International Journal of Physical Education and Sports Sciences

Vol. VII, Issue No. XIV, January-2015, ISSN 2231-3745

AN ANALYSIS UPON VARIOUS PHYSIOLOGICAL IMPACTS OF YOGIC PRACTICES ON DIFFERENT SYSTEMS OF HUMAN BODY

AN INTERNATIONALLY INDEXED PEER REVIEWED & REFEREED JOURNAL

www.ignited.in

International Journal of Physical Education and Sports Sciences
Vol. VII, Issue No. XIV, January-2015, ISSN 2231-3745

An Analysis upon various Physiological Impacts of Yogic Practices on Different Systems of Human Body

Rekha Rani[1] Dr. Kishore Kumar[2]

[1]Ph.D., Scholar, Mewar University, Rajasthan

[2]Associate Professor

Abstract – Yoga was imparted in the morning and in the evening hours with one hour per day for a period of twelve weeks. The systolic, diastolic blood pressure, body weight and lipid profile including TG, TC, LDLC,VLDLC(except HDLC) were significantly low in yoga group (P=<0.05) compared to the control group. HDLC values were significantly high in yoga group. The results of test revealed that yoga was effective in controlling the variables of hypertension.

The objective of this study is to assess the findings of selected articles regarding the therapeutic effects of yoga and to provide a comprehensive review of the benefits of regular yoga practice. As participation rates in mind-body fitness programs such as yoga continue to increase, it is important for health care professionals to be informed about the nature of yoga and the evidence of its many therapeutic effects. Thus, this manuscript provides information regarding the therapeutic effects of yoga as it has been studied in various populations concerning a multitude of different ailments and conditions. Therapeutic yoga is defined as the application of yoga postures and practice to the treatment of health conditions. Results from this study show that yogic practices enhance muscular strength, body flexibility, promote and improve respiratory and cardiovascular function, promote recovery from treatment of addiction, improve sleep patterns, and enhance overall well-being and quality of life.

----------♦----------

INTRODUCTION:-

Twenty first century has witnessed a land mark development in science and technology including space, defense, atomic energy, computer, internet service etc. By the internet invention we can collect required information within a fraction of second from any part of the world. Due to this advanced scientific technological invention, the body movements of the human being have been restricted. Tension and competitive feeling increased. Man has been felt the prey of stress, hypo kinetic and psychosomatic diseases. So time has come that man should not ignore the importance of any physical activities. Every one desires good health and it is the ultimate objective of all those who want happiness in life. Everyone has to follow good health practices in their routine life. Minor health disorders are quite common to all. In the case of major health problems, the precautionary measures are plenty. Some people control their diseases like blood pressure, diabetes, acidity, asthma etc. by taking medicines regularly. But such practice does not in a way completely eliminate the health disorders; on the other hand it leads to several other adverse health problems.

The continuous, systematic and regular practice of Yoga and any physical activities is an effective tool to maintain good health and also helps eliminate all the dreadful diseases from the human body.

Physical education and sports, being an integral part of education, experiences the impact of scientific advancements. Now sports are able to give outstanding performance because of involvement few scientifically substantiated training methods and means of execution of sports exercise such as sports techniques and tactics improvement of sports gear and equipment as well as other components and conditions of sports training.

Physical educators understand the scientific foundation for what they do today is better than what they did years ago. They no longer conduct exercises and physical activities simply for the purpose of entertainment or to stimulate muscular activity for its own sake. Today they are interested in providing exercises and physical activities that will accomplish specific objectives for participant such as helping a handicapped person to have a sense of accomplishment in physical activity to enhance his or

her self concept or assisting an industrial executive in determining his or her state of fitness through sophisticated measurement techniques. The physical education is also utilizing computer technology to store information that will be readily available for instant retrieval and application in their filed.

Yoga, an ancient Indian Science has been practiced as a healthy way of life. Recently yoga has been adopted as an approach to health within alternative medicine. Modern man is the victim of stress and stress related disorders which threaten to disrupt life totally. Yogic life style, Yogic attitudes and various yogic practices help man to strengthen his body and mind. Living a happy and healthy life on all planes is possible through the unified practice of yoga along with asana and pranayama when performed consciously and with awareness. Yoga emphasizes on controlled breathing (Pranayama), body posture (asana). Relaxation of mind (meditation) keeps a person energetic and healthy for maintaining health and fitness and for treating diseases. Sudarshan Kriya of Yoga is a unique breathing process advocated by The Art of Living Foundation, Bangalore, India. The Foundation is one of the established yoga school of international repute. Yoga is said to heal and purify from within and is a natural and noninvasive technique. Yoga has a sound scientific basis and is an ideal tool for improving the health. The practice of yoga has beneficial effect on biochemical and physiological functions of man.

The yoga, exercise and relaxation, music, balanced diet are different physical stress management strategies which are effectively used by women to combat stress. Earlier studies shown that planning, social support and mediation are effective stress management techniques. The practice of positive thinking, selecting and reflecting principles of life will decrease stress and will strengthen the manageability of life.

Modern medicines can treat hypertension to some extent but in the long run they have side effects. Although there are some reports available in literature the present study will provide concrete evidence about the usefulness of yoga in treating hypertension of working women in Maharashtra State of India. Reduction in stress through integrated approach of yoga therapy is achieved by practice of deep relaxation at the somatic level by different postures (asanas), slow controlled breathing to decrease respiratory rate (pranayama), and techniques for calmness of mind such of meditation and chanting.

YOGA

Yoga means to “yoke” to “unite” to bind to “link” to connect or to “merge”. As yoke joins two bulls together, the yoga unites body and mind together. The merger of soul with God, and the experience of oneness with him is yoga. It is possible only through the control over sense organs and through continued practice and detachment. According to the great Sage Patanjali the withdrawal of sense organs from their worldly objects and their control is yoga.

The aim of man’s life is to get rid of the worries, anxieties and sufferings of the world and to achieve peace and bliss. To get rid of the tempting delusions, sorrows and pains of the world, there are different paths of yoga namely Bhakti yoga, Karma yoga, Dhyana yoga, Jnana yoga, Hatha yoga and other yogas. The paths may be different but the ultimate aim is the same. Our body has been called the temple of the God. According to Shankracharya we can see the image of God in our own body if maintained purity and free from disease. Just as spotless mirror gives clear reflection, the body and mind if maintained purity and health can lead up to success.

Yoga is a science of physical and mental control. It is a system of self-renewal of mind and body. It is a means of acquiring a slim supple and healthy body. It can be a way to achieve inner tranquility. It is also a path to great spiritual attainment. Our ancient Rishis and sages have given eight stages of yoga. They are Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana and Samadhi.

Yoga is a psycho-somatic-spiritual discipline for achieving union and harmony between our mind, body, and soul and the ultimate union of our individual consciousness with the universal consciousness. Pranayama is derived from two Sanskrit words, namely, prana, which means vital force or life energy, ayama means to prolong.

Transcendental meditation (TM) is one of the techniques of meditation, which involves allowing the mind to dwell on a series of words (called a mantra) given by the meditation teacher, with no effort. If the attention wanders it is allowed to wander till it returns to the mantra.

When a person practices yoga, with yogic attitude (attitude of patience, persistent practice, overcoming obstacles within self, that is, trouncing laziness, anger, delusion, and desire for being different or better than others), there are several changes in physiology. In order to provide a general overview and understanding, we performed a Medline search to review relevant articles in English literature on physiological effects of yogic practices including pranayama and TM. Data were constructed and issues were reviewed from there.

Yoga postures can lead to improvement in the sensitivity of the b-Cells of the pancreas to the glucose signal and also the improvement in insulin sensitivity in turn can be due to the cumulative effect of performing the postures.

Direct stimulation of the pancreas by the postures can rejuvenate its capacity to produce insulin. Regeneration of pancreatic beta cells could occur by yoga exercises that promote blood circulation in the region of the pancreas and yoga asanas that stimulate the meridian of pancreas also could assist in some diabetic patients.

Pranayama practices, stretches the lung tissue producing inhibitory signals from action of slowly adapting receptors and hyperpolarising currents. These inhibitory signals coming from cardiorespiratory region involving vagi are believed to synchronize neural elements in the brain leading to changes in the autonomic nervous system; and a resultant condition characterized by reduced metabolism and parasympathetic dominance.

Pranayama modified various inflatory and deflatory lung reflexes and interact with central neural element to bring new homeostasis in the body.

EFFECTS OF YOGA ON DIFFERENT SYSTEM

Nervous system - In a study to assess the immediate effect of three yoga breathing techniques on performance of a letter-cancellation task, the authors reported that there were improved scores and fewer errors on letter cancellation task and suggested that yoga practice could bring improvement in the task which requires selective attention, concentration, visual scanning abilities, and a repetitive motor response. A study on performance of participants on mirror-tracing task found that yoga group had improved reversal ability, eye-hand co- ordination, speed and accuracy which were necessary for mirror star tracing. In another study conducted to assess changes in p300 following two yoga-based relaxation techniques reported a reduction in the peak latencies of P300 after yoga based relaxation technique and indicated that yogic meditation enhances cognitive processes underlying the generation of P300.

Left-sided unilateral forced nostril breathing led to right-hemisphere dominance and improved spatial skills while maneuver on opposite side showed left hemisphere dominance with improved verbal skills. Practicing asanas, pranayama, meditation, and tratakas (concentrated gazing practices), and attending devotional sessions for 10 days led to a significant improvement in fine coordinated movements. Yoga practices for a month not only led to a reduced degree of optical illusion created by muller-lyer lines and raised the critical fusion frequency but also improved neural performance, higher critical fusion frequency indicating reduced fatigue and stress level.

Respiratory system - In a randomized controlled trial (RCT) conducted on 57 adult subjects with mild or moderate bronchial asthma, there was a steady and progressive improvement in pulmonary functions, the change being statistically significant in case of forced expiratory volume in first second (FEV1) volume at 8 week, and peak expiratory flow rate at 2, 4, and 8 weeks as compared with the corresponding baseline value and also a significant reduction in exercise induced bronchoconstriction as well as in Asthma Quality of Life (AQOL) scores in the yoga group compared with control group.

A study with a quest whether yoga could reduce the basic problem in asthma (i.e., airway hyper responsiveness), showed improvement on subjective measures as well as airway hyper responsiveness to methacholine after sahaja yoga meditation.

In a setup of randomized, double-blind, crossover trial design there was a significant increase in the dose of histamine needed to provoke a 20% reduction in FEV1 during yoga breath, but not with the control. Yoga group, compared with control group, showed greater improvement in scores for drug treatment, peak flow rate, and decreased weekly attacks of asthma, following 2 weeks of yoga practice. Yogic exercise group showed maximum improvement in respiratory function when compared with that improved by national defense training.

In a RCT conducted at All India Institute of Medical Sciences, Delhi, India, showed that adding a comprehensive yoga-based mind-body intervention to the conventional treatment improved several measures of pulmonary function in subjects having mild to moderate bronchial asthma, a decrease in exercise-induced bronchoconstriction in the yoga group, particularly in the exercise-sensitive subjects. Yoga improved the QOL and reduced rescue medication use in bronchial asthma, and achieved the reduction earlier than conventional treatment alone.

Musculoskeletal System - Scientific studies on yoga demonstrate that yoga improves dexterity, strength and musculoskeletal coordination of the practitioners. Postures assumed during yoga practice are mainly isometric exercises which provide optimally maintained stretch to the muscles. Series of asans involve assumption of the pose followed by counterpose i.e. it involves co-ordinated action of synergistic and antagonistic muscles which brings increased steadiness, strength, stamina, flexibility, endurance, anaerobic power, better neuro-muscular coordination and improved orthostatic tolerance. Body weight is itself used to provide load to the muscles and bones. This load bearing strengthens the bones and prevents age-related weakening, thus helping in prevention of osteoporosis. A properly selected set of exercises stretches nearly all joints and joint capsules without much danger of injuries

and exhaustion. Bera and Rajapurkar (1993) have reported significant improvement in ideal body weight, body density, cardiovascular endurance and anaerobic power as a result of 1 year yoga training in children aged 12-15 years. Clearly, yoga practices should be started at an early life. Hart and Tracy (2008) studied effects of Bikram yoga on strength, steadiness and balance in 10 young adults (29 +/- 6 years). 24 yoga sessions of supervised, standardized postures for 1.5 hr were conducted for 8 weeks. They reported that even short-term yoga program of this type in young adults improved the balance, produced modest improvements in leg strength, and improved leg muscle control for less steady subjects. Dhume and Dhume (1991) compared the relative effectiveness of dextroamphetamine and yogic meditation on the performance of medical students to concentrate on the task to balance on a balance board. The performance of meditators went on steadily and progressively increasing throughout the period of 10 trial days with overall percentile rise of 27.8% while amphetamine use deteriorated the task performance of students. Therefore, yogic meditation is of merit to achieve concentration for mental as well as physical task such as neuro-muscular coordination and dexterity. Raghuraj and Telles (2008) studied the effect of breathing through one nostril on the lateralization of hand grip strength.130 right hand dominant school children 11 to 18 yr were randomly assigned to 5 groups. Each group had a specific yoga practice in addition to the regular program for a 10 day yoga camp. The practices were: (i) right-, (ii) left-, (iii) alternate nostril breathing (iv), breath awareness and (v) practice of mudras. Hand grip strength of both hands was assessed initially and at the end of 10 days for all 5 groups. The right, left and alternate nostril breathing groups had a significant increase in grip strength of both hands, ranging from 4.1% to 6.5% without any lateralization effect. The breath awareness and mudra groups showed no change. Hence, this study suggests that yoga breathing through a particular nostril or through alternate nostrils increases hand grip strength of both hands without lateralization.

Ray et al (2001) studied the effect of training in hatha yogic exercises on aerobic capacity and perceived exertion after maximal exercise in young adults. They found that absolute value of VO2 max increased significantly in the yoga group after 6 months of training. The perceived exertion scores after maximal exercise decreased significantly in the yoga group after the 6 months training period. Therefore, the practice of hatha yogic exercises along with games helps to improve aerobic capacity. Chaya et al (2006) found that yoga practices (asan, meditation and pranayama) for a minimum period of six months results in significantly lower basal metabolic rate of the yoga practitioners as compared to that of the non-yoga group. It may be linked to reduced arousal, with the long term practice of yoga using a combination of stimulatory and inhibitory yogic practices.

Endocrine and Reproductive System - Studies have shown that practice of yoga orchestrates fine tuning and modulates neuro-endocrine axis which results in beneficial changes in the practitioners. Chaya et al (2008) reported significant decrease in fasting plasma insulin in the yoga practitioners. They also found that long term yoga practice (for 1 year or more) is associated with increased insulin sensitivity and attenuation of the negative relationship between body weight or waist circumference and insulin sensitivity.

Manjunatha et al (2005) studied the effect of four sets of asanas in random order for 5 consecutive days and observed that performance of asanas led to increased sensitivity of B cells of pancreas to the glucose signal. They proposed that this increased sensitivity is likely to be a sustained change resulting from a progressive long-term effect of asanas.

Kamei et al (2000) found changes in brain waves and blood levels of serum cortisol during yoga exercise in 7 yoga instructors and found that alpha waves increased and serum cortisol significantly decreased. Tooley et al (2000) found significantly higher plasma melatonin levels in experienced meditators in the period immediately following meditation compared with the same period at the same time on a control night. It was concluded that meditation can affect plasma melatonin levels. It remains to be determined whether this is achieved through decreased hepatic metabolism of the hormone or via a direct effect on pineal physiology. Either way, facilitation of higher physiological melatonin levels at appropriate times of day might be one avenue through which the claimed health promoting effects of meditation occur. In another study, Harinath et al (2004) evaluated the effects of 3 month hatha yoga practice and Omkar meditation on melatonin secretion in healthy subjects. Yoga group subjects practiced selected yogic asanas for 45 minutes and pranayam for 15 minutes during the morning, whereas during the evening hours these subjects performed preparatory yogic postures for 15 minutes, pranayam for 15 minutes, and meditation for 30 minutes daily for 3 months. Results showed that yoga practice for 3 months resulted in an improvement in cardiorespiratory performance and psychological profile. The plasma melatonin also showed an increase after three months of yogic practice. Also, the maximum night time melatonin levels in yoga group showed a significant correlation with well-being score. These observations suggest that yogic practices can be used as psychophysiologic stimuli to increase endogenous secretion of melatonin, which, in turn, might be responsible for improved sense of well-being.

Diabetes - In an interventional research involving 98 subjects found fasting blood sugar (FBS), serum total cholesterol, low density lipoproteins (LDL), very low density lipoproteins (VLDL), the ratio of total cholesterol to HDL-C, and total triglycerides were significantly lower, and HDL-C significantly higher, on

the last day of the course compared with the first day of the 8-days course.

A comparison of yoga practice with physical training showed that yoga practice for 6 months reduced fasting blood glucose, lipid levels, markers of oxidative stress, while physical training also decreased fasting blood glucose but had few of the other beneficial effects.

In a study, 44 type 2 diabetic patients were taught yoga (n = 22) and pranayama for three continuous months, 1 h every day in the morning by yoga expert had significant decrease in FBS, Postprandial blood sugar (PPBS), glycosylated hemoglobin (HbA1c), triglycerides and LDL of test group with $P < 0.001$, compared with control group (n = 22). The requirement of insulin in the yoga group was also significantly reduced.

Arthritis - A randomized controlled study to evaluate the efficacy of integrating hatha yoga therapy with therapeutic exercises for osteoarthritis (OA) showed that there were significant differences within (Wilcoxon's, $P < 0.001$) and between the yoga and control groups (Mann–Whitney U, $P < 0.001$) on all the studied variables, with better improvements in the yoga than the control groups.

In a pilot study involving 27 women with musculoskeletal problems such as OA subjected to undergo 8 sessions (twice weekly for 4 weeks) of a yoga program indicated that post study values of patients' gait parameters were found to be statistically higher than their pre- study values ($P < 0.05$). There was a decrease in the rheumatoid factor levels along with less pain and better function following a week of yoga. Another pilot study involving 12 sessions of yoga for rheumatoid arthritis (RA) demonstrated statistically significant improvements in RA. Sixteen postmenopausal women with RA subjected to three 75- min yoga classes a week over a 10-week period showed a significant decrease in Health assessment Questionnaire disability index, perception of pain and depression, and improved balance.

Cancer - A new term, restorative yoga (This is a gentle, therapeutic style of Yoga that uses props to support the body to deepen the benefits of the poses. It is a soothing and nurturing practice that promotes the effects of conscious relaxation) has been used to describe a gentle form of yoga which help females with ovarian or breast cancer to reduce depression as well as anxiety state, and better mental health and overall QOL. There was also a decrease in fatigue. Yoga also helped patients with cancer to deal with distressful symptoms and treatment related toxicity of chemotherapy. Yoga could influence immune system, especially increasing the natural killer cells. Radiation causes DNA damage and yoga practice could reduce the damage. Increased survival time were obtained by the association between neuroimmunotherapy with melatonin plus IL-2 and kriya yoga program (2 years), which was significantly longer with respect to that achieved by supportive care alone, Yoga alone, or IL-2 plus melatonin alone (1 year).

EFFECTS OF YOGIC PRACTICES ON DIFFERENT ORGANS

Yoga is a psycho-somatic-spiritual discipline for achieving union & harmony between our mind, body and soul and the ultimate union of our individual consciousness with the Universal consciousness (Madanmohan, 2008). Yoga is mind-body technique which involves relaxation, meditation and a set of physical exercises performed in sync with breathing. Being holistic, it is the best means for achieving physical, mental, social and spiritual well-being of the practitioners. This can be achieved by systematic and disciplined practice of yoga described by sage Patanjali. The result is unfoldment of a unique spiritual personality that is a blessing for the whole humanity. Yoga helps in developing our total personality in an integrated and holistic manner.

Impact of Yoga asanas on human body system is expansive and eternal. The muscles, bones, nervous system, respiratory, circulatory and digestive systems of the human body are greatly benefited from regular practice of yoga asanas. All the body systems are co-ordinated with each other. The body becomes more flexible, and more able to adjust to environmental changes after practising asanas. The sympathetic and para-sympathetic nervous systems are brought into a state of balance with the help of asanas.

Effect on Skeletal System - The human skeleton supports the softer parts of the body such as muscles, which are attached to it and the organs, which it protects. The skeleton, its joints and muscles are exercised through asanas that leads to the proper development of the bones and strengthens them with the passage of time.

The gentle stretching of the muscles and joints releases muscle tension, thus increasing flexibility. The stretching of the joints in asanas causes the secretion of a lubricant called the synovial fluid. This fluid is released into the joints that keep them supple, as well as removing waste products. The result is to reduce stiffness, which will prevent arthritis or improve it if the person already suffers from the condition. Weight bearing asanas usually help prevent osteoporosis, and may also help those who are already diagnosed with osteoporosis, practised with care. Long term benefits of asanas include reduced back pain and improved posture.

Effect on Digestive System - The major functions of the digestive system are ingestion, digestion, absorption, and defecation. Yoga Asanas effect improved blood circulation and the massaging effect of surrounding muscles speeds up sluggish digestion. As a person gets older, the digestive system functions with gradually reducing efficiency. The regular practice of asanas thus result in an improved blood and nerve supply to the digestive and eliminative systems keeping them functioning well. The stomach lifts while asanas are practiced massages the digestive organs, as well as contracting and stretching them.

CONCLUSION

Yoga affects every cell of the body. It brings about better neuro-effector communication, improves strength of the body, increases the optimum functioning of all organ-systems, increases resistance against stress and diseases and brings tranquility, balance, positive attitude and equanimity in the practitioner which makes him lead a purposeful and healthier life.

Yoga affects every cell of the body. It brings about better neuro-effector communication, improves strength of the body, increases the optimum functioning of all organ-systems, increases resistance against stress and diseases and brings tranquility, balance, positive attitude and equanimity in the practitioner which makes him lead a purposeful and healthier life. The various avenues of study of yoga practices reviewed in the present article indicated considerable health benefits, including improved cognition, respiration, reduced cardiovascular risk, BMI, blood pressure, and diabetes mellitus. It also influenced immunity and ameliorated joint disorders.

Despite extensive searches, recent research articles in sighting the Physiological basis underlying the effects of yogasanas, pranayamas and TM were limited. Further researches exploring the effects of yoga on different organ systems would be invaluable.

REFERENCES

- Agte, V,V, and Tarwadi, K. (2004) Sudarshan kriya yoga for Treating Type 2 Diabetes. A preliminary study. Alt Comple Therapies, 10(4): 220-222.
- Bera TK and Rajapurkar MV. Body composition, cardiovascular endurance and anaerobic power of yogic practitioner. Indian J Physiol Pharmacol 1993; 37: 225-228.
- Catherine Woodyard. Exploring the therapeutic effects of yoga and its ability to increase quality of life. Int J Yoga. 2011: 49–54.
- Chaya MS, Kurpad AV, Nagendra HR, Nagarathna R. The effect of long term combined yoga practice on the basal metabolic rate of healthy adults. BMC Complement Altern Med. 2006 ;6: 28
- Chaya MS, Ramakrishnan G, Shastry S, Kishore RP, Nagendra H, Nagarathna R, Raj T, Thomas T, Vaz M, Kurpad AV. Insulin sensitivity and cardiac autonomic function in young male practitioners of yoga. Natl Med J India. 2008; 21: 215-6.
- Dhume RR and Dhume RA. A comparative study of the driving effects of dextroamphetamine and yogic meditation on muscle control for the performance of balance board. Indian Journal Physiol Pharmacol 1991; 35: 191-94.
- H. Kumar Kaul, Yogasanas for Every One, (New Delhi: Surjeet Publications, 2002), p.1.
- Harinath K, Malhotra AS, Pal K, Prasad R, Kumar R, Kain TC, Rai L, Sawhney RC. Effects of Hatha yoga and Omkar meditation on cardiorespiratory performance, psychologic profile, and melatonin secretion. J Altern Complement Med. 2004; 10:261-68.
- Hart CE, Tracy BL. Yoga as steadiness training: Effects on motor variability in young adults. J Strength Cond Res. 2008 Sep; 22: 1659-69.
- Madan, M. and Pal, G.K.(2002) Effects of Yoga Training on Cardio respiratory functions of school children of Pondicherry. Dissertation submitted to Dept of Physiology JIPMER Pondicherry,
- Madanmohan Role of Yoga and Ayurveda in Cardiovascular Disease. [2008].
- Matveyer. L, Fundamentals of Sports Training, (Moscow: Progress Publishers, 2001), p. 11.
- Paden, S.L. and Buehler C. (2005). Coping with the dual income life style. J. Marriage Fam., 57(1): 101-110.
- Raghuraj P, Telles S. Immediate effect of specific nostril manipulating yoga breathing practices on autonomic and respiratory variables. Appl Psychophysiol Biofeedback. 2008; 33: 65-75.
- Raub JA. Psychophysiologic effects of hatha yoga on musculoskeletal and

cardiopulmonary function: A literature review. J Altern Complement Med. 2002;8:797–812.

- Ray US, Mukhopadhyaya S, Purkayastha SS, Asnani V, Tomer OS, Prashad R, Thakur L and Selvamurthy W. Effect of exercises on physical and mental health of young fellowship trainees. Indian J Physiol Pharmacol 2001; 45: 37-53.

- Sarang SP, Telles S. Immediate effect of two yoga-based relaxation techniques on performance in a letter cancellation task. Percept Mot Skills. 2007;105:379–85.

- Tandon OP. Yoga and its applications. In: Tandon OP, Tripathi Y, editors. Best and Taylor's Physiological Basis of Medical Practice. 13th ed. Gurgaon: Wolters Kluwer health/Lippincott Williams and Wilkins publishers; 2012. pp. 1217–30.

- Vestergaard-Poulsen P, van-Beek M, Skewes J, Bjarkam CR, Subberup M, Bertelsen J, et al. Long-term meditation is associated with increased gray matter density in the brain stem. Neuroreport. 2009;20:170–4.

- Yogalink. A community service donated by samyama yoga. [Accessed Jul 9, 2012]. athttp://www.yogalink.com.au .