CHAPTER – I

INTRODUCTION

“To be born as human is rare and very rare!
Arithu! Arithu! Manidarai Pirathal Aridhu!”

Tamil Saint and Poet Auvaiyar (1960)

The soul is said to be in the cycle of birth and death and human life is the greatest one among the various kinds of beings in the Universe. In such a supreme life, a human being must know the greatness of his life and the importance of attaining the highest goal in his lifetime. To live with an aim and awareness of truth is the attainment of the noblest bliss. On this earth, many are the ways of the wise and life has many ups and downs. To select the right path and proceed sincerely without any deviation from it, is to be the pattern of every soul.

Swami Satyananda Saraswati (1997), “Yoga is not an ancient myth buried in oblivion. It is the most valuable inheritance of the present. It is the essential need of today and the culture of tomorrow.”

Yoga today is a subject of worldwide interest. This is, indeed, a wholly new and remarkable phenomenon in the long history of Yoga. In the past, Yoga used to have a very limited appeal. Those who understood it were very few and fewer still practiced it. It was a pursuit reserved for the chosen ones. They were usually men of not this world. Their main interest was in the world hereafter. In order to study Yoga one had to renounce the world of achievement, desire and enjoyment.
Yoga is no more regarded as a discipline to be followed only by those who have set ‘emancipation’ as the highest goal of their life. All educated and uneducated people find Yoga to be useful. Renunciation is no longer a precondition to the study of Yoga. Yoga has come out of its secret ‘hiding place’. It has crossed the boundaries of its land of origin, and has spread practically to the nook and corner of the world. The popularity of Yoga has not been hindered by the diversity of religious beliefs, languages or geographic conditions.

1.1 MEANING OF YOGA

Yoga is a system of exercises which helps the mind and body in order to achieve tranquility and spiritual insight. Yoga is comprised of various asanas which mean "to sit" or "to be present". But in the Yoga context it means, "to be established in a particular posture". The term asana can also be described as "the arrangement of the different components of the body in a specific way." Asanas evolved as an integral part of a spiritual practice as Yoga is oriented toward purification, accomplishment, and realization.

While one is on the path to achieve his / her highest spiritual potential, asana practice promotes structural stability, physiological immunity, and emotional health, as it helps to restore and develop balance, stability, strength, flexibility, skeletal alignment, and mechanical freedom.

1.2 CONCEPT OF YOGA

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. In spite of this fact, no field is so miserably misunderstood as Yoga in India. If one takes a cross section of the society and makes a general survey of the public opinion about Yoga, K.Chandrasekaran (1999).

1.3 HISTORY OF YOGA

When we study the ancient Indian tradition we understand that the Yogic principles had been the functions for Indian culture. Yoga is not a religion it is a science that regulates the individual's physiological and psychological behaviors. It follows the principles of science and hence systematic observations and regular practice of the Yogic path are prescribed. Invariably all scholars associate Yoga with spirituality. Through this system, they claim, people can awaken their spirituality. Thus the Yoga history is linked with that of Hinduism.

Yoga in India has a long history. Robert Linssen, the French Oriental Scholar says India through largely emanates from a mixture of two currents. Yoga, established before the Vedic period, and Brahmanism which belongs to the period of the Vedas the Upanishads and the Vedanta. During the Mohenjo Daro excavations in the Indus basin, the John Marshal's expedition discovered intact ceramics about five thousands years old on which were depicted Yogic meditative postures. Yoga thus pre-dates the main Vedic currents of Indian thought which began about 1500 - 1000 BC with the Rig Veda, the Sama Veda and the Yajur Veda, followed by the Atharva Veda about 1000 -800 BC, the Brahmanas about 800-600 BC and the first Upanishads about 800 - 500 BC.
Many consider Yoga as an important factor of Indian Culture. A French Scholar, Professor Masson-Oural has described Yoga as the permanent basis of Indian culture. Hence it has its varieties and diversities as it has its right and discipline. Certainly, the different kinds of Yoga have played a vital role in forming the spirit of modern India.

The great saint Patanjali was called as the Father of Yoga. He is the first man who wrote all the teachings of Yoga in Sanskrit as Yoga sutras. Actually, Patanjali is not the originator of Yoga. Our ancestor’s practiced Yoga before Patanjali’s birth. Only limited information is known about him that many scholars have come up with different views. However, it is generally agreed that the Yoga sutra was written between 300 and 200 BC.

1.4 THE IMPORTANCE OF YOGA TODAY

Today as one prepares to enter the twenty first century, a spiritual heritage is being reclaimed of which Yoga is very much a part, while Yoga’s central theme remains the highest goal of the spiritual path, yogic practices give direct and tangible benefits to everyone regardless of their spiritual aims.

Physical and mental therapy is one of Yoga’s most important achievements. Yoga has succeeded as an alternative form of therapy in diseases and other ailments of a chronic and constitutional nature where modern science has not. Research in to the effects of Yogic practices on HIV is currently underway with promising results. According to medical scientists, Yoga therapy is successful because of the balance created in the nervous
and endocrine system which directly influences all the other systems and organs of the body.

The science of Yoga brings to work on the outermost aspect of the personality, the physical body, which for most people is a practical and familiar starting point. When imbalance is experienced at this level, the organs, muscles and nerves no longer function in harmony, rather they act in opposition to each other. Yoga aims at bringing the different bodily functions in to perfect co-ordination so that they work for the good of the whole body.

Yoga is simply a means of maintaining health and well being in an increasingly stressful society. Relaxations techniques help to maximize the effectiveness of ever-diminishing time-off. In an age of mobile phones and twenty-four hour shopping, yogic practices make great personal and even business sense.

1.5 AIM AND OBJECTIVES OF YOGA

The aim of Yoga is control over the mind. A man who cannot control his mind will find it difficult to attain this divine communion but the self-controlled man can attain it if he tries hard and directs his energy by the right means.

The main aim of Yoga is integrating the body, mind and thoughts so as to work for good ends. In our modern life style means diseases, mostly due to our food habits, daily routines and also due to air and water pollution etc, easily affect the human body. The human mind is just like fire. It could be used to preserve and also destroy. With a matchstick we can light a candle
and illuminate the house. At the same time it can also be used to torch a house. Like that, our mind can also be used for either good or bad purposes. Many poets have compared our minds to monkey. Monkey would not sit at one place. It will jump here and there. Like a monkey, our thoughts will be always wavering, and ultimately the individual’s peace of mind is disturbed.

Though systematic and regular Yogic practices our body may be made healthier and its resistance power to fight against the diseases could be enhanced, mind will get sharpened and the concentration and memory power may be developed. Thus, minds could be canalized for thinking the right good thoughts. Then the good and healthy thoughts will develop in the right direction. Yoga will pave the way for an individual to do any action peacefully and perfectly.

The main objectives of the Yogic practices are to make free from diseases, ignorance, egoism, miseries the afflictions of old age, and fear of death etc.

1.6 EIGHT LIMBS OF YOGA (Ashtanga Yoga)

There are eight limbs of Yoga to secure purity of body, mind and soul. They are:

1. Yama (Universal moral Commandments)
2. Niyama (Self Purification by Discipline)
3. Asanas (Postures)
4. Pranayama (Breathing Control)
5. Pratyahara (Withdrawal of Senses)
6. Dharana (Concentration)
7. Dhyana (Meditation)
8. Samadhi (Universal Spirit)

1.7 GENERAL IMPORTANCE OF YOGA IN PHYSICAL EDUCATION AND SPORTS

The Physiological, bio-chemical, psychological and other benefits of Yoga for Physical Education and Sports.

i) Physiological benefits
ii) Bio-chemical effects
iii) Psychological benefits
iv) Other Benefits of Yoga

i) Physiological Benefits of Yoga

Decreased pulse rate, respiratory rate, blood pressure, reaction time and EMG activity, increased functional ability of all systems of the body, cardiovascular efficiency, respiratory efficiency, breath holding time, vital capacity, intake of oxygen, vision and hearing ability, neuro-muscles coordination and galvanic skin response, pain tolerance, energy level, immunity power and EEG-alpha waves.

ii) Bio-chemical Benefits of Yoga

Decreased glucose levels, sodium levels, total cholesterol, triglycerides, LDL cholesterol and VLDL cholesterol. Increased HDL
cholesterol, haemoglobin, lymphocyte count, total white blood cell count, vitamin C, thyroxin and total serum protein.

iii) Psychological Benefits of Yoga

Increased self-control, self-actualization, wellness, kinesthetic awareness, depth perception, attention, concentration, memory power learning efficiency, cognitive function, psychological stability and social skills. Decrease / Eliminate anxiety, aggression, emotion and depression.

iv) Other Benefits of Yoga

Promote general health, leads to better sleep, prevention of sports injuries, speedy recovery from sports injuries, improvement sports skill, Yoga therapy for players, rehabilitation of the handicapped, promotion of sports, leads to holistic living.

1.8 IMPORTANCE OF YOGIC EXERCISES

Positive changes in the life style of the people can be brought through Yoga. During the period of Education Yoga can make them aware of their bodies and further make them realize the need of emotional and physical well being. Their behavior can also be formed properly, leading to balanced role by bringing the therapeutic effects in Asthma, diabetes, hypertension, respiratory troubles and the like. This has been proved through research work based in scientific and clinical experiments. Some Yoga practices have both preventive as well as curative values. Yoga is the most developed and dedicated approach to personality- pursuit of man and his nature. Yoga therefore should have and integral place in the pattern of our education with
the object of equipping the youth with proper physical, emotional and mental capacity so that he may develop into a well adjusted person for his benefit and well as for the benefit of the society around him.

“Yoga is a way of life which can be practiced by any human being regardless of age, condition of health, religion or nationality for it is based on general physical and spiritual laws which operate on all mankind alike”, Jones MCC Athry (1969).

It is pointed out that does not perceive man as having only a physical body. On the contrary, it lays greater emphasis on the value of the mind and soul, which characterize a man’s personality. It must therefore be remembered that whenever Yoga refers to good health it always includes the mental and moral soundness of a person in addition to physical fitness, Jaydevyogendra (1988).

In the minds of many people in the West, Yoga is associated with strange contortion of the body but the major focus of Yoga is actually on the alteration of one’s awareness and his relationship with the world. It is a complete system of therapy which includes work on developing awareness and control of physical body emotions mind and interpersonal relations, Sawi Rama (1990).

Yoga is a system of attaining perfect physical and mental health. It controls one’s senses, resulting in an integrated personality, free from stress. It stabilizes one’s behavior pattern, develops skill, will power, controls the blood cholesterol and helps one to lead a healthy, happy and balanced life.
Yoga plays an important role bringing the therapeutic effects in disease like asthma, diabetes, blood pressure and the like. Yoga tones up glands, visceral muscles, regulate even the involuntary muscles. It increases the hormonal secretions by which it connects the blood composition.

In short, good health and physical fitness are outcome of yogic practices. Health and physical fitness and emotional stability are the two objectives which bring Yoga and Physical Education on a common platform for the benefit of human beings. Health is a more general and comprehensive term conveying the feeling of well being, while physical fitness is a more specific term. Physical fitness is an organic fitness. It may be defined as the capacity of an individual to perform a given task at a particular time. There are several factors in physical fitness, Mahar (1984).

1.9 BENEFITS OF ASANAS

- The internal organs of the body do not get proper exercise while asanas give sufficient exercises to the internal organs of the body.

- It has a greater impact of the mind and the senses than other physical exercises with the result that asanas help to develop one’s physical and mental powers to calm the mind and control the senses.

- The body becomes flexible and active with an increased ability of doing any activity. One who performs Yoga looks younger in age and lives longer.

- The power of contraction and expansion of lungs is increased by practicing of Pranayamas.
• Yoga stimulates different glands of the body and different blood vessels are purified.

• Yoga makes possible not only physical and mental development but also intellectual and spiritual development.

1.10 PRANAYAMA

Pranayama generally means breath control. Normally we breathe without awareness. It is more a unconscious action. But it is related with mind. Mind and breath are related, inter linked and inter dependent. “When the breath wanders, the mind is unsteady but when the breath is still, so is the mind still”- Hatha Yoga Pradipika. Mind and moods changes the patterns of the breath. By regulating the breath a yogi brings the mind under his total conscious control. Pranayama helps to control mind.

Pranayama is not just breathings alone. It starts with breathing – regulating and controlling to absorb more oxygen in inhaling, and releasing more carbon-di-oxide exhaling thus purifying and charging the blood for the metabolism of each cell in the body.

Pranayama – the word comprises of two roots – Prana – and ayama also prana and yama. Prana – is the fundamental basic, universal cosmic energy – manifested into 5 elements – sky, air, fire water and earth. The prana the vitral life energy created all the living beings Prana survives and sustains them through sunlight, air, water and food. Prana is the vital force permeates and exists in all things whether animate or inanimate. Yama means control; ayama means expansion or extension. So a yogi practices
the pranayama, utilizes breathing influences the prana to flow in the nadis and chakras, the energy channels of the pranamaya kosha – the energy body – the doorway to the evolution of the consciousness.

A yogi uses various rules and methods in his breathing practices to access over the prans – the basic universal cosmic energy, to attain the higher state of spiritual experience. Breathing becomes his means to achieve his higher end.

Pranayama is the science of breathing. With its various skills and techniques, the practitioner gains more benefits to his physical body, mind and emotions, and finally to his spirit.

The practice of asana and pranayama creates more prana, the vital life force energy in the body bringing more vitality, strength, health and well being.

Pranayama starts with proper breathing, the breathing is the most vital process of the body, activates the each and every cell of the body, influences the brain nervous system along with mind, thought and emotions. The vital process breathing is ignored and lack awareness and attention.

Pranayama advocates rhythmic regular normal deep and complete breathing patterns results in health wellbeing positivity and vitality. As food energises the physical body, the breath – provides prana to the energy body, pranamaya kosa.

Retain the emptiness for the allowed timings, is “kevala, bahaya kumbaham – soonyaham”. This completes the one round of yogic breathing.
The entire movement – process should be harmonious and flowing. Completely aware the yogic breathing all the phases are done in show gradual, natural way not forced or strained.

It increases the exchange of air – more oxygen is absorbed and more carbon dioxide is released from the blood. The more oxygenated blood reaches out the cells of the body, energizes vitality and improves their metabolic functions. The brain and nervous system is charged and activated to function well. It has positive effect on the cardiac function supports the heart beat and circulation. Yogic breathing creates an inner massage over stomach, liver, pancreas, spleen and intestines results in improved functions in digestion, assimilation and excretion. All the organs glands and every part of the body are rejuvenated, with the conscious yogic breathings.

It establishes complete control over breathing. Breathing is directly connected with thoughts and emotions, related with each other and one effects the other. The thought and emotion affects the breathing patterns. So the practitioner have access in controlling his thought and emotions by controlling breathing consciously. It calms the mind brings into tranquility, increases the concentration power, useful instiutions of highstress and anger. It can be done with ratios. Sama vriti pranayama is 1:1:1 is the ratio, counts as directed by the masters – Guru. It corrects the natural deep breathing, but should not continue with long duration. Masters guide the disciples with various ratios and counts according to the benefits and also to suit the practitioner.
1.11 NADI SUDDI PRANAYAMA

Bring the awareness of the prana, the life force energy along with breathing. The ration of breathing – inhalation, retention exhalation and emptiness, may suit with the individuals breathing capacity. But done in easy gradual way, use no force. Shift in awareness and attention is more on prana along with the nadis. Close right nostril with right thumb, start exhaling with awareness the Chandra nadi from eyebrow, aware the pranic flow on the left side of the body flowing left – face, neck, hands, chest, stomach left hip, thigh, knees, ankles and left hands and toes. Keep empty retention for a while, start inhaling charging, energizing, the left side of the body toes to eyebrow centre gradually. Keep the inhaled retention for a while, do for 5 to 10 times. Then close the left nostril with the ring, the fourth finger, open the thumb, right nostril. Breathe through the right nostril feel the flow of prana along with the surya nadi energizing right side of the body – do – for 5 to 10 times. Now take off the hands rest over the laps. Now observe breathing, in the spine, inhaling from the tip of the spine to fore head eye, do retention for a while in Ajna charka and exhale from the fore head eye to the tip of the spine. Be there for while in empiness. Feel the flow of prana energizing and charging the central channel, susumna, connecting the mooladhara with the ajna charka. Finally breathe in the ajna charka the centre for all the three major nadies. Visualize, meditate from the Ajna charka the whole body is more energized with health and well being. Mind become focused and set in tranquility. The awareness on the prana – the basic spiritual energy is realized for the first time, used in mediation for spiritual growth.
Many time nadi suddhi pranayama is taught and practiced with breathing alone. But shifting from breathing to prana consciousness the vital life force energy gives more positive results in all the three levels physical, mental and spiritual. The prana, the life force energy is taken through all the three nadies reaching all the organs glands senses and limbs. Energy balance is maintained in physical and mental level result in good health in body and with calm steady focused mind. More carbon-di-oxide is removed from the blood and the blood is charged with more oxygen nourishing each cell of the whole body. The brain hemispheres, cerebrum, cerebellum and its related parts, nerves are stimulated and activated to functions to their optimum capacity. It also includes tranquility, clarity of thought and concentration. It increases the vitality and lowers the level of stress and anxiety by balancing and harmonizing the pranas. It clears the pranic blockages and balances ida – chandra nadi and pingala soorya nadis causing susumna nadi to flow which leads to deep states of meditation and spiritual awakening. Nadi suddhi pranayama shall be practiced before meditation.

It relives the fatigue, tiredness and strain in the body immediately, releases the tension, negativity, fears and phobias, sets the mind focused, helps to concentrate, to decision making and also for reading understanding and memory purpose.

It balances the blood pressure (high and low) problems. It soothes the heart palpitation and giddiness. Regular practice saves from strokes.

The practioner keeps himself in poised calmness. Should not practice in hurry and with worry. People with heart problem should not increase the
duration of antar, bahir kumbakes. People with low/high blood pressure should consult the masters before practice.

1.12 WALKING

Walking is for every one. It is a convenient, in expensive and healthy from of that contributes to one's health and physical fitness. Physiologically, it improves muscle and skeletal strength; keeps blood vessels, hearts, and lungs in good shape; and strengthens log muscle of the body. It is the number one experts activity in the nation and has the support of fitness experts.

Walking can help in weight control since it burns at least four times more colories than sitting or standing. Willam, E. (1980).

Walking is the main form of animal locomotion on land, distinguished from running and crawling. When carried out in shallow waters, it is usually described as wading and when performed over a steeply rising object or an obstacle it becomes scrambling or climbing. The word Walking is derived from the Old English walkan (to roll).

Walking is generally distinguished from running in that only one foot at a time leaves contact with the ground: for humans and other running begins when both feet are off the ground with each step. (This distinction has the status of a formal requirement in competitive Walking events, often resulting in disqualification even at the Olympic level.) For horses and other quadrupedal species, the running gaits may be numerous, and Walking keeps three feet at a time on the ground.
1.12.1 IMPORTANCE OF WALKING

Lenin (1990), one may read how important the simple exercise of Walking is for all individuals. It is particular for today's generation of men as they seem to be in pursuit of a leisurely life as compared to their preceding generations.

Some of the most common and perhaps truly fruitful benefits of Walking include its utility as an excellent form of transport. Walking makes an individual independent of all sorts of hassles and worries such as the rising prices of gas, public bus fares and traffic problems.

Walking not only helps in a better metabolism by leading to a good digestion system but also increases your appetite, thus contributing towards your better health, David, (2001).

Walking can solve one big issue associated with owning and keeping other transport such as a bike or even a car by Walking.

Yet another benefit of Walking for men is the relief one gets such as being stress free, as Walking relieves an individual of most if not all the worries. In addition, the movement of limbs and arms certainly takes most of the pressure off the mind and body altogether which haunts the minds of men at all times.

1.12.2 SOME IMPORTANT HEALTH ASPECTS OF WALKING

- Walking helps keeping weight in check. This is particularly good for men who work long hours and have jobs which involve sitting all day long
• Walking helps in better digestion of food. Thus men who like to eat fried and heavy foods can compensate by Walking regularly

• Walking is a good time to talk and catch up with friends. It not only contributes towards better health of men but also leads to some leisure time

This is aside from the numerous benefits including burning extra calories, feeling happier, feeling energetic and above all the tendency to move about at a faster pace than those who lead an unhealthy life style. Thus, it can be said, that Walking is very important as it can solve many of men’s health problems without costing them much, Turner B (1984).

1.12.3 ADVANTAGES OF WALKING

1. It reduces hypokinetic stress.

2. It can be used as Gamana Vipasyana [Walking meditation] thereby promoting one's own mental health.

3. It preempt waiting for a particular transport such as bus and hence prevents or alleviates the anxiety.

4. It provides sunlight [vitamin D] and thus rectifies or prevents vitamin D deficiency.

5. It stimulates sweating and thus reduces excretory burden on the kidneys.

6. It improves the skin hygiene due the ingredients in the sweat.
7. It improves the complexion of skin due improvement in subcutaneous circulation.

8. It reduces the chances of skin infection due improvement in blood supply to skin.

9. Walking or climbing staircases reduces the chances of infection [which are more in enclosed airtight elevators] and also saves electricity.

10. It [if practiced to reach the working place or for completing errands, then] reduces the number of vehicles on the road and thereby reduces
    - Accidents
    - Pollution
    - Wear and tear of road
    - Consumption of fuel and expenses over it
    - Maintenance of vehicles
    - Traffic congestion and traffic jams.

11. It reduces the anxiety caused often due to increase in fuel consumption or fair of automotive vehicles as one proceeds.

12. Walking connects us to nature and revitalizes us.

13. Walking being harmless and risk free can be practiced by people of any age and any economic stratum.

14. Thus Walking, though a simple and natural aspect of life, is extremely useful and instrumental to the Total Well Being of both, an individual as well as the world.
1.12.4 BIOMECHANICS OF WALKING

Human Walking is accomplished with a strategy called the double pendulum. During forward motion, the leg that leaves the ground swings forward from the hip. This sweep is the first pendulum. Then the leg strikes the ground with the heel and rolls through to the toe in a motion described as an inverted pendulum. The motion of the two legs is coordinated so that one foot or the other is always in contact with the ground. The process of Walking recovers approximately sixty per cent of the energy used due to pendulum dynamics and ground reaction force.

Walking differs from a running gait in a number of ways. The most obvious is that during Walking one leg always stays on the ground while the other is swinging. In running there is typically a ballistic phase where the runner is airborne with both feet in the air (for bipedal).

Another difference concerns the movement of the center of mass of the body. In Walking the body ‘vaults’ over the leg on the ground, raising the center of mass to its highest point as the leg passes the vertical and dropping it to the lowest as the legs are spread apart. Essentially kinetic energy of forward motion is constantly being traded for a rise in potential energy. This is reversed in running where the center of mass is at its lowest as the leg is vertical. This is because the impact of landing from the ballistic phase is adsorbed by bending the leg and consequently storing energy in muscles and tendons. In running there is a conversion between kinetic, potential, and elastic energy, Oliver M (1988).
There is an absolute limit on an individual's speed of Walking (without special techniques such as those employed in speed Walking) due to the velocity at which the center of mass rises or falls - if it's greater than the acceleration due to gravity the person will become airborne as they vault over the leg on the ground. Typically however, animals switch to a run at a lower speed than this due to energy efficiencies.

1.13 PHYSIOLOGICAL VARIABLES

Physiological variables may be defined as the scales that measure the function of human systems.

Physiological variables may be defined as those variables which are linked with the various physiological system and which may be voluntary or involuntary such as pulse rate, blood pressure, respiratory rate and vital capacity.

1.13.1 IMPORTANCE OF PHYSIOLOGICAL VARIABLES

Proper training induces specific and identifiable physiological effects on variables like vital capacity, pulse rate, breath holding time, and blood pressure. A physical fit person tends to have lower pulse rate and blood pressure level after given amount of work than an untrained person. Exercise enhances the body's ability to utilize oxygen which helps to fuel body functions.

1.13.2 PULSE RATE

The number of beats in exactly one minute is the pulse rate and it is one of the components of physiology. The average rate of the pulse in a
healthy adult is 72 beats in each minute. There may be variation up to five beats per minute (rarely more) within the normal range.

1.13.3 IMPORTANCE OF PULSE RATE

A disease free healthy and wholesome life is the concern of all perplex. In this competitive world people are always litigated by stress and strain which later lead to physical and physiological complications, it is a known feel that a regular practice of physical exercise or Yogasana relaxes the mind and considerable brings down the mental streets and physical strain. It has also been established that the pulse rate will decreased the quality of physical condition like. Discussing the formational articling of an individual. Vital observes “How high the heart rate is when the body is at rest how living it climes during various in the sites of exercise and how quickly it reforms to it’s starting rate following different levels of exercise are good indication of gourd heart condition and working capacity.

1.13.4 RESPIRATORY RATE

The second physiological variable chosen for the investigation is respiratory rate. It is the number of breaths taken in a minute or number of inspiration expiration in a minute, Edward L. Fox (1981).

1.13.5 IMPORTANCE OF RESPIRATORY RATE

Basic changes in respiratory function during exercise are increased in ventilation and cardiac output. During mild exercise, rise of Carbon-di-oxide \((CO_2)\) tension in blood stimulates carotid sinus reflex and respiratory centre causing increased pulmonary ventilation, which prevents further rise of \(CO_2\) in
alveoli. A sort of equilibrium is reached between effect of increased CO₂ tension in arterial blood and that of increased respiratory activity in lowering CO₂ tension. Due to the impulses from the higher to respiratory centre, there is increased respiratory rate even before the start of exercise. The increase in rate and amplitude of respiration is proportional to the type of exercise performed.

i) Due to increased respiratory movements, the CO₂ tension in blood falls below normal.

ii) Lack of oxygen causes respiratory increase through stimulation of carotid body.

iii) Liberation of adrenaline also augments pulmonary ventilation.

iv) Pulmonary blood flow increase from 5 to 30 Liters/Minute

v) Oxygen intake and CO₂ output increase from 0.25 Liters/Minute 1 to Liters per minute.

1.13.6 VITAL CAPACITY

The third physiological variable chosen is vital capacity. Vital Capacity is the largest amount of air that can be expired after a maximal aspiratory effort. Vital Capacity is frequently measured clinically as an index of pulmonary function. It gives useful information about the strength of respiratory muscles, William F. Ganong, (1969).
1.13.7 IMPORTANCE OF VITAL CAPACITY

Athletes have higher vital capacity than sedentary workers do. There is a relationship between vital capacity and physical measurements like height, weight, sitting height and body surface area. The normal value has a wide range. Even in healthy subjects of about the same and age physical build, the vital capacity may vary from the mean by about 20 per cent. Vital capacity is reduced by about 5 per cent in the lying position partly because of an increase in the pulmonary blood volume and partly because of an upward shift of the diaphragm. Vital capacity varies with age, sex and physical development. It is higher in males than in females. Vital capacity increases progressively form childhood to adolescence and the highest values are obtained in young adults. It is reduced in old age. The vital capacity is reduced due to many diseases of the respiratory system as well as in cardiac disorders. Low values are observed in pulmonary emphysema, fibrosis, bronchial obstruction, pneumothorax, pleural and pericardial effusion, poliomyelitis and congestive cardiac failure, Sarada Subramanyam (1995).

1.14 BIO-CHEMICAL VARIABLES

Bio-chemical variables chosen for the investigation of this study have been defined as those related to the blood and its biochemical composition.

1.14.1 IMPORTANCE OF BIO-CHEMICAL VARIABLES

Of the several bio-chemical composites such as blood sugar, insulin level (c-peptide) cholesterol, lactic acid, insulin and pyretic acid three of the most important variables, blood sugar, insulin level (c-peptide) and cholesterol
were selected for this study. Brain tissues entirely depend on blood sugar for their energy needs. Diminution blood sugar even for few minutes will lead to death of brain cells.

Likewise, excess cholesterol (LDL) may block arteries which may lead to heart attack and atherosclerosis (Blocking of arteries). Normal amount of cholesterol is essential for RBC and WBC production, biosynthesis of adrenal cortex hormones, transport of fatty acids and enhance the antigen sanctity. Considering the above vital roles played by ten. The cholesterol and blood sugar were selected as biochemical variables for the investigation.

1.14.2 BLOOD SUGAR

Glucose also called dextrose or blood sugar is formed as a natural sugar in food in is produced in the body because of digestion of more complex carbohydrates. Glucose can be used directly by the cells for energy, strod as glycogen in the muscles and liver, or converted to fats for energy storage, William D. Mc Ardle (1986).

Blood glucose is solely derived from liver glycogen via glucose-6-phosphate to maintain blood glucose level within normal limits of 70 to 100 % mgm.

1.14.3 IMPORTANCE OF BLOOD SUGAR

There is prime necessity to maintain blood sugar level constant. The nervous tissue depends for its energy needs exclusively on blood glucose. If blood glucose content suffers a diminution below 50%mg adverse symptoms follow, leading on to even death. It is in this respect that the maintenance of blood sugar assumes paramount importance in the homeostatic mechanisms
of the body. When blood sugar content exceeds 180%mg the glucose is excreted in the urine, Subramaniam, M (1974).

1.14.4 INSULIN LEVEL (C-PEPTIDE)

Insulin is one of the important pancreatic endocrine hormones. It is the first hormone discovered. It was identified by a doctor and a medical student in the late 1920s, namely Doctor Banting and Best. Since it is a hormone, insulin is also a protein.

A group of cells found in the pancreas, called the islet cells are responsible for secreting insulin. More specifically, the type of islet cells that secrete insulin are called the Beta cells. These Beta cells that produce insulin, occupy most of the central area of the islets and account for about 80% if the islets.

High blood glucose is the factor that stimulates insulin secretion. After a meal, carbohydrates (or sugars) travel from the intestine into the bloodstream. The pancreas detects this elevation of sugar in the blood stream and in response, secretes insulin. Insulin then performs its role of increasing the uptake of glucose in the body cells. Most cells of the body have insulin receptors which attach the insulin to the cell surface. When insulin is attached to the cell surface, the cell activates other receptors that absorb glucose from the blood-stream into the cell. The body cells that insulin affects the most are the muscle cells, red blood cells and fat cells. This is the process by which insulin performs its most important role of lowering blood glucose.
The secretion of insulin by the pancreas is always accompanied by a simultaneous secretion of a substance called C-peptide or connecting peptide. Secretion of insulin is quite difficult to measure since insulin has a half-life of only above five minutes. C-peptide, on the other hand, has a half-life of about thirty minutes. The fact that C-peptide secretion accompanies insulin secretion and that C-peptide has a much greater half-life than insulin, means that the measurement to C-peptide secretion gives a precise reading of the level of insulin secretion. Therefore, C-peptide is necessary in determining how much insulin is being secreted by the pancreas, especially in diabetic patients.

1.14.5 IMPORTANCE OF INSULIN

Insulin is a very important and necessary hormone and has many essential functions. Without insulin, the body cells cannot absorb the glucose from the bloodstream properly and the cells will also be unable to make use of the calories obtained from food. A person may develop insulin deficiency (lack of insulin). Such a person is said to have Type 1 diabetes mellitus and needs daily insulin shots in order to lead a normal and healthy life. A more common condition is when a person develops "insulin resistance". Such a person is said to have Type 2 diabetes mellitus. The term "insulin resistance" refers to a condition in which the levels of insulin in the blood are slightly higher than, or within, the normal range, but the body cells respond slowly and inefficiently to this insulin. As a result, the cells do not absorb the sugar molecules as required and blood sugar levels rise.
Besides regulating blood glucose levels by increasing the cell's uptake of glucose, insulin has many other important functions that are necessary for controlling the metabolism of carbohydrates, lipids and proteins, Khaled Abdulla (1977).

1.14.6 CHOLESTEROL

Cholesterol is defined as a fat like chemical compound in animal tissues.

Cholesterol is white, odorless, tasteless nearly ubiquitous fatty alcohol. It is rich in eggs, meat, butter, shell- fish. It is also manufactured in the body primarily in the liver and is essential for life.

Cholesterol is widely distributed in all cells of the body. The concentration of cholesterol human plasma is 150 to 250 mg 100 ml of blood,

1.14.7 IMPORTANCE OF CHOLESTEROL

Cholesterol, fat and obesity are all of co-elated things that yield more heat and energy to the body but at the same time, it is the main substance which develops disease like heart attack, blood pressure and diabetes.

1. Cholesterol is lone of the important constituent in structure of cells, where its amount is practically constant.

2. Leucocytes (WBC) and erythrocytes (RBC) are rich in cholesterol contents. In red cells its concentration on cell membrane helps to detoxify the hemolytic effects of substances. Example: Bacterial toxins, Snake venom etc.
3. Transports of fatty acids in the body mainly takes place as cholesterol esters.

4. Cholesterol increases the antigen sensitivity.

5. Cholesterol serves as precursor of
   
   i. Cholic acid and bile salts formation.
   
   ii. Vitamin D3 formation and ergo sterol; the latter is converted to active vitamin D by ultraviolet rays.
   
   iii. Steroids formation: Cholesterol is converted into pregnenlone and then progesterone. From this are formed adrenal cortex hormones. Androgens and oestrogens.

6. Brain tissue has upto 80% cholesterol white matter being richer in it that grey matter. This cholesterol is presumed to be involved in electrical impulses conduction and insulation mechanisms,

Subramaniam, M (1974)

1.15 PSYCHOLOGICAL VARIABLES

The word psychology comes from the Greek word “Psyche” meaning mind or soul and “logous” means science. Therefore, from these Greek words it can be seen that Psychology is the science of mind and soul.

Psychology studies human nature scientifically rather than formulate conditions. Psychology as a behavioural science has made its contribution in this regard. It has helped coaches to coach more efficiently and athletes to perform more proficiently, Charles A. Bucher (1987).
1.15.1 IMPORTANCE OF PSYCHOLOGY

Sports Psychology within a short span of time has taken giant strides in the field of competitive sports. Training of an athlete is incomplete without psychological training often competitor, Robert (1975) states that “sports psychology explores one’s behavior in Athletics”. Sports psychology means applying psychological theories and concepts to aspects of sports such as coaching and teaching. The sports psychologist uses psychological assessment, techniques and achieves their optimal performance.

While sports Psychology is concerned with analyzing human behavior in various types of performances. Psychology as a behavioural science has made its contribution for improving sports performance. This psychological aspect of sports in gaining much attention among sports administrators. The importance of utilizing psychological approaches in attempting to understand physical performance has been stated by world famous psychologist.

1.15.2 ANXIETY

Anxiety is one of the psychological factors. Anxiety differs form ground in that if encompasses booty some degree of activation and an unpleasant emotional state. Thus the term anxiety is used to describe the combination. The direction of characteristic of anxiety is negative in that it describes subjective feelings that are unpleasant, Anne Marie Bird (1986)
1.15.3 IMPORTANCE OF ANXIETY

A moderate level of anxiety seems best for the acquisition and performances of motor skills levels of anxiety either too high or to low tend to inhibit learning and performance, Jack H.Lewellyn (1982).

1.15.4 STRESS

Selye first used the word stress borrowed from physics to describe the result of some kind of traumatic imingent on the organism even or trauma affecting the organ son and the word “STRAIN” denotes what happens to the organism to individable.

1.15.5 IMPORTANCE OF STRESS

Stress referred to peoples reactions to situation in which they feel threatened pressured frustrated, anxious or in conflict pleasant and unpleasant situations can be stressful

Bernard has categorized the stress into “DYS STRESS” an unpleasant damaging and paniful type which is always destructivte; “EVS STRESS” is that type which is pleasant and often associated with excitement and fun

1.15.6 SELF CONCEPT

Self-concept is relatively stale and more or less a conscious phenomenon, emotionally experienced a as a unique system of the individual’s ideas about himself, based on which he interacts with other people and develops an attitude towards himself. Self-concept is an integral image of one’s self, albeit not devoid of inner contradiction. It is an attitude
towards him involving the cognitive aspect which is the individual’s image of his own qualities, abilities, appearance and social significance.

1.15.7 IMPORTANCE OF SELF CONCEPT

Our psychological make up is influenced tremendously by our physical structure. All the aspects of behavior like needs, impulses, emotions, habits, memories, traits and temperament, attitudes and values are now thought to be the expression of the self. The concept of the self is now used to understand the way in which personality and its various aspects are organized. It would seem to be of interest to coaches and physical educators to determine whether individuals who participate in specific aspects of sports have self-concepts, which distinguish from other, Alderman, R.B. (1974).

1.16 DIABETES

Diabetes mellitus is a condition in which the pancreas no longer produces enough insulin or when cells stop responding to the insulin that is produced, so that glucose in the blood cannot be absorbed into the cells of the body. Symptoms include frequent urination, lethargy, excessive thirst, and hunger. The treatment includes changes in diet, oral medications, and in some cases, daily injections of insulin.

Diabetes is a wasting disease in which the mechanism of strong glucose in the body is hindered. Glucose is derived from the food we eat, especially from the carbohydrates in the food, as an end product of the process of digestion. Liver stores glucose in the form of glycogen. Glucose is the most important energy giving substance. The blood glucose level is 80 to
100 mg. Per 100 ml of blood. After a heavy meal containing great quantities of carbohydrate, it may rise to 150 mg per cent.

Insulin influences carbohydrate metabolism in two ways: it helps to convert glucose into glycogen in the liver and tissues and it increases the entry of glucose from the blood into the cells and tissues, resulting in a reduction of the glucose level in the blood. In a normal adult the pancreas secretes about 50 units of insulin every day. Extremely high carbohydrate diets continued over a long time may be a cause of such exertion of the beta cells. In most cases diabetes is caused by hereditary factors which make the insulin producing cells over sensitive to stimulation.

The excess of glucose in the blood is filtered in the kidneys and passed out through urine. There is frequent and excessive urination which gives raise to constant thirst, one feels hungry all the time but in spite of eating much, there is a loss of weight and even a little exertion causes fatigue. Although there is so much of energy-rich glucose in the blood, the diabetic is actually starving. One characteristic symptom of diabetes which usually leads to its detection, is very slow healing of wounds. The process of hardening of arteries is hastened by diabetes which may lead to damage of the kidneys, heat or the brain. The retina of the eye may be affected causing blindness in severe cases.

Diabetes is caused by an insufficiency of the antidiuretic hormone which is an important factor in the conservation of water in the body. This hormone is produced in the posterior pituitary gland and the hypothalamus. When diseases or tumors destroy hormone-producing cells, adequate
amounts of the hormone are not secreted, which results in loss of large amounts of water by diuresis.

Diabetes mellitus is far more common. It may be of the severe type or the milder type. The severe type, called juvenile diabetes is caused by a virtual absence of circulating insulin and responds only to insulin therapy. The milder type is observed in the case of middle-aged people especially among the obese.

1.16.1 TYPES OF DIABETES

This type of diabetes, also known as insulin-dependent diabetes mellitus (IDDM) is an autoimmune disease. That means the body's immune system turns inexplicably against its own cells, destroying them as if they were foreign invaders.

The destruction of the insulin-producing beta cells begins when the T-lymphocytes of the immune system fail to recognize the beta cells as friendly and turn against them. Other immune system cells, the B-lymphocytes, are recruited and the destruction proceeds. One by-product of this destruction is the formation of auto antibodies which are directed against specific components of the pancreatic beta cells. Auto antibodies that are frequently found in people with type 1 diabetes variously target the islet cells, insulin, and other beta cell proteins such as glutamic acid decarboxylase (GAD) and tyrosine phosphatase. The presence of these antibodies signals the ongoing destruction of the beta cells; they usually appear years before you notice any symptoms or are diagnosed with diabetes.
Eventually, total destruction of the beta cells leaves the body unable to produce insulin and metabolize nutrients properly. As a result, blood sugar levels rise and cells starve, even though they are bathed by glucose-rich blood. A person with type 1 diabetes must have daily insulin injections to survive.

Type 1 diabetes is sometimes referred to as juvenile diabetes because it usually develops in children and adolescents, most often around puberty. It’s the most common serious chronic disorder in children and adolescents. Type 1 can also develop in adulthood, although this is uncommon.

Type 1 diabetes is an inherited disease, so people with a family history of it are at greatest risk. For instance, if you have an identical twin with type 1, you have a 50% chance of getting it as well. If you have a sibling with the disorder, your risk of developing it is 5%–10%; that’s 10 times the rate of someone without a diabetic sibling. White people of northern European heritage are more prone to type 1 than members of other racial and ethnic groups.

A combination of abnormalities is responsible for Type 2 diabetes. The first is probably insulin resistance, a condition in which body cells become less responsive to insulin. Therefore, the body must secrete more insulin to maintain normal metabolism. Insulin resistance which is very common, doesn't cause type 2 diabetes by itself. The pancreas usually rallies to compensate for the resistance by pumping out more insulin. For most people with insulin resistance, blood sugar levels stay within a normal range. But for
some, the insulin-producing cells eventually fail to keep up with the increased demand. Blood sugar levels rise, resulting in type 2 diabetes.

Essentially, type 2 diabetes is a problem of supply and demand. The pancreas supplies too little insulin to keep up with the increased demand that occurs with insulin resistance. For this reason, people with type 2 diabetes can be treated with therapies that decrease insulin demand, including diet, exercise, and drugs; with medications that increase insulin supply, such as sulfonylureas or meglitinides; or with insulin itself, Emila Ripoll-Bunn (2003).

1.17 OBJECTIVES OF THE STUDY

On the basis of the present topic, the following objectives have been framed.

1. To find out whether there is any significant difference in the Pulse Rate, Respiratory Rate, Vital Capacity, Blood Sugar, Insulin Level (C-Peptide), Cholesterol, Anxiety, Stress and Self Concept due to the effect of Yoga and Walking.

2. To find out whether there is any significant difference in the Pulse Rate among different experimental group.

3. To find out whether there is any significant difference in the Respiratory Rate among different experimental group.

4. To find out whether there is any significant difference in the Vital Capacity among different experimental group.

5. To find out whether there is any significant difference in the Level of Blood Sugar among different experimental group.
6. To find out whether there is any significant difference in the Insulin Level (C-peptide) among different experimental group.

7. To find out whether there is any significant difference in the Level of Cholesterol among different experimental group.

8. To find out whether there is any significant difference in the Level of Anxiety among different experimental group.

9. To find out whether there is any significant difference in the Stress Level among different experimental group.

10. To find out whether there is any significant difference in the Level of Self Concept among different experimental group.

11. To find out which experimental group shows significant improvement among the four different experimental groups.

1.18 STATEMENT OF THE PROBLEM

The purpose of this study was to find-out the effect of Yoga and Walking on the selected physiological, Bio-chemical and psychological variables of diabetic patients.

1.19 SIGNIFICANCE OF THE PROBLEM

1. The study would help the people to improve health and to promote preventive health care and their personal well being.

2. The study will generate adequate information base that will add to the quantum of knowledge in the areas of Yoga education and may be of great use to Yoga therapist and Physical Education scientists,
Physiologists, Psychologists and biochemists to organize Yoga and Walking programme and cater to the needs of the diabetic patients.

3. The study would throw more light on the effect of the Yoga and Walking on the selected physiological, psychological and bio-chemical variables. If it proved beneficial, it could be advocated not only to diabetic patients but also to patients with other diseases.

1.20 HYPOTHESIS

In order to analyse effect of Yoga and Walking on the selected Physiological, Bio-chemical and Psychological variables of diabetic patients, the following hypothesis were framed.

It was hypothesized that there would be significant improvement on the influences of Yoga and Walking on diabetic patients.

1. There would be significant differences on the influences of Yoga and Walking on diabetic patients.

2. There would be significant differences on the influences of Walking on diabetic patients.

3. There would be significant differences on the influences of Yoga on diabetic patients.

4. There would be significant differences on the influences of Yoga on diabetic patients better than Walking.

1.21 DELIMITATIONS

1. The study was limited only to men.

2. The samples were diabetic patients only.
3. Age of the samples were between thirty five and forty five years.

4. The study was limited to the people residing in Vellore District.

5. The study was restricted to the following dependent and independent variables.

A. Dependent variables

• Physiological variables
  1. Pulse rate
  2. Respiratory rate
  3. Vital capacity

• Bio-chemical variables
  1. Blood sugar
  2. Insulin level (c-peptide)
  3. Cholesterol

• Psychological variables
  1. Anxiety
  2. Stress
  3. Self concept

B. Independent variables

  1. Walking training
  2. Yoga training

1.22 LIMITATIONS

This research study was limited in the following respect which need to be taken into consideration while interpreting results.
1. Certain factors like habits, life style, daily routine, diet and others which may have an effect on the results of the study were not taken into consideration.

2. No attempt has been made to control the factors like air resistance, intensity of light, atmosphere and temperature during training and testing period.

3. No special motivational technique was used during testing. Therefore the difference that occurred in performance due to lack of motivation was recognized as a limitation of the study.

4. The differences in economic and educational background of subjects that affected their performance were not taken into consideration.

5. Physical maturity which might have taken place during the study period was not taken into consideration.

1.23 DEFINITION OF THE TERMS

The following terms, pertinent to the study are defined for clarity and clarification and to avoid possible difficulty and confusion in understanding them.

1.23.1 YOGA

“Yoga is a timeless pragmatic science evolved over thousands of years with the physical, moral, mental and spiritual well being of man as a whole”, Lyengar, K.S. (1986)
The word “Yoga” comes from the Sanskrit word Yuj which means “to join” or “to yoke”, Swami Satyananda Saraswati (1997)

1.23.2 YOGIC PRACTICES

Yoga is the inhabitation of the modification of the mind. This means that it prevents the contents of the mind from taking different toms, Ananda (1981).

1.23.3 ASANAS

Asanas are not movements but postures to be developed and held most are relaxing rather than demanding effort, refreshing rather than fatiguing. They are noncompetitive they require no special equipment of clothing they can be performed by men and women and persons in all age groups, James Hewitt (1985)

1.23.4 PRANAYAMA

Pranayama generally means breath control. Normally we breath without awareness. It is more a unconscious action. But it is related with mind. Mind and breath are related, inter linked and inter dependent.

1.23.5 WALKING

Walking is generally distinguished from running in that only one foot at a time leaves contact with the ground: for humans and other bipeds running begins when both feet are off the ground with each step.

"Walking is a capacity of the biological organism but it is also a human creation and it can be elaborated to include the `goose-step', the `march', and
`about-turn'. Walking is rule-following behaviour, but we can know a particular person by his walk or by the absence of a walk, Beardshaw V (1988).

1.23.6 PULES RATE

The number of beats in exactly one minute.

1.23.7 RESPIRATORY RATE

The number of respiratory movements performed in one-minute account for the respiratory rate of the individual, Edward L. Fox (1981).

1.23.8 VITAL CAPACITY

According to William F. Ganong (1969) Vital capacity is the maximal volume of air that can be forcefully exhaled from the lungs following a maximum inspiration.

1.23.9 BLOOD SUGAR

Glucose also called dextrose or blood sugar, is formed as a natural sugar in food or is produced in the body as a result of digestion of more complicated carbohydrates. Glucose can be used directly by the cells for energy, stored as glycogen in the muscles and liver, or converted to fats for energy storage, Willam D. (1986).

1.23.10 INSULIN LEVEL (C-PEPTIDE)

Insulin is a hormone produced by the beta cells of the pancreas that permits glucose to enter cells and helps the body use glucose for energy. Insulin controls the amount of glucose in the blood.
1.23.11 CHOLESTEROL

The term Cholesterol is derived from the Greek work “Chole” meaning bile and “Stereos” meaning solid. Highly purified cholesterol is a white powder at room temperature. Cholesterol is a member of the class of lipids called steroids, which are derivatives of the tetra cyclic hydrocarbon per hydro-cyclopentaphen, Geoffrey Zebay (1984).

1.23.12 ANXIETY

Anxiety is a complete emotional state characterized by a general fear or foreboding usually accompanied by tension. It is related to apprehension and fear (often explained) and is frequently associated with failure either real or anticipated. If often has to do with interpersonal relation social situation and feeling of rejection and insecurity are usually a part of anxiety, Revbem B (1971).

1.23.13 STRESS

The process by which the individual responds to temromental and psychological event that are perceived as threatening or challenging.

Stress referred to people’s reactions to situation in which they feel threatened, pressured, frustrated anxious or in conflict. Pleasant and unpleasant situation can be stressful.

1.23.14 SELF CONCEPT

Encyclopedia of psychology defines self concept as “the totality of attitudes, judgments and values of an individual relating to his behaviour,
abilities and qualities. Self concept embraces the awareness of these variables, and their evaluation, Robert L. Ebel (1969).

1.23.15 QUESTIONNAIRES

It may be defined as a list of planned written questions that one related to a particular topic or series of topic, Joul B.Henton (1976)

1.23.16 DIABETES

Diabetics have an inability to bring glucose from the blood to the cells. This abnormality is due to either a decrease in the production of insulin by the pancreas or an insensitivity of the cells to respond to the insulin present, Emilia Ripoll-Bunn (2003).