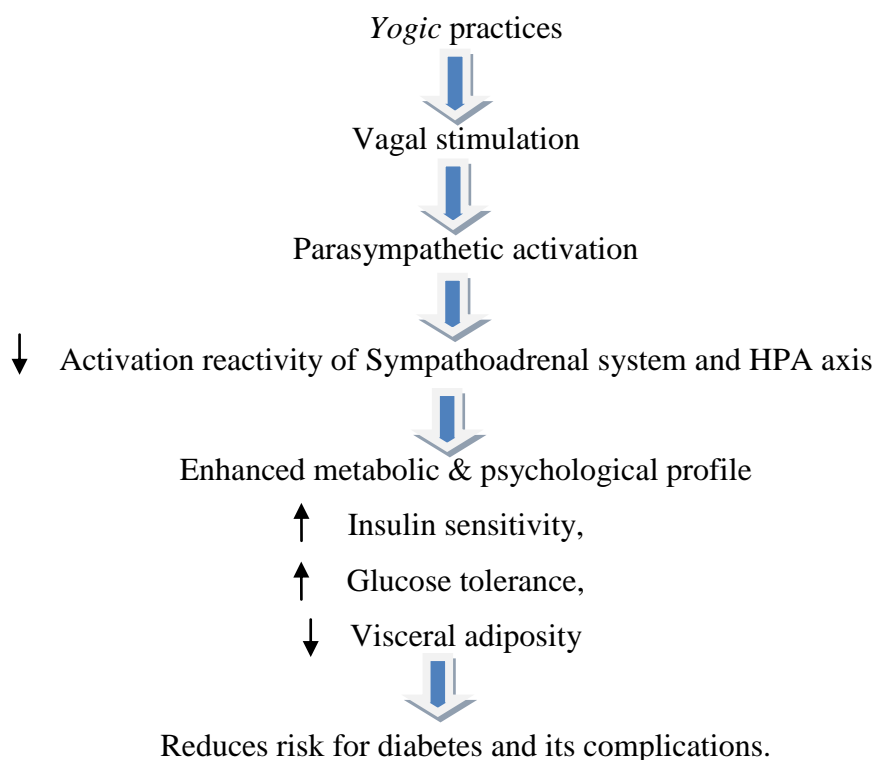
Hypertension and its management through Yoga- Hypertension is one of the most common lifestyle related disorder and leading cause of morbidity and mortality which occurs when pressure inside the blood vessels is higher than the normal expected values for age and gender due to deposition of cholesterol resulting into hardening of arteries which further leads to increased risk of heart disease, stroke, kidney damage etc. *Yogasanas* and *Pranayama* helpful for this is- *Makarasana*, *Matsyasana*, *Vajrasana*, *Padmasana*, *Siddhasana*, *Bhujangasana*, *Shalabhasana*, *Anuloma-viloma Pranayama*, *Bhramari Pranayama* etc. reduces fatigue and releases all the tension.^[8]

DISCUSSION

Yoga affects every cell of the human body bringing about better neuro-effector communication, improve strength and enhance optimum functioning of all organ systems while increasing resistance against stress and diseases with resultant tranquility, balance, positive attitude and equanimity.

In Respiratory Disorders: Scientific basis of using *Yoga* as a therapy in chronic obstructive pulmonary diseases is well established with significant improvements in lung function. *Yogic* cleaning techniques like *Dhautikriya*, *Netikriya* removes excessive mucous secretions, decrease inflammation and reduce bronchial hypersensitivity thereby increasing provocation threshold while *Kapalabhati*, through forceful exhalations, improves the capacity to exhale against resistance. Also well performed slow *Yogic* breathing maintains better blood oxygenation, reduces sympathetic activation during altitude induced hypoxia and decreased chemo reflex sensitivity to hypoxia and hypercapnia.

IN TYPE-2 DIABETES MELLITUS: *Yoga* acts on hypothalamic-pituitary-adrenal (HPA) axis to reduce cortisol level in plasma. Further, reduces sympathetic nervous system tone and increases vagal activity.



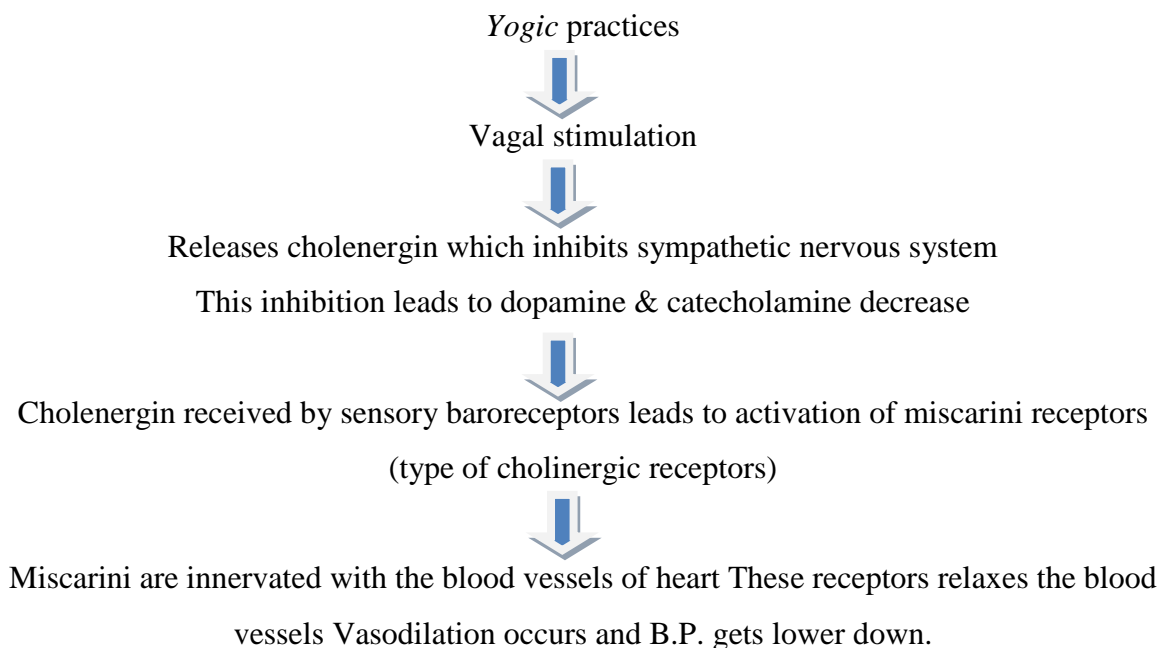
IN MANAGING STRESS: It is well established that stress weakens our immune system. Scientific research in recent times has shown that the physiological, psychological and biochemical effects of *Yoga* are of an anti-stress nature. The stress produces:^[18]

- An imbalance of the autonomic nervous system with decreased parasympathetic and increased sympathetic activity.
- Under activity of the gamma amino-butyric acid (GABA) system, the primary inhibitory neurotransmitter system
- Increased allostatic load.

Yoga leads to an inhibition of the posterior or sympathetic area of the hypothalamus resulting in correction of under activity of the parasympathetic nervous system and GABA systems in part through stimulation of the vagus nerves, the main peripheral pathway of the parasympathetic nervous system and reduces allostatic load. Also *Yoga* practices inhibit the area responsible for fear, aggressiveness and rage and stimulate the rewarding pleasure centers in the forebrain and other areas leading to a state of bliss and pleasure. Inhibition results in low anxiety, heart rate, respiratory rate, blood pressure.^[19]

IN CARDIOVASCULAR CONDITIONS: *Yoga* helps in regression of coronary lesions, improvement in myocardial perfusion and reduction in systolic and diastolic pressure. Longer duration of *Yoga* practices produces better cardiopulmonary endurance.

IN HYPERTENSION: Stress related hypertension can be easily prevented by *Yogic* practices.



CONCLUSION

Yoga immediately reduces the sympathetic response or stress and relaxes the body and mind. It leads to an inhibition of the posterior or sympathetic area of the hypothalamus and this inhibition results in lower anxiety, lower heart rate, lower respiratory rate and blood pressure. It leads to significant increase in serotonin levels coupled with decrease in the levels of monoamine oxidase, an enzyme that breaks down neurotransmitters, and cortisol due to which the stress gets reduced which is in turn the root cause of majority diseases. The actual solution for global peace is dependent on each and every individual in the society, by attaining inner peace and harmony through *Yogic* practices to heal entire sufferings.

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