CHAPTER I

INTRODUCTION

“Yoga has complete message for humanity,
It has a message for the human body,
It has a message for human mind, and
It has a message for human soul.”

-Swami Kuvalayananda

1.1 HEALTH

Health is the general condition of a person in all aspects. It is also a level of functional and metabolic efficiency of an organism, often implicitly human. At the time of the creation of the World Health Organization (WHO), in 1948, health was defined as being “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.”

Yoga provides the techniques (at physical, mental, intellectual and emotional levels) for this growth. These techniques are also useful therapeutically for many of the lifestyle (stress) related problems. Sound health is a balanced development of an individual’s personality and emotional attitudes, which enable him to live in harmoniously with him milieu. It is only a fine tuning of biological equilibrium in our body and that can be achieved by doing yogic effective practices and exercises,
regulating dietary pattern and having a positive attitude towards ourselves and the surrounding (Murthy, 2010).

1.2 PHYSICAL EDUCATION AND HEALTH

In this competitive world, many people find it hard to dedicate their time for physical activities like exercises, although one of their first priorities is to stay remain in perfect body structure. Most of the great personalities have told about the importance of exercise in our daily lives. Without a doubt, exercises are particularly helpful for weight control. Research consistently shows that regular physical activity, combined with healthy eating habits, is the most efficient and healthful way to control one’s weight. Whether one is trying to lose weight or maintain it, one should understand the important role of physical activity and include it in one’s lifestyle. Physical activity helps to control one’s weight by using excess calories, Otherwise it would be stored as fat. The number of calories one eats and use each day regulates one’s body weight. Everything one who eats contains calories, and one who uses calories, including sleeping, breathing, and digesting food. Any physical activity in addition to what one normally does will use extra calories. Regular exercise helps prevent heart disease. It does this by slowing the build-up of plaque in the arteries of the heart. Active people tend to have larger, cleaner arteries (Brehm, 2010).

Obesity is serious and common health problem. Most of the people are obese when they develop diabetes and the obesity is becoming a major health hazard worldwide. The incidence of diabetes is also increasing with the increase in age, physical inactivity and sedentary lifestyle. Its strong familial predisposition makes the situation even worse with the result that children and adolescents now present
with juvenile diabetes. Behavioral and emotional disorders are now the leading cause of disability in children and adolescents (Hanson and Bennett, 1998).

For instance, according to the guidelines of the American College of Sports Medicine, the conditions for effective exercise are: 20–60 minutes of moderate- to high-intensity endurance exercise (50–85% of maximal oxygen uptake (VO$_2$ max) performed three or more times per week. However, it has been reported recently that intermittent bouts of physical activity, as short as 8 to 10 min, totaling 30 min or more on most days provide beneficial health and fitness effects. In addition, it is recommended that the intermittent activity is not necessarily exercising training. For example, walking up the stairs instead of taking the elevator, waking instead of driving short distance, gardening, housework, and so on. Therefore, it can be considered that the amount of activity is more important than the specific mode of activity performed. It is reported that the current low-participation rate of general population in sports activities may be due, in part, to the misperception of many people that to reap health benefits they must engage in vigorous, continuous exercise. This view is of practical importance and is consistent with health recommendations for menopausal women, for whom the issues of moderate and short bouts of physical activity are of greater interest (Patel, 1995).

1.3 TRAINING

Organized activity aimed at imparting information and instructions to improve the recipient's performance or to help him attain a required level of knowledge or skill (Business dictionary, 2010). Don't dismiss yoga as simply a slow, seated practice, its benefits go beyond breath and can actually improve one’s athletic ability. Tons of athletes who practice yoga by stretching the main muscle
groups to strengthen the supporting muscles specific to each sport (House, 2009).

Generally asanas for the understanding is explained and categorized as special patterns of postures that stabilize the mind and the body through static stretching. The aim of the yoga training is to establish proper mechanism in the neuromuscular tonic impulses and improve the general muscle tone.

1.3.1 CONCEPTS OF TRAINING

Yoga is a very ancient discipline. It is recognized as one of the most important and valuable gifts of our heritage. Today the world is looking to yoga for solving the various problems men are facing. At no time in the past yoga had attracted so much attention from people in so many places in the world as is so today. The term yoga is used in literature both as end and as well as means. As an end yoga signifies the integration of personality at the highest level. Health, physical fitness and emotional stability are the objectives which bring yoga and physical education on a common platform for the benefit of human individual. Health is a more general and comprehensive term conveying the ‘feeling of well-being’, while physical fitness is a more specific term. Through constant practice of yoga, one can overcome all difficulties and eradicate all weakness, pain can be transmitted into bliss, sorrow in to joys, and failure into success and sickness into perfect health. Determination, patience and persistence lead one to goal.

Yoga practice has been transmitted from teachers (gurus) to students.

Over the millennia, yoga has been influenced by different traditions and philosophies evolving into a variety of practices. Different schools often emphasize different components of the eight limbs described above. Health benefits were
recognized as a by product to physical and mental discipline of yoga practice. In the twentieth century, the introduction of yoga to the West has emphasized the potential for yoga as means of health maintenance, prevention, and treatment for chronic disease. The majority of yoga practices in the West contain aspects of postures, breath control and meditation. Styles of vary in the emphasis of each component by technique, sequence, and intention.

As a mind body practice, the biological mechanism of yoga probably has multiple components. As a physical activity, part of the effect is similar to other types of exercise. Generally, yoga is considered a low- to moderate-intensity exercise. Exercise is known to improve health through improving cardiovascular fitness, muscle strength, and respiratory adaptations, modifying metabolism and immune function. Yoga’s emphasis on relaxation in static and dynamic exercises distinguishes it from conventional exercise. By systematically contracting and relaxing muscles in coordinate sequences, changing breathing patterns, and cultivating mental attentiveness and awareness during practice, yoga attempts to synchronize the body and mind. The practice of yoga requires active participation of the subjects. Hence, the effects of factors such as the motivation to receive yoga training as well as the subject’s age and gender may be expected to influence the outcome. This is interesting to study as yoga training is increasingly being included as part of routine programmes (Manjunath, 1998).

1.4 HISTORY OF YOGA

“Yoga” the very word radiates peace and tranquility. This feeling probably stems from the etymology of the word. The word Yoga is derived from the Sanskrit word ‘Yuj’ which essentially means to join or unite. The union referred to is that of
the individual self-uniting with Cosmic Consciousness or the Universal Spirit. Yoga is a means to achieving this goal.

Yoga as we identify it today is the product of a complex spiritual evolution that has taken place over centuries, the exact history of Yoga is uncertain. The earliest signs of Yoga can be traced to Stone Age Shamanism, both Shamanism and Yoga has cultural similarities. The shamanistic civilization revered the sacred art of discern the cosmic order through inner vision; they used rituals to create shifts in their perceptual field to communicate with the spirit world. Shamans were the precursors of the Yogis. Evidence of yoga postures were found on stone drawings dating from these times. Archaeological findings from the Indus Valley Civilization, revealed a portrait of a Yogi meditating in what looks like an Asana, it is known as the Pashupati seal.

Born in India, almost 26,000 years ago, Yoga is believed to have evolved during the period of the ‘Sat Yuga’, also called the Golden age. This period became known as a time of everlasting peace and abundant blessings, filled with seekers of the Eternal Truth. That is why, probably, even today we associate yoga with sages and hermits. It was not until the discovery of the Indus- valley civilization, the largest civilization that knowledge about the origin of Yoga surfaced. Excavations give evidence of yoga’s existence during this period; yogi -like figures engraved on soapstone seals have been unearthed. In fact, it was the Aryans, migrating from the north- west, who were instrumental in discovering yoga. Yoga’s long rich history can be divided into five main periods: Vedic Yoga, Pre-Classical Yoga, Classical Yoga, Post-Classical Yoga and Modern Yoga.
1.4.1 VEDIC YOGA

Vedas are a compilation of hymns and rituals which contain a comprehensive key to cosmic evolution, the Sanskrit word Veda means “knowledge”. The Vedas contains the oldest known Yogic teachings and is considered divine revelation. Teachings found in the Vedas are called Vedic Yoga, this teachings revolves around the through of reuniting the visible material world with the spiritual world transcending the limitations of the mind. During this time, the Vedic people relied on rishis (Vedic prophets) to teach them how to live in divine harmony, understanding the world. Later, texts known as the Brahmanas were written as commentaries explaining the hymns of the Vedas. The Aranyakas are texts which details rituals for Yogis living in the seclusion of the forest, most Brahmanas have one or more Aranyakas associated with them. The actual word “Yoga” was first mentioned in the Rigveda, the Rigveda; which dates back to approximately 1,500 before the Common Era; is a collection of hymns describing the practice of meditation as a discipline.

1.4.2 PRE-CLASSICAL YOGA

The Pre-Classical Yoga period covers an extensive period of approximately 2,000 years; the creation of the Upanishads marks the beginning of this period, they are a huge work containing over 200 scriptures which describes the idea of karma, the cycle of birth and death, the moral causation from past actions and first mentioned the Koshas (one of five coverings of the soul), these explain three subjects: the ultimate reality (Brahman), the transcendental self (Atman) and the relationship between the two.
Around 500 B.C.E., the Bhagavad-Gita was created; it is a beautiful story of a conversation between the God-man Krishna and the prince Arjuna. In the Bhagavad-Gita, three aspects must be brought mutually in our existence: Bhakti (devotion), Jnana (knowledge), and Karma (cause and effect). The Gita then tried to unify the Yogic traditions of Bhakti Yoga, Jnana Yoga, and Karma Yoga searching the sacrifice of the ego through self-knowledge and it is because of this that it has gained importance. During this time, Yoga found its way into Buddhism too, the Buddha saw that the suffering is caused by desire, greed, and delusion, its Yoga stresses the importance of Meditation and ethics over Physical Postures. A revered figure named Vyasa, categorized the Vedic hymns into the 4 Vedic texts: Rigveda (“Knowledge of Praise”), Yajurveda (“Knowledge of Sacrifice”), Samaveda (“Knowledge of Melodies”), and Atharvaveda (“Knowledge of Atharvan”). Atharvan was a legendary Rishi.

1.4.3 CLASSICAL YOGA

The classical Yoga period is defined by the Yoga Sutra, composed by Patanjali, In Patanjali’s sutras; Yoga is presented in a standardized and approachable way; Patanjali has often been called the founder of Yoga because of this work. Patanjali believed that every individual is composed of Prakrti (matter) and Purusha (spirit) and that the goal of Yoga is to free the spirit from the material world. This is in a severe dissimilarity to Pre-classical and Vedic Yoga, which signify the unification of the matter and the spirit.

The 195 sutras (words of wisdom) that comprise the Yoga Sutra expound the practice of yoga into an eight-limbed path of self-transcendence, these are:
1. Yama – Self-restraint or ethical conduct
2. Niyama – Personal and religious observance of purity, devotion and study
3. Asana – Physical activity
4. Pranayama – Breath control or regulation
5. Pratyahara – Abstraction of the senses
6. Dharana – Concentration
7. Dhyana – Meditation that leads to Samadhi
8. Samadhi – Absorption in the sublime and blissful awareness

Patanjali’s concept was prevailing for some centuries that some Yogis focused entirely on Meditation and ignored the practice of Asanas.

1.4.4 POST-CLASSICAL YOGA

Yogis of the past had not paid much attention to the physical body as they were focused on meditation and contemplation. A few centuries after Patanjali, Yoga took a turn, the new generation of yoga masters beginning to probe the hidden powers of the human body, developing a system where different exercises, in conjunction with deep breathing and meditation, would help to rejuvenate the physical body, prolong life and achieve enlightenment. The human body was regarded as the temple of the immortal soul.

The Post-Classical Yoga period gave a dramatic increase in Yogic literature and brought big changes to Yoga, with the developing of Hatha Yoga and other branches of Yoga. During this time Yoga flourished and nowadays is practiced throughout the world. In contrast to classical Yoga, Post-Classical Yoga is focused
in the appreciation of the present moment and the affirmation of the unity of everything.

1.4.5 MODERN YOGA

Yoga arrived to the West during the late 1800’s. It can be attributed to many gurus, including Swami Vivekananda, a student of Ramakrishna who was commissioned to attend the 1893 Parliament of Religions in Chicago causing deep impression on the Americans. Other important Yoga gurus include Swami Paramahansa Yogananda, Swami Sivananda Radha, Sri Tirumalai Krishnamacharya, Yogi Swami Sivananda, Swami Satchidananda and Maharishi Mahesh Yogi who popularized Transcendental Meditation in the 1960’s. Dalai Lama is a great yogi from Tibet; he was awarded the Nobel Prize for peace and has inspired many westerners to learn more about Buddhism and Yoga.

Yogi Swami Sivananda taught the Five Principles of Yoga which are:

1. Proper Relaxation (Savasana)

2. Proper Exercise (Asanas)

3. Proper Breathing (Pranayama)

4. Proper Diet

5. Positive Thinking and Meditation (Dhyana)

Yoga now has several different schools or styles, all emphasizing the diverse aspects of the practice. Hatha Yoga practitioners learn to recognize reality and use physical resources in order to achieve self-development. Nowadays, Yoga is
the mainly diversified spiritual practice in the planet; it has gained enormously popularity throughout the last few years, and these days over 30 million people follow the Yoga message of peace. Yoga is not a religion. It is a philosophy of life based on certain psychological facts, and its aim is the development of a perfect balance between the body and the mind that permits union with the divine. All the sacred writings of India (the Vedas, the Upanishads, the Puranas and the Tantras) are full of exploits by men and women of all castes, creeds and religions; people from all walks of life that arrived at the highest degree of knowledge through the discipline of yoga-while carrying on their various occupations (Ananda, 2006).

1.5 YOGA AND SPORTS

Yoga postures are the physical positions that coordinate breath with movement and with holding the position to stretch and strengthen different parts of the body. Asana practice is the ideal complement to other forms of exercise, especially running, cycling and strength training, as the postures systematically work all the major muscle groups, including the back, neck, and shoulders, deep abdominal, hip and buttocks muscles and even ankles, feet, wrists and hands.

By their very nature, asanas affect major and minor muscle groups and organs as they simultaneously import strength, increase flexibility and bring nourishment to internal organs. Although most poses are not aerobic in nature, they do in fact send oxygen to the cells in the body by way of conscious deep breathing and sustained stretching and contraction of different muscle groups. Life style affects people’s health, with eating habits and regular physical activity being the two most influential factors (Panagiotakos, 2004).
Whatever sports you choose to practice, yoga can enhance and complement your ability. Most sports build muscular strength and stamina, often in specific areas of the body. Yoga can help to check any imbalance in muscular development and will enable both your body and your mind to function more efficiently. If your body is flexible and supple you will be less prone to sports injuries, as your joints will be kept lubricated. Skiing demands mental alertness as well as good balance. Yoga asanas strengthen your muscles, release physical tension and improve your concentration and poise. Yoga makes your limbs balanced, strong and relaxed. Golfers may be prone to one-sided or uneven muscle development. Yoga asanas can strengthen weak areas and ease muscular tension. The standing poses improve balance and muscle flexibility. Yoga breathing techniques help swimmers to breathe in a relaxed way when exercising. For bicyclists, back bends can relieve any stiffness caused by bending over handlebars. Because a cyclist’s back stays in one position for long periods, the muscles may become tense. This can be remedied with stretches. Gentle stretching exercises also ease stiffness in the legs and shoulders. Yoga asanas will also improve flexibility. Racket sports often involve intense physical effort. Yoga practice can help players to relax and replenish their energy after strenuous games. It also promotes calm, clear thinking, even in situations that call for fast reactions. Asanas for joint mobility can make hips and shoulders more flexible.

1.6 YOGA AND HEALTH

Yoga and Health are closely related. Yoga is a popular aid in improving both physical and mental health. This is basically the most common goal of people who practice Yoga - for health reasons. They want to ease their back pain, find a method
to ease stress, or learn ways to deal with their health problems. This section takes a closer look on how one’s body functions and how Yoga practice can benefit one’s body. Yoga practice is beneficial - whether physically, mentally, or emotionally. Just keep in mind that there are guidelines in doing Yoga Exercises. Make sure that one do not push yourself in doing poses which are beyond one’s limits. Moreover, Yoga is not the sole treatment to many health problems.

Swami Sivananda recognised that every Yogi, or human being for that matter, possesses and identifies with each of these elements: Intellect, heart, body and mind. Although many people think this term refers to union between body and mind or body, mind and spirit, the traditional acceptance is union between the Jivatman and Paramatman that is between one's individual consciousness and the Universal Consciousness. Therefore Yoga refers to a certain state of consciousness as well as to methods that help one reach that goal or state of union with the divine. Yoga is a scientific system of physical and mental practices that originated in India more than three thousand years ago. Its purpose is to help each one of us achieve our highest potential and to experience enduring health and happiness. With yoga, we can extend our healthy, productive years far beyond the accepted norm and, improve the quality of our lives. Health related physical fitness of a person is dependent on both lifestyle related factors such as daily physical activity levels, nutritional habits and genetic factors and is an important indicator of health status (Takken, 2003). Low physical fitness is associated with a high mortality rate, a higher risk of certain forms of cancer, obesity, decreased mental health, diabetes, hypertension and a lower quality of life (Booth, 2002).
Yoga promotes health and well-being through physical exercise. The regular practice of asanas, and breathing exercises (pranayama), makes the body strong, supple and healthy. It has a profound effect on the circulation and on the functioning of the inner organs, glands and nerves, keeping all systems in radiant health and leading to greater energy, better concentration, and a happier, more fulfilling life. Many common physical ailments can also be improved through the regular practice of yoga, and it is never too late or too early in life to take it up. Anyone can practice yoga. Yoga and Health are closely related. Yoga is a popular aid in improving both physical and mental health. This is basically the most common goal of people who practice Yoga - for health reasons. Some of the important Yoga benefits include anti-ageing, balance and flexibility of body, increase in knowledge and wealth, improvement in mental health and development of personal and social values. Yoga also helps in improving strength, sexual life and reducing weight. Yoga makes you feel good. Yoga is relaxing. It's energizing. It's strengthening. Yoga cures different incurable diseases (Ruchita, 2011).

1.7 ASANAS TRAINING

“Sthiram Sugam Asanam”
- Patanjali

The third limb of yoga is asana or posture. Asana brings steadiness, health and lightness of limb. A steady and pleasant posture produces mental equilibrium and prevents fickleness of mind. Asanas are not merely gymnastic exercises. They are postures. Asanas have been evolved over the centuries so as to exercise every
muscle, nerve and gland in the body. They reduce fatigue and soothe the nerves. But their real importance lies in the way they train and discipline the mind (BKS Iyengar, 2008).

It is includes Ancient Theories, explanation and ideas about the mind and body connection that is now being established by modern drug. Extensive research has been performed to look at the health advantages of yoga India- from the yoga asanas, yoga pranayama and meditation. The information on yoga poses and advantages are grouped into three groups physiological, biochemical effects. In addition, scientists have set these outcomes against the advantages of usual exercise (Harshika, 2010).

Asanas are postures or postural patterns. In Hatha yoga there are number of asanas which may be classified into three main groups as follows (Saraswathi, 1973).

(i) Asana used for meditative purpose

There are different variations of sitting on the floor and have vivid names such as Padmasana (Lotus posture), Siddhasana (Accomplished posture), Gomukasana (Cow’s face posture), Vajrasana, etc. The salient features of these asanas are

(a) Broad triangular base.
(b) The buttocks and knees in one horizontal plane.
(c) A balancing condition to the head, neck and trunk.
(d) Slackening of any voluntary effort to maintain a steady and comfortable posture.
(e) An ability to switch over from body awareness to the awareness of one’s breathing (Pranayama) or mental chanting of a mantra (Japa).

(ii) **Asanas used for physical relaxation and release of muscular tension**

Any physical activity or even sitting in a meditational posture for a long duration disturbs the tonic equilibrium between antagonistic muscles. This disturbs the proprioceptive component of awareness. Through relaxation postures such as Savasana and Makrasana one can recognise the tensions and release them by gross movement or subtle adjustments till one develops a uniform proprioceptive awareness of the whole body with lightness and a kind of openness from within outwards. Technically, it is useful for removal of ‘tug of war’ type of conflicts at the level of muscles.

After relaxation of skeletal muscles, one is expected to switch over to experimenting of the breathing movements and to proceed from experiencing of breathing movements and to proceed from experiencing of gross movement experienced in the extremities right up to the tips of the toes and fingers.

(iii) **Cultural or Corrective asana**

These are used for correcting the proprioceptive awareness of the musculoskeletal system and to develop the same for the arousal of ‘Kundalini Shakti’ in a spiritual aspirant. A large number of asanas fall in this group and most of the books devote maximum attention to describe the details of these asanas. They may be defined as under

1. Asanas concerned with the joints of the extremities, e.g. Garudasana
2. Asanas related with the muscles and joints of the vertebral column and the pelvis e.g. Bhujangasana, Salabhasana, Danurasana, Arthamatsyendrasana and Vakrasana

3. Asanas involving body balancing mechanisms e.g. Mayurasana.

4. Asanas working on visceral organs e.g. Pavaanamuktasana

5. Asanas capable of influencing breathing movements in a subtle way. Almost all the asanas do so. (Kuvalayananda, 1933).

The aim of cultural asanas is to produce physiological balance in the different systems working in the human body. So that, it possess the best organic vigor. The other aim is training the spinal cord and the digestive system can work elastic. Asanas like bhujangasana, shalabhasana, dhanurasana, yoga mudra, paschimotanasana and halasana are the best to give efficient exercise to abdominal muscles. Asanas are simple actions for keeping the internal and external body in good health. Asanas give sufficient exercise to the internal organs of the body. Consequently, an individual can maintain good health and longevity of life.

Asana is an ancient form of relaxation and exercise that has many healthy benefits, including lowering cholesterol. We hear of yogis living to a very old age. In his book Autobiography of a Yogi, Yogananda speaks of Trailanga Swami, who was reputed to be over 300 years old, and Shankari Mai Jiew, who was born in 1826, was still alive in 1946. Maharishi Raghuvacharya lived to the age of 115, and Devraha Baba was believed to have lived to over 250 years old. Yogis well known in the west who lived to a very old age include Krishnamacharya (101), Pattabhi Jois (93) and Indra Devi (103). Not only are master yogis long lived, but they also
maintain excellent health e.g. BKS Iyengar is still going strong at 91; he was in better shape at 80 than many people at 40. Krishnamacharya doing full parsvakonasana at 78 years old, and Pattabhi Jois continued to teach yoga until the age of 90 (Desikachar and Cravens, 1998).

### 1.7.1 PHYSIOLOGICAL BENEFITS OF ASANAS

Yogasanas are the physical practices which tone up the internal organs of the body. The body that is visible from outside is only a skeleton conversed by muscle cells which gives it a shape. Until and unless our internal organs are healthy, we cannot be healthy. We see that the heart works for all the 24 hours and does not take rest even for a single moment. The heart can get rest only when the nerves carrying the blood to and from the heart are clean. Even a small obstruction in them can cause a major disorder. Our lungs should also function properly and take maximum air full of oxygen for purifying the blood. Similarly our stomach, liver and other glands should secrete their full quantity of juices for the proper digestion of food. The intestines should also extract the maximum food elements from the food. The formation of juices, blood, muscles, fat, bones and semen should take place according to the needs of the body. Our nervous system should get strength so that all body movements can be performed in a proper way. The impurities should not get accumulated in the body and we should be able to enhance our muscle power.

Medical experts observed that in the absence of regular exercise, a chalk-like impurity gets accumulated in the muscles and other body parts. It contains chemical substances like lime-phosphate and magnesia. For the human body, this impurity is
like poison. As the age of a person increases, the amount of this poison also increases in such proportions that it is able to damage several parts of our body. By the accumulation of this impurity, the veins and arteries contract, the circulation of blood in the brain becomes slower, the memory is affected and doubts, worries, bad temper take hold of us. But, on the other hand, if we exercise regularly, we can get rid of this impurity, thereby enhancing our physical and mental health and increasing our-life span (Pal, 1996).

The physical benefits of yoga are myriad. Yoga keeps one’s body strong, as it involves all the muscles in one’s body to hold and balance yoga asanas (poses). The various yoga postures strengthen one’s feet, legs, hands, abdominals, lower back, legs, and shoulders. Yoga's stretching and breathing exercises improve one’s flexibility, helping joints, tendons, and muscles stay limber. People suffering from osteoarthritis or rheumatoid arthritis will see a noticeable improvement in their stiffness, pain, and other arthritic symptoms by practicing yoga poses and postures.

Yoga improves one’s endurance, especially the more athletic forms of yoga such as ashtanga yoga, power yoga, vinyasa yoga, and Bikram yoga. These rigorous yoga practices follow a specific sequence of poses (asanas) that become more challenging as one progress. Unlike the more gentle hatha yoga, the forms of ashtagna yoga, power yoga, vinyasa yoga, and Bikram yoga require one to keep one’s body in constant motion between poses, resulting in a strenuous cardiovascular workout and improved core strength. Hatha yoga can relieve chronic back and neck pain, since the poses and postures gently stretch and strengthen one’s back and neck muscles. Yoga is often prescribed to help heal various injuries,
including repetitive strain injuries, knee and back injuries, pulled hamstrings, even minor skin burns. Of course, one should consult one’s physician before using yoga as a treatment for any injury! Yoga is an excellent weight-bearing exercise that can improve your bone density. This is particularly beneficial for women approaching menopause, since yoga can help ward off osteoporosis, or thinning of the bone.

There are many known benefits to the regular practice of yoga, which would help to minimize many of the problems associated with ageing. Regular exercise (asana) can help to maintain muscle strength and tone and bone density, joint flexibility, and improve posture, balance and maintain mobility. Combined with pranayama, regular practice can help to maintain circulatory and respiratory health. Yoga has also been shown to be beneficial in the management of stress, anxiety and depression, aiding in the maintenance of mental health. A vegetarian diet can also aid in extending life - it has been shown that vegetarians live longer, have less heart disease and lower rates of cancer (Anon, 2005).

1.7.2 ASANAS AND DEXTERTY

Dexterity is defined as ‘“fine, voluntary movements used to manipulate small objects during a specific task’” and is typically an integral part of a thorough evaluation of the hand. An examination of dexterity provides a unique way of evaluating the neuro motor function of the entire hand because sensation and intrinsic hand strength combine to produce the manipulative skills that facilitate dextrous movements. Dexterity may be further described by two related terms, manual dexterity, which is the ability to handle objects with the hand and fine motor
dexterity, which refers to in-hand manipulations as separate skills from the gross motor grasp and release skills associated with manual dexterity (Backman, 1995).

Sport combines the skill and dexterity of ball sports with the beautiful surroundings of the greens and fairways. Fine motor skills are the coordination of small muscle movements which occur e.g., in the fingers, usually in coordination with the eyes. In application to motor skills of hands (and fingers) the term dexterity is commonly used. When applied to the theory of human aptitude this is called manual dexterity. Handedness (also referred to as chirality or laterality) is an attribute of humans defined by their unequal distribution of fine motor skill between the left and right hands. An individual who is more dexterous with the right hand is called right-handed, and one who is more skilled with the left is said to be left-handed. A minority of people is equally skilled with both hands, and is termed ambidextrous. People who demonstrate awkwardness with both hands are said to be ambilevous or ambisinister. Ambisinistrous motor skills or a low level of dexterity may be the result of a debilitating physical condition. Those who lack fundamental motor skills are likely to experience frustration and difficulty in learning more advanced skills, reducing their enjoyment of sports and other activities.

Fine motor skills can be defined as small muscle movements: those that occur in the finger, in coordination with the eyes. Teaching fine motor skills is similar to teaching other skills because the instructor must always try to be patient and understanding. "Fine Motor Skills" won't develop over-night, but with time and practice. In application to motor skills of hands (and fingers) the term dexterity is commonly used. The abilities which involve the use of hands, develop over time, starting with primitive gestures such as grabbing at objects to more precise activities.
that involve precise hand-eye coordination. Fine motor skills are skills that involve a refined use of the small muscles controlling the hand, fingers, and thumb. The development of these skills allows one to be able to complete tasks such as writing, drawing, and buttoning (CurrClick, 2011).

The tweezer dexterity test is to measure the muscular steadiness, concentration and co-ordination. These needs physical fitness, the highest concentration in a relaxed manner. The concentration, muscular steadiness and co-ordination are easily get through practice of yogasanas. By measuring tweezers dexterity the ability of an individual to manipulate with fingers can be understood.

Sports and games many events in aquatics like rowing canoeing and swimming, the techniques like placement of palms positioning, the fingers tilting of the oars by the fingers. The track and field events such as javelin, discus and hammer events, the role of fingers movement are more important. The fingers allows the implements in a desirable direction. The asanas and yogic practices provide above psycho-motor qualities of an individual. Some of the games which are associated with finger dexterity are chess, card games, gymnastics, archery, fencing, dance, and also the major games such as hockey, volleyball, cricket, tennis, baseball, shooting and weight lifting etc., Hence the finger dexterity is needed for all these games.

Yoga increases the musculoskeletal flexibility and joint range of motion, normalizes the weight, increases the EEG - alpha waves and decreases the pain level, increases the somatic and kinesthetic awareness, boosts breath-holding time, respiratory, cardiovascular efficiency, eye-hand coordination, reaction time, grip strength, dexterity skills, joint range of motion, pose, strength and resiliency,
endurance, energy level, Immunity, steadiness, depth perception enhances the level of balance, sleep, Integrated working of body parts, lessens of respiration, pulse rate, blood pressure, excretory works, EMG activity, normalizes the function of gastrointestinal, endocrine and constant autonomic nervous system equilibrium (Harshika, 2010).

1.7.3 ASANAS ON BODY COMPOSITION AND BMR

Lean tissue is composed of muscle, bone and organs. Fat tissue is composed of three different categories: essential fat, storage fat and non-essential fat. Essential and storage fat are both necessary for the body to function, while non-essential fat serves no real purpose. Body composition is the term used to describe the different components that, when taken together, make up a person's body weight. The human body is composed of a variety of different tissue types including lean tissues (muscle, bone, and organs) that are metabolically active, and fat (adipose) tissue. Yoga is a way of building muscle without the bulk. Yoga uses isometric resistance to help build lean muscle. Isometrics uses the body’s own weight as resistance. This happens when the muscle does not change its length. For example, when you lift a dumbbell you are shortening the muscle, and when you lower the dumbbell you are lengthening the muscle. Isometrics does not move the added weight to make it stronger. This type of training is easier on the muscle.

In physical fitness, body composition is used to describe the percentages of fat, bone and muscle in human bodies. Because muscular tissue takes up less space in our body than fat tissue, our body composition, as well as our weight, determines leanness. Two people at the same height and same body weight may look
completely different from each other because they have a different body composition.

The National Institute of Health recommends that a healthy adult male's body should have between 8 and 17 percent fat and a female should have 10-21%. Levels significantly above these amounts may indicate excess body fat. Athletes, leaner individuals, and more muscular individuals will have a body fat percentage lower than these levels. In general, most athletes experience greater performance benefits at body fat percentages between 7 and 19 percent for men, and 10 and 25 percent for women, depending on the sport. For the physiological system of the body to be fit, they must function well enough to support the specific activity, the individual is performing. Moreover different activities make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurological process, which are specific to the activity (Reuban, 1975).

Systematic performed physical exercise result in a good many changes in the organism. The changes take place on the levels of cellular structures, tissues, organs and body fluid. The changes extend from cellular metabolic processes and their molecular mechanism up to functional capacities of cellular structures as well as organs and their systems. Pronounced alterations have been found in the mechanisms of control of body functions and metabolic processes, including levels of cellular auto regulation, hormonal regulation and neural regulation. Most of the training induced changes express adaptation to the conditions of enhanced muscular activity. Our general understanding of training will significantly improve if we consider that all training effects are based on exercise-induced changes in the organism and each change is specifically dependent on the exercise nature, intensity and duration. Thus,
each training exercise results in specific changes in the organism that is necessary to obtain the goal of training (William et al., 2000).

Obesity and Diabetes are also termed as twin epidemics. Obesity may be defined as the excessively high amount of body fat in relation to lean body mass. This occurs when your calorie intake is greater than the amount of energy you burn. Medical professionals measure how much a person is overweight by figuring his BMI (Body Mass Index). Obesity may be caused by genetic factors, though some psychological, environmental, and some other factors also play a role. Obesity may run in the family or may be caused by lack of activity or a sedentary lifestyle. Some people also eat as a way to cope with some psychological disturbance. Other cases are due to binge eating or the feeling that one cannot control how much he is eating. Illnesses like hypothyroidism, Depression and certain neurological ailments can also lead to overeating. Drugs like steroids may cause a person to gain weight excessively. Both Obesity and Diabetes is highly preventable through proper diet, exercise and lifestyle change. Yoga Lifestyle will be most suitable to facilitate treatment for this twin epidemic. The Yoga principle on Healthy Diet and the practice of the Asanas will help balance the endocrine system, tone the abdominal organs, stimulate both the nervous and Circulatory System, and reduce stress. Yoga also helps one to gain a better understanding of oneself, leading to acceptance and appreciation which will help eliminate the psychological reasons for Obesity. The practice of Yoga deals with all the aspects of an individual: the mind, body and spirit, giving a person control over his mind and body and making the effect is more permanent than other techniques. The lower metabolic rates, decreased sympathetic
nervous system activity and a stable autonomic nervous system response (to different stressors) achieved due to training in yoga (Chaya and Nagendra, 2008).

1.7.4 ASANAS AND BIO-CHEMICAL VARIABLES

Biochemical advantages of yoga: lessens in amount of glucose, sodium, cholesterol, triglycerides, catecholamines, total white blood cell count, boosts the level of cholinesterase, ATPase, hemoglobin, hematocrit, lymphocyte count, vitamin c, thyroxin, total serum protein. Psychological advantages of yoga: increases the mood improves and subjective well-being, self-acceptance and self-actualization, social adjustment, self-actualization, social skills, self-acceptance, well-being, somatic and kinesthetic awareness, improves the concentration, memory, attention, learning efficiency, mood, attention, learning efficiency, symbol coding, depth perception, flicker fusion frequency, decreases the anxiety, depression and hostility (Harshika, 2010).

It may surprise one to know that cholesterol itself isn't bad. In fact, cholesterol is just one of the many substances created and used by our bodies to keep us healthy. Some of the cholesterol we need is produced naturally (and can be affected by your family health history); while some of it comes from the food we eat. There are two types of cholesterol: “good” and “bad.” It’s important to understand the difference, and to know the levels of “good” and “bad” cholesterol in one’s blood. Too much of one type or not enough of another can put one at risk for coronary heart disease, heart attack or stroke. Cholesterol is a waxy substance made naturally in the body. One’s body needs some cholesterol to work properly, and it can make all it needs. Cholesterol may cause problems if one get too much in one’s food. The extra cholesterol can lead to blocked arteries. Our liver also produces
cholesterol, about 1000 milligrams per day, as the same is needed to make vitamin D and some hormones, build cell walls, and create bile salts that help us digest fat. Cholesterol cannot travel alone in the blood. It combines with certain proteins and forms lipoprotein. The two important types of lipoprotein are High Density Lipoproteins (HDL) and Low Density Lipoproteins (LDL). The later category is injurious and causes blood vessels to clog and inhibits blood from flowing freely through the vessels. On the contrary, HDL cholesterol is also known as 'good' as it carries the cholesterol back to liver for re-processing. But unfortunately the percentage of HDL cholesterol is less than the LDL ones, in a ratio of 1:3. Comprehensive studies done on large populations in the past 15 years have proved that reducing cholesterol and keeping the blood pressure under check can significantly reduce coronary artery diseases. There was a time when a total cholesterol level of 240 mg was considered normal. But by 1986 itself, the threshold was fixed at 200 mg. In recent times, though the threshold for total cholesterol has remained at 200 mg, the cut-off point for LDL or bad cholesterol has been lowered to 75 mg (Howard, 2010).

The dynamic series known as surya namaskara (salutation to the sun) is most important for the treatment of obesity. Surya namaskara is a complete practice in itself because it includes asana, pranayama, mantra and meditation. This practice has a unique influence on the endocrine and nervous system, helping to correct metabolic imbalances that cause and perpetuate obesity. Being a dynamic practice, it is also an excellent exercise equated to cycling, jogging or swimming. There are several fairly obvious physical factors in the yogic lifestyle that would influence health and aging, as well as more subtle factors. Calorie restriction (CR) is widely
accepted as the only method so far proven to extend longevity and reduce the physical manifestations of ageing. It has been demonstrated in a wide variety of species, from yeast to monkeys (though not yet in humans), that a calorie restricted diet (lowering the calorie intake by 20-30%, while providing essential nutrients), increases lifespan. CR animals maintained youthful appearances and activity levels longer and showed delays in a range of age-related diseases. CR reduces age associated neuronal loss, prevents age-associated declines in learning, psychomotor and spatial memory tasks and improves the brain's ability for self repair. We can find several parallels between the effects of calorie restriction and the metabolic effects associated with yoga practice (Koubova and Guarente, 2003). Effect of pranayama (voluntary regulated breathing) and yogasana (yoga postures) produced a significant reduction in the levels of serum cholesterol, Low-density lipoprotein (LDL) cholesterol, serum triglycerides, and very-low-density lipoprotein (VLDL)-cholesterol at the end of the yoga session (Acharya et al., 2010).

1.8 PRANAYAMA TRAINING

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“Breath is life, and if you breathe well
You will live long on the earth”

-Sanskrit Proverb
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Breath is the life force that sustains life. Nobody can survive more than a few minutes without air. When the breath stops, life ends. The Forefathers of yoga developed a special system- 'Pranayama' to increase, develop and control this life force. Normal breathing uses only a fraction of our potential respiratory capacity.
Pranayama helps to control this life force in a superior and extra ordinary way to reap maximum benefits.

Basically, yoga depends on eight pillars; one of them is breathing or what is called Pranayama in Sanskrit. Yoga looks at breathing as an art that needs training as yoga teachings emphasize that breathing in the right way is the perfect method to synchronize all the organs of one’s body. “Prana” means life force and “anayama” means control. Pranayama means mastering the life force within. When consciously controlled, it has a powerful vitalizing effect on the body, mind and spirit.

Our lifestyle and unhealthy habits cause restriction in our breathing pattern. Poor posture (hunching, slouching) reduces lung capacity. This results in fatigue caused by the decrease in blood circulation and insufficient supply of oxygen to the blood cells. We need to breathe slowly and deeply. Quick, shallow breathing results in oxygen starvation, which leads to reduced vitality, premature ageing, a poor immune system and fatigue. No one can live for more than a few minutes without breathing, yet how many of us are even aware of the importance of proper breathing? On the physiological level, pranayama was designed by our yogis by watching nature. They noticed how animals, whose breath was slow and steady, like the elephant and tortoise, lived longer. They also noticed that animals that breathed fast and erratically, like hunting lions or dogs, had a short lifespan. Further, they realised mental control could be achieved by reining in the breath as it linked body and mind. One simple illustration: when one exhale after prolonged breath retention, one goes beyond the habit of the mind, the desperation of the body (for a deep breath). One calmly tells one’s mind and body to follow one’s command (Akthar, 2010).
Pranayama also helps to connect the body to its battery, the solar plexus, where tremendous potential energy is stored. When tapped through specific techniques this vital energy, or prana, is released for physical, mental and spiritual rejuvenation. Regular practice removes obstructions, which impede the flow of vital energy. When the cells work in unison, they bring back harmony and health to the system. 20 to 25 minutes (every morning or evening) of pranayama practice increases lung capacity, breathing efficiency, circulation, cardiovascular efficiency, helps to normalize blood pressure, strengthens and tones the nervous system, combats anxiety and depression, improves sleep, digestion and excretory functions, provides massage to the internal organs, stimulates the glands, enhances endocrine functions, normalizes body weight, provides great conditioning for weight loss, improves skin tone and complexion (Sugumar and Raghavan, 2010).

The practice of yoga includes postures (Asanas), breathing methods (Pranayama), chanting, and meditation (Dhyana). As the use of these techniques increases, it is important that possible mechanisms underlying the effects of these practices be elucidated.

Yoga will let one teach one’s lungs to breathe in the right way. Of course we all can breathe, but breathing in the right way means making use of all of our lung capacity, and not just a portion of it. Swimmers appreciate this fact a lot and they try to improve their breathing through front crawl breathing. This type of training not only affects the quantity of air inhaled and exhaled, but also it teaches one’s body to work in harmony, even with what one do spontaneously, like breathing.

Breathing exercises for swimmers are considered a primary part of their training because breathing in a rhythm means more stamina. If one is able to inhale
more air then one can get more oxygen in every breath and breathing in a rhythm will let one swim for a long time before one are winded out. In martial arts the situation is the same, but here the emphasis on the moves and the power is maybe more. That’s why martial arts breathing play an important role at the beginning of every training session just to bring the concentration to the desired level. Breathing is like any other technique: it needs a lot of training over a long period of time before one can master it. With yoga, the best thing is, one can start anytime and anywhere and within a short period of time you will be able to tell difference. This also explains why it is so beneficial for patients of chronic respiratory disorders like asthma.

When participating in any sport, new motor skills and movement combinations are frequently being used and repeated. All sports require some degree of strength, endurance training and skilled reaching, in order to be successful in the required tasks. Evidence has shown that increases in strength occur well before muscle hypertrophy, and decreases in strength due to detraining or ceasing to repeat the exercise over an extended period of time precede muscle atrophy. Specifically, strength training enhances motor neuron excitability and induces synaptogenesis, both of which would help in enhancing communication between the nervous system and the muscles themselves (Adkins and Boychuck, 2006).

1.8.1 PHYSIOLOGICAL BENEFITS OF PRANAYAMA

Years of shallow breathing also take their toll on the lungs and roughly one third of the lungs remain unutilized. By following the deep breathing techniques taught in Pranayama, one can utilize all of the lungs to breathe effectively. This
helps to energize the body as more oxygen is available to parts of the body that were previously deprived of it. When the supply of oxygen to the body is increased, all the various organs and systems work much more efficiently. This helps to increase the metabolic rate. Thus, the body burns fat more efficiently and digestion is also improved. The increase in flow of oxygen and blood also strengthens the immune system.

Just as the word yoga is one of wide import, so also is prana. Prana means breath, respiration, life, vitality, wind, energy or strength. It also connotes the soul as opposed to the body. The word is generally used in the plural to indicate vital breaths. Pranayama we increase the expansion and contraction of our lungs so that they become capable of purifying more and more blood. In other exercises, the lungs breathe quickly, but not deeply. The oxygen, therefore, does not reach their innermost parts. These parts therefore keep on accumulating wastes and impurities and after some time show off as disease. In fact, yogasanas, pranayama and six yogic practices of purification are a panacea for all ills. They have a unique power to throw waste products out of the body. They can therefore be depended upon for physical and mental well-being (Pal, 1996).

1.8.2 PRANAYAMA AND DEXTERITY

Fine motor skills generally refer to the small movements of the hands, wrists, fingers, feet, toes, lips, and tongue. Skillful performance or ability without difficulty; "his quick adeptness was a product of good design"; "one was famous for his facility as an archer". Skill in using one's hands or body; adroitness. Skill in using one’s mind; cleverness. Motor skills are actions that involve the movement of
muscles in the body. They are divided into two groups: gross motor skills, which include the larger movements of arms, legs, feet, or the entire body (crawling, running, and jumping); and fine motor skills, which are smaller actions, such as grasping an object between the thumb and a finger or using the lips and tongue to taste objects. Both types of motor skills usually develop together, because many activities depend on the coordination of gross and fine motor skills. Sports also offer an enjoyable, exciting environment in which to learn how to handle both failure and success. Everyone wins and loses some of the time in both sports and other endeavors. Winning feels great and empowering but can also cause a young person to feel pressure and anxiety in the next attempt to win. Losing usually produces feelings of sadness, depression, and disappointment. Learning how to cope with these different feelings fosters good mental health.

Fine motor skills are often discussed in terms of transitive movements, which are those done when using tools (which could be as simple as a tooth brush or pencil). Transitive movements have representations that become programmed to the premotor cortex, creating motor programs which result in the activation of the motor cortex and therefore the motor movements (Dowell et al., 2009). In a study testing the motor memory of patterned finger movements (a fine motor skill) it was found that retention of certain skills are susceptible to disruption if another task interferes with one’s motor memory. However, such susceptibility can be reduced with time. For example, if a finger pattern is learned, then another is learned six hours later the original pattern will still be remembered, while learning such patterns back to back may cause forgetting of the initial one (Krakauer and Shadmehr, 2006).
Practice of pranayam or breathing exercises and meditation also helps in focusing the mind. Pranayam or rhythmic breathing technique also helps in focusing, as you breathe in and out. Counting of inhalations and exhalations also compels one to concentrate. Deep breathing is basically a technique for relaxation. The Deep breathing process reduces the tension and improves physical wellness and mental wellness and also clears the mind. Sometimes we are not aware that we breathe shallowly when we are very anxious of anything. Shallow type breathing reduces the intake of oxygen and adds even stress to the body and creates a vicious cycle. Breathing exercises can easily break the cycle. Pranayama exercise thus shows a strong tendency to improving the autonomic nervous system through enhanced activation of the parasympathetic system (Pramanik et al., 2009).

When one’s breathing becomes short and shallow one are creating an oxygen deficit. One may feel light headed, dizzy, anxious and nervous as experienced earlier. This lack of oxygen affects reflex time, hand and eye coordination, visual acuity, balance, movement and judgment. As stressors build we sometimes slip out of deep abdominal breathing, which only serves to complicate the situation (Patrica, 2009).

1.8.3 PRANAYAMA ON BODY COMPOSITION AND BMR

The act of breathing causes your metabolic rate to increase and the oxygen you breathe in is needed for proper organ functioning and burning of fat. According to Marcelle Pick and Genevieve Morgan, authors of "The Core Balance Diet: 4 Weeks to Boost Your Metabolism and Lose Weight for Good," taking in deep breaths allows you to derive many of the advantages associated with regular aerobic
exercise. Breathing exercises allow your hypothalamus to trigger the parasympathetic nervous system so that you can become more relaxed. What's more, breathing deeply, while not recommended as any kind of substitute for exercising, is an act that improves cardiovascular capacity, and it enhances the functioning of the lymphatic system as well as your metabolic rate.

One of the causes of Diabetes and other serious medical conditions is Obesity which affects 60% of the American population. Obesity and Diabetes are also termed as twin epidemics. Obesity may be defined as the excessively high amount of body fat in relation to lean body mass. This occurs you're your calorie intake is greater than the amount of energy you burn. Medical professionals measure how much a person is overweight by figuring his BMI or Body Mass Index. Obesity may be caused by genetic factors, though some psychological, environmental, and some other factors also play a role. Obesity may run in the family or may be caused by lack of activity or a sedentary lifestyle. Some people also eat as a way to cope with some psychological disturbance. Other cases are due to binge eating or the feeling that one cannot control how much he is eating. Illnesses like hypothyroidism, Depression and certain neurological ailments can also lead to overeating. Drugs like steroids may cause a person to gain weight excessively.

Add extra oxygen to the body fat, it will inevitably break down into two well known substances: H²O— water, which enters the blood stream, goes through the kidneys and is then excreted via urination, and CO²— carbon dioxide, which is excreted via respiration. Breathing techniques are used by a number of alternative medicine practitioners around the world. It is far more popular in Europe, Australia and New Zealand than in the U.S. Practitioners are also found in Canada and
Mexico. A number of instrumental books has been written promoting special breathing techniques for weight loss. Although there are skeptics, there are also many people around the world who swear by the success they have achieved in losing weight via hypnosis to help with improved breathing techniques. The bottom line is that breathing techniques are certainly worth a try. Use them immediately before a race or training session for the breathing techniques to give you optimal results. Another key point is that you must somehow not only be centered and relaxed, but also determined enough to work at your goal velocity. In a race or high intensity workout setting, that is a true juggling act, because determination often produces increased muscle tension and higher heart rates, not relaxation (Pineault, 2010).

Several studies have shown that certain pranayama exercises do change metabolic rate. In 1993, Vivekananda Kendra Yoga Research Foundation published the Journal of Exercise Physiology revealed that right nostril breathing raised metabolic rate more than left nostril breathing or alternate nostril breathing and an impact on lipid (fat) metabolism in the blood. The way lipids are metabolized in the blood can affect conditions like coronary artery disease. To yogis, practicing controlled breathing is the key to good health. Among other things, by simply controlling one’s breath, one can increase one’s energy, increase awareness and focus and fall into deep relaxation. According to Tony Briggs, in an article in Yoga Journal, it is important to practice pranayama daily. Practicing sporadically may cause more damage than not practicing at all. But by starting slowly, being aware of one’s breath, and practicing regularly, subtle changes may be seen in energy levels, heart rate, mental clarity and metabolism (Hall, 2010). Pranayama functionally
resets the autonomic nervous system through stretch-induced inhibitory signals and
hyper polarization currents propagated through both neural and non-neural tissue
which synchronizes neural elements in the heart, lungs, limbic system and cortex.
During inspiration, stretching of lung tissue produces inhibitory signals by action of
slowly adapting stretch receptors and hyper polarization current by action of
fibroblasts. Both inhibitory impulses and hyper polarization current are known to
synchronize neural elements leading to the modulation of the nervous system and
decreased metabolic activity indicative of the parasympathetic state (Jerath et al.,
2006).

1.8.4 PRANAYAMA AND BIO-CHEMICAL VARIABLES

Iron deficiency is the most prevalent nutritional problem in the world. Two-
thirds of children and women of childbearing age living in most of the developing
countries are estimated to suffer from iron deficiency and one third is prone to
disorders of iron-deficiency-like anemia (Scrimshaw, 1991). Exercise can influence
erthropoietin and red cell survival in a variety of ways. A number of mechanisms
have been proposed that could lead to mild changes in the hemoglobin (Hb) level or
red cell mean corpuscular volume (MCV). In addition, athletes may be at high risk
of developing iron stores depletion (Balaban, 1992). Factors affecting the
hematological profile of athletes include gastrointestinal bleeding, hematuria,
sweating, menstruation and heavy exercise (Chatard et al., 1999).

The mean corpuscular volume (MCV) and the red cell distribution width
(RDW) can be quite helpful in evaluating a lower-than-normal hematocrit, because
it can help the clinician determine whether blood loss is chronic or acute. The MCV
is the size of the red cells and the RDW is a relative measure of the variation in size of the red cell population. A low hematocrit with a low MCV with a high RDW suggests a chronic iron-deficient erythropoiesis, but a normal RDW suggests a blood loss that is more acute, such as a hemorrhage.

Depletion of iron is associated with mineral disorder of training athletes. An insufficient iron balance in male and female athletes (10-20% respectively) has been reported (Balaban et al., 1989) (Magnusson et al., 1984). Iron and iron-binding proteins play a significant function in the physiology of various human systems, including the immune system as well as cellular processes such as DNA synthesis and electron transport. Moreover, it is a vital component of hemoglobin, the oxygen carrying protein in the blood. Thus poor iron status can affect physical performance (Lamanca et al. 1993). Ferritin has been the most frequently used indicator of iron stores in the body. Low ferritin levels evidence decreased or exhausted iron stores while normal ferritin levels do not necessarily reflect adequate iron stores as ferritin concentrations increase in various infection or inflammatory states. Namely ferritin is an acute phase protein and may thus cover actual iron deficiency (Ahluwalia, 1998) (Baynes, 1996). Free radicals play an important role in pathogenesis of tissue damage in many clinical disorders. Practicing pranayama increases the activity of antioxidant enzymes and reduces the lipid peroxidation and heart profile enzymes which prevents cellular damage due to free radicals (Nikam, 2010).

1.9 REASON FOR SELECTING THE STUDY

An active lifestyle which includes regular exercise is reported to promote physical capacity, quality of life and self-esteem, as well as reducing the risk of
certain diseases. In this area, the effects of yoga asanas and pranayama have received particular attention because of its link with a reduced risk of cardiovascular disease. This may be via both a direct independent effect, and via its influence upon other established risk factors. Considering the above facts researcher planned to study the effects of yoga asanas, pranayama and combined practicing for protection of normal health with the help of investigating dexterity, body composition, basalmetabolic rate and biochemical variables.

Asanas and pranayama have positive effect on body composition and biochemical variables. Though, several studies have been conducted on asanas, pranayama on body composition and biochemical variables. No study has been conducted to analyse the influence of asanas, pranayama and combined effect on dexterity, body composition, and biochemical variables in an exhaustive manner in India. In order to findout the influence of combined effect of asanas and pranayama over dexterity, body composition, and bio-chemical variables, the investigator selected this study.

1.10. STATEMENT OF THE PROBLEM

Determining the effect of asanas, pranayama and combination of asanas and pranayama training on selected variables are useful to research objectives and it has drawn the attention of the investigator. The present scientific study is one of such effort to explore the responses of dexterity, body composition and biochemical variables due to the different training methods.
The investigation was conducted to explore the effects of asanas, pranayama and combination of asanas and pranayama training on dexterity, body composition and biochemical variables.

1.11. OBJECTIVES OF THE STUDY

The following objectives were made to fulfill the purpose of the study.

1. To find out the dexterity level of the subjects due to influence of asanas pranayama and combined training.

2. To analyse the changes in body composition such as fat percentage, lean body mass of the subjects through asanas, pranayama and combination of asanas and pranayama training.

3. To assess the influence of asanas, pranayama and combination of asanas and pranayama training over body weight and basal metabolic rate of the subjects.

4. To choose the best combination among asanas, pranayama and to improve dexterity, bodyweight, body composition, basal metabolic rate and bio-chemical status of the subjects.

5. To analyse, whether the asanas, pranayama and combined training are suitable modes to improve dexterity level, body composition, bodyweight, basal metabolic rate and bio-chemical changes of the subjects.

6. To evaluate the changes in biochemical variables such as Low density lipo protein, High density lipo protein and Triglycerides (LDL, HDL and TGL) and hematocrit (HCT) through asanas, pranayama and combined training.
1.12 SIGNIFICANCE OF THE STUDY

The findings of this study will be of significant in the following ways:

1. The findings of the study may add to the existing source of knowledge with regard to the training among male students on dexterity, body composition basal metabolic rate and biochemical variables.

2. The findings of the study will add to the quantum of knowledge in the level of improvement on selected criterion variables.

3. This study may help to know the increase/decrease of the lipoprotein levels among male due to the effect of various training methods.

4. The findings of this study may also help the doctors, athletes, physical education teachers and coaches to know about the influences of training on improvement of selected variables of participants.

5. This study will help the coaches to identify the appropriate methods among the three types namely asanas, pranayama and combined training, to change the selected variables of dexterity, bodyweight, fat percentage, lean body mass, basal metabolic rate, High-density lipoprotein (HDL), Low-density lipoprotein (LDL), Triglycerides (TG), and hematocrit (HCT).

6. This study would create awareness about asanas, pranayama and its combined effect.

7. The contribution of the study would bring healthily fit society in India.
8. The study may help the future research scholars to select the problem related to the study.

1.13. HYPOTHESES

The researcher had gone through various related research studies completed on this area. Based on the available literature, keeping the above logical concepts, the following hypotheses have been formulated.

1. It was hypothesized that there would be a significant improvement in dexterity, body composition and biochemical variables of college men due to the influence of asanas training.

2. It was also hypothesized that the 12 weeks of pranayama training would produce a significant improvement in dexterity, body composition and biochemical variables of college men students.

3. It was also hypothesized that 12 weeks of combination of asanas and pranayama training would improve the dexterity, body composition and biochemical variables of college men.

4. Further, it was hypothesized that asanas, pranayama and the combination of asanas and pranayama training would produce similar changes on dexterity, body composition and biochemical variables of college men.
1.14. DELIMITATIONS

1. The subjects of this study were confined to one hundred and twenty men students studying bachelor degree in law from the Government Law College, Madurai, Tamil Nadu during the year 2010 - 2011.

2. The age of the subjects ranged between 18 and 25 years.

3. The selected subjects were divided into four equal groups namely asanas training (AT), pranayama training (PT), combination of asanas and pranayama training (APT) and control (CG) groups.

4. The duration of the training period was restricted to twelve weeks and the number of sessions per week was confined to six.

5. The asanas, pranayama and combination of asanas and pranayama training were considered as independent variables.

6. The criterion variable selected for this study was confined to the following

   1. Dexterity

   2. Body Composition variables

      i. Body Weight

      ii. Percent Body Fat

      iii. Lean Body Mass

      iv. Basel metabolic rate (BMR)
3. Biochemical variables

   i. High-density lipoprotein (HDL)

   ii. Low-density lipoprotein (LDL)

   iii. Triglycerides (TG) and

   iv. Hematocrit (HCT)

1.15. LIMITATIONS

The following uncontrollable factors associated with the study were considered as limitations of the study.

1. The uncontrollable changes in climatic conditions such as atmospheric temperature, humidity and other meteorological factors during the period of experiment and at the time of pre and post test were considered as limitations.

2. The growth and development of the subjects if any, during the experimentation and possible influence on the criterion variables, which could not be controlled, were considered as limitation.

3. Though the subjects were motivated verbally, no attempt was made to differentiate the motivational level during the period of training and testing.

4. Since, the subjects were non-hostellers, the investigator did not take any effort to control and assess the quality and quantity of food taken by each individual.
5. The quantum of physical exertion, life style and physiological stress and other factors that affect the metabolic functions were also considered as limitations.

6. Previous physical training in sports and games were not taken into consideration.

1.16. DEFINITION OF TECHNICAL TERMS

TRAINING

Organized activity aimed at imparting information and/or instructions to improve the recipient's performance or to help him attain a required level of knowledge or skill (Business dictionary, 2010).

YOGA

The word yoga is derived from the Sanskrit root yuj meaning to bind, join, attach and yoke, to direct and concentrate one’s attention on, to use and apply (Iyenkar, 1996).

ASANAS

The third limb of yoga is asana or posture. Asana brings steadiness health and lightness of limb (Iyenkar, 1996).

PRANAYAMA

Prana means breath, respiration by vitality energy or strength. Ayama means stretch extension, expansion, regulation of breath and its restraint (Iyenkar, 1996).
DEXTERITY

Readiness and grace in physical activity; skill and ease in using the hands; expertness in manual acts; as, dexterity with the chisel. (Business dictionary, 2010).

BODY COMPOSITION

It is the physical makeup of the body including weight, lean weight, and percent fat (Morrow, 2005).

BODY WEIGHT

The weight of a person’s body is based chiefly on height but modified by factors such as gender, age build and degree of muscular development (The American Heritage Dictionary, 2006).

BODY FAT

Total body fat consists of essential fat and storage fat. Essential fat consists of fat present in bone marrow, nerve tissue, and organs. Storage fat represents the energy reserve that accumulates as adipose tissue beneath the skin and visceral depots (McArdle, 2007).

LEAN BODY MASS (LBM)

Lean body mass is defined as the total body weight less the weight of the subcutaneous mass includes all of body tissue such as bone, muscle, nerve, fibre coverings etc. with the exception of stored “depot” fat, the LBW generally remains relatively constant while most body weight changes are brought about by changes in fat content (Shaver, 1981).
BASAL METABOLIC RATE

It is a measure of the minimal amount of energy (kcal) needed to maintain basic and essential physiological (such as heart beat, breathing and cell metabolic activities) process in a relaxed, awake and reclined state (Heyward, 2002).

HIGH-DENSITY LIPO PROTEIN

HDL (high-density lipoprotein) cholesterol, known as "good" cholesterol because elevated levels decrease coronary heart disease risk. HDL transports cholesterol from the cells back to the liver so it can be excreted (Durstine, et al., 2002).

LOW-DENSITY LIPOPROTEIN

Low-density lipoprotein (LDL) cholesterol can deposit cholesterol on artery walls, lowering blood flow, and is considered "bad" cholesterol (Durstine, et al., 2002).

TRIGLYCERIDES

Triglycerides, which are chains of high-energy fatty acids, provide much of the energy needed for cells to function (Durstine, et al., 2002).

HEMATOCRIT

The hematocrit (Ht or HCT) is the proportion of blood volume that is occupied by red blood cells. It is considered an integral part of a person's complete blood count results, along with hemoglobin concentration, white blood cell count, and platelet count (Purves, et al., 2004).