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Impact of yoga on mind-body management and its possible scientific mechanisms

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Abstract

This review article summarizes beneficial effects of yoga on different systems of body in maintaining of normal heath as well as in prevention and treatment of many non-communicable diseases. Current evidences of effects of yoga in many studies as well as the possible scientific mechanisms of these effects are explained in this article.

Yoga is effective supportive adjunct with pharmacological treatment for therapy of some medical conditions. Yoga is beneficial in psychological stress related diseases, and diseases related to cardiovascular, respiratory, reproductive etc. It also has a proven role in immune system, cancer and even at genetic level but extensive research is required for firmly establishment of such benefits. Possible scientific mechanisms of health benefits of yoga are by increased vagal activity and decrease sympathetic activity. It helps in normalisation of hypothalamo-pitutary- adrenal axis as well as the baroreflex sensitivity. Alteration of gene expression and level of inflammatory mediators are also noted in many studies.

Yoga is relatively safe, cost-effective, and easy to be practice as a part of self-care behavioural treatment. In conclusion, everybody should practice yoga in day to day life for maintenance of better health and prevention of diseases as well as adjunct to medicines for treatment of some diseases under appropriate supervision.

Keywords: Yoga, Scientific basis of yoga, Mind-body management, Alternative treatments, Yoga for health

Introduction

Several studies suggest that mind-body connection, an important component of integrative medicine or complementary and alternative medicine (CAM) may be effective in reducing biologic measures of stress and thereby can hasten the healing process from disease. Moreover diet, lifestyle and stress management are important components of Integrative medicine (IM).[1]

Yogic cognitive-behavioural practices, including yoga asana, meditation, breathing exercises etc. are important components for healthy well-being. Eight main aspects of Yoga (asthanga) according to Patanjali's yoga darshan are: yama (universal ethics), niyama (individual ethics), asana (physical postures), pranayama (breath control), pratyahara (control of the senses), dharana (concentration), dyana (meditation), and samadhi (bliss).[2] This article reviews the various latest studies of effect of yoga on various patho-physiological systems with possible scientific mechanisms.

Yoga and Psychological distress

Studies on Yoga suggest that psychological distress can be reduced which has beneficial effects in mood and anxiety disorders.[3,4,5] Beneficial effect on psychosocial distress in turn is linked to effective outcome in various disease states, such as depression and other psychiatric disorders, cardiovascular disease, and cancer etc.[6] Psychological stress increases oxidative stress and promote a pro-inflammatory milieu at the cellular level.[6,7,8] Oxidative stress is related to accelerated aging of cell which makes the cell more prone to a variety of diseases.[9] Role of yoga in effectively counteracting psychological distress augments healing and wellness.[3,5,10,11] Down regulation of the hypothalamic–pituitary–adrenal (HPA) axis and the sympathetic nervous system (SNS), is one of the main mechanisms through which yoga produces beneficial endocrine outcomes.[12]

Yoga and Cardiovascular system

The beneficial effect of Yoga and pranayama on diverse cardiovascular disease conditions are plenty. Convincing antihypertensive effect is due to positive effects on the heart rate, low density lipoprotein (LDL) cholesterol, and reduction in salivary cortisol, the 'stress hormone' levels. Other key mechanisms like improvement of the autonomic neurological function[13] and restoration of baroreflex sensitivity are also included which are produced by specific yogic asana equivalent to head-up or head-down tilt.[14] It was found that patients who participated in yoga exercise had progressive attenuation of renin-angiotensin activity.[15] Studies show that secondary cardiac complications of chronic hypertension like Left ventricular hypertrophy, diastolic dysfunction myocardial ischemia and congestive cardiac failure can be improved by head-down-body-up postural exercise (Sarvangasana).[15]

Yoga and Respiratory system

It is well known that yoga has significant role in the improvement of COPD (Chronic obstructive pulmonary diseases), asthma and other respiratory diseases. In a study on elderly patients with COPD showed that after a

12-week yoga program, the subjects tolerated more activity with less DD (dyspnoea-related distress) and improved their functional performance.[16]

In another study the yoga postures and pranayama proved to be beneficial in asthma patients. There was improvement in haemoglobin level and superoxide dismutase level of blood. It was also observed in this study that the asthmatic patients have decreased number of eosinophils and monocytes in blood after daily practice of yoga.[17]

In a recent study on healthy subjects it is observed that Vital capacity (VC), Tidal volume (TV), Expiratory Reserve volume (ERV), Breath holding time (BHT), 40 mm endurance, Peak expiratory flow rate (PEFR) are increased after yoga training.[18] Yoga is helpful in improvement of the lung function and respiratory performance of the body. The beneficial effect of different pranayama is well reported to improve the ventilatory functions by different studies.[19,20] The suggested mechanism is the efficient use and strengthening of abdominal and diaphragmatic muscles by yoga due to which chest and lungs inflate and deflate to fullest possible extent and improve respiratory functions.[19,21] Yoga and pranayama modify the respiratory center activity and make the lungs to work to their maximal extent to take O_2 and expire CO_2 maximally.[22]

In another study it was found that the persons who do yoga practice regularly found increase in 40 mm endurance time. Their proposed mechanisms are alteration in responsiveness of respiratory center and chemoreceptors towards oxygen and carbon dioxide level.[23]

Yoga and Gene expression

There are studies which showed that yoga practice can cause changes even at genetic level. The changes were reported in gene expressions in mononuclear cells of blood in the persons who practice yoga and meditation on regular basis.[24,25] It is known that alteration in gene expression can occur in many diseases. Therefore yoga/mediation may be helpful in prevention and restoring of these changes at genetic level. It has been evaluated by a study that gene expression changes occurring at the level of various cellular pathways in the peoples who involve in regular yoga and meditation practice might be a possible cause of better response to oxidative stress.[26]

Another study investigated changes in gene expression induced by the practice of Sudarshan Kriya which is a type of yoga. The expression of Glutathione-S-transferase mRNA, anti-apoptoticgene COX-2 and BCL-2 and stress response gene HSP-70 were reported high in sudarshankriya practitioners. Yoga triggers a better antioxidant status upto genetic level by changes in the expression of the related genes, which may be responsible for better response to environmental stress. The increased levels of anti-apoptotic genes might result in prolonged the life span of white blood cells that may lead to better immune functioning and protection from disease.[27]

Yoga and Immune system

Other physiological parameters on which yogic/ meditative practices have beneficial effects are humoral factors and the immunity.[10,26,27] An intervention study of a two-month hatha yoga in chronic heart failure patients found significant reduction in the pro-inflammatory cytokine interleukin-6 and C-reactive protein respectively, compared to minimal changes in non-practice group.[28] Study also found increased antioxidant enzyme production in a yoga breathing based program.[29] Another study on HIV positive patients showed that mindfulness meditation training can buffer CD4+ T-lymphocyte declines in HIV infected adults.[30]

Yoga and Reproductive functions

Yoga practice is very beneficial in improvement of overall health if done regularly by pregnant women. It has been well documented increase in birth weight by regular practice of physical postures and meditation. It was also observed in the same study that there was decrease in incidences of preterm labour and intrauterine growth restriction in daily yoga practitioners.[31] Beddoe et al. found in their study that women practicing yoga in their second trimester reported less physical pain as compare to control.[32] Women in their third trimester showed greater reductions in perceived stress and anxiety after practicing yoga and meditation. Yoga can be used to prevent or reduce obstetric complications and maintaining the health during pregnancy. It is also proved that regular practice of yoga improves the sexual functions scores in females significantly.[33]

Regular yoga practice of yoga can cause improvement of the sperm count and motility in man. A study showed that by decreasing the stress, yoga can improve the overall sexual function and helps to treat mild erectile dysfunction (ED).[34] The benefits of yoga on reproductive health may be due to reduce stress and anxiety, improve autonomic functions by the suppression of sympathetic activity with predominance of parasympathetic activity.

Yoga and Diabetes mellitus

Yoga by effectively reducing stress improves insulin action. By reducing perceived stress and HPA (Hypothal amopituitary adrenal axis) activation, yoga improves overall metabolic and psychological profiles. It also increases insulin sensitivity thereby improving glucose tolerance, attenuation of the negative relationship between body weight or waist circumference and insulin sensitivity and lipid metabolism.[35]

Studies have also attributed increased sensitivity of the beta cells of pancreas to the glucose signal probably resulting from a progressive long-term effect of asana.[36]

Yoga and Cancer

It has been seen that when battling cancer, the worst part is not just the symptoms of the disease itself, but often the discomfort and debilitating fatigue brought on from cancer treatments. Whether faced with the scar-tissue of surgery or ongoing nausea and weakness from chemotherapy or radiation, cancer patients endure a long road of physical trials. Some studies have reported beneficial effect of yoga for people with cancer in managing symptoms of cancer.[37] Another study showed that patients of breast cancer who practice yoga regularly, feel less pain and other symptoms of cancer.[38] Another study on breast cancer patients also showed that yoga is also beneficial for reduction in postoperative stress. In patients who practice yogasana daily has less immune suppression after surgery.[39] Studies showed that high level of melatonin increases the chances of incidence of prostate tumour. Meditation is helpful in prevention of prostate tumour by reduction of melatonin level.[40,41] Kundalini yoga is a type of yoga which is proved to be beneficial in treatment of prostate cancer.[42]

Conclusion

From the various latest studies mentioned above it can very well be concluded that daily yoga practice is beneficial in prevention and treatment of many diseases related to cardiovascular, respiratory, reproductive system etc. It is one of the safe and easy method for mind-body-management with promising results in many non-communicable multi-factorial chronic diseases.

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