CHAPTER I

INTRODUCTION

Those who think they have not time for bodily excercise will sooner or later have to find time for illness.

-Edward Stanly (1873)

The body is the temple of Soul and to reach a harmony of the mind, body and spirit, the body must be physically fit (Charles A. Bucher). The human body is built for physical activity and movement. Throughout the ages, man has had to be physically active in order to procure his daily food to succeed in the battle for survival. Every individual physical activity is essential for harmonious physical and mental development.

In today's society, with computers, televisions and cars most people do not provide their bodies with sufficient physical exercise to maintain adequate health. In fact, many people have become so sedantary, that their life style has become a serious threat to their health and their lack of physical exercise has begun to lead to an increased deterioration rate of the human body and often to a premature illness a death.

Many technological advances are intended to alienate physical exertion from every day activities. The automobile and television are the contributors to our sedentary life style.
It is universally recognized that Physical Education is one of the most important factors in promoting health and longevity. Physical Education and Sports increase the scope of human abilities and enrich the life of the individual and that of the society as a whole. Sports and physical activities are an essential part of the human resource development.

The primary aim of Physical Education is not simply to develop star athletes, winning team or expert performance, but a natural vitality with character values and physical fitness.

Physical Education is potentially a powerful force in the present day society to develop total fitness.

Sports has now become an integral part of life for large sectors of the population. Sports is an important ingredient of Physical Education and is a worldwide phenomenon today.

Life is characterized by movement and it is imperative that all parts of the body should be exercised daily. Predominance of the scientific evidence indicates that exercise stimulates the process of growth and development.

Physical inactivity is considerably more dangerous than physical activity. Individuals who are not physically active and who do not exercise their muscles show decrease bone mineral content (or) low calcium in the skeleton, which may develop into osteoporosis. This condition
increases the risk of fractures. Inactivity reduces the strength in muscles, joints, tendons and ligaments. Inactive people are more likely to gain weight become obese and develop impaired cardiac function. Moreover inactive people have a poorer tolerance of physical and mental stress and are less able to cope with illness and injury. Inactivity accelerates the process of ageing.

Exercise plays a major role in improving the quality and most likely the longevity of our lives. Most people who exercise regularly will agree that one of the main reasons for their exercise is that it makes them feel good, and help them to attain or maintain good health and physical fitness. The effect of regular physical activity significantly improves health, physical fitness and work capacity and enables people to use their leisure time more beneficially and thereby assists in adding life to years and also years to lives.

FITNESS

Fit people make a fit nation. Fitness is that State which characterises the degree to which a person is able to function more efficiently. Fitness is an individual matter. It implies the ability of each person to live most effectively within his potentialities (Hockey Ed., 1985).

Fitness is that state which characterizes the degree to which a person is able to function efficiently. To lead a happy and successful life, people have to develop physical fitness, because it is necessary for the proper functioning of the body and the system. While fitness is
important and functional according to the activity or the game that one undertakes, health becomes a basic necessity to every human being to live best and serve best.

**PHYSICAL FITNESS**

Physical Fitness is “the capacity of the heart, blood vessels, lungs and muscles to function at optimal efficiency” (Bud Getchell, 1965).

Physical fitness makes one feel mentally sharper, physically more comfortable and more in tune with body and later able to cope with the demands of every day life. (Gordon, 1988).

Physical fitness is a prime requisite to lead the optimum life and to live most and serve best. A sound mind and a sound body are men’s most precious possession (Gene Hook, 1958).

Physical fitness as defined by the World Health Organizations is "the ability to perform muscular work satisfactorily".

The purpose of physical fitness is to create a consciousness and enthusiasm amongst the people and to stimulate their interest for physical welfare, which will in turn help them to lead a more healthy living. The physical fitness is also expected to assess factors such as speed, strength, endurance and agility which makes a person physically efficient (Robert V. Hockey, 1993)
A physically fit person will have the efficient body movement or neuromuscular co-ordination as it is often called and is also bestowed with the ability to perform a given task with a high degree of proficiency.

The term fitness includes physical fitness, physiological fitness, mental fitness, cardiovascular fitness, social and spiritual fitness. Physically fit people are able to withstand fatigue for longer periods and are better equipped to tolerate physical stress.

Many researchers strongly support the view that regular exercise helps to keep a strong and healthy heart and prevents cardiovascular diseases. A physically fit heart beats at a lower rate and pumps more blood per beat at rest. As a result of regular exercise, an individual’s capacity to use oxygen is increased substantially. To develop and maintain physical fitness, vigorous effort by the individual is required. Cardio-respiratory endurance, strength, muscular endurance, flexibility, power and agility are the basic compounds of physical fitness. Physical fitness is considered as one of the most valuable assets and it has received a high priority in all thoughts and actions. Modern coaches denote their time in coaching during pre season mainly for ensuring endurance, strength and flexibility. These are improved by training.

Powell (1972) explains that fitness is not an end, it is the beginning. A person must get fit to perform and will not necessarily get fit by performing. Fitness is not a matter of physical capacity alone. To develop and maintain a person's physical fitness, vigorous effort by the individual
is required. Body fitness and weight control greatly reduce cardiovascular diseases. This results from (a) maintenance of moderately lower blood pressure, (b) reduced blood cholesterol and (c) low density lipoprotein along with increased high-density lipoprotein. As pointed out earlier, these changes all work together to reduce the number of heart attacks and brain strokes.

Therefore it is the responsibility of every country to promote physical fitness for its citizens, because physical fitness is the basic requirement for most of the tasks to be undertaken by an individual in his/her daily life.

To develop certain physical fitness and physiological fitness several methods of training are used namely circuit training, weight training, fartlek training, yoga training, aerobic training, etc.

From the above, it is inferred that Yoga and Aerobic exercises are very much needed to maintain a general level of physical fitness, particularly as it enhances the physical stamina and the cardio respiratory endurance.

Accordingly the investigator makes an attempt to study the effect of Yoga and Aerobic training on the influence of physical, physiological, hematological and bio-chemical variables on young women subjects.
YOGASANA

Yoga is the “Union of the individual self with the universal self” (Iyengar, 2001).

Yoga means the union or communication or unity with our inner being. ‘Asana’ means a state of being in which we can remain steady, calm, quiet and comfortable with our physical body and mind.

MEANING OF YOGASANA

The word Yoga is derived from the Sanskrit root “yug’ meaning “to unite” or “union” or “to combine” or “to join” development of the personality of a human being physical, mental, moral, intellectual and spiritual. Yoga is a science by which the individual approaches the truth of disease and of age.

Yoga advocates unselfishness and cosmic love. Yoga advocates purity and self-restraint. Yoga also provides cheerfulness, powerful tonic for the mind, manliness, mannerliness with the capacity for interception and self analysis.

Asanas are an integral part of yoga. Yoga uses the body to exercise and controls the mind so that at a later stage the body and the mind together may harmonize with the soul. The yogasanas affect and penetrate every single cell and tissue making them come to life.
PHYSIOLOGICAL VIEWS OF YOGASANAS

Yoga helps to tone up the entire body to regularize blood compositions and improve blood circulations, tones up glands and visceral muscles.

Robson states that “Yoga develops flexibility and vital capacity”.

Regular practice of yoga helps to keep our body fit, controls cholesterol level, reduces weight, normalizes blood pressure and improves heart performance.

Further, preliminary studies in the United States and India suggest that yoga may be helpful for specific conditions, such as Asthma, Epilepsy, anxiety, stress and others.

Regular exercise results in an increase in the blood flow and improves oxygen carrying and waste removal capacity and further increases work load capacity (Frank Vitale, 1973).

Exercise increases the volume of haemoglobin and erythrocyte of the blood. Also blood vessels are seen to maintain elasticity and suppleness when stressed systematically probably by the beneficial effect of the heart.
BENEFITS OF YOGA

Today, the focus is more on Yoga’s practical benefits. There is a definite difference between yoga and stretching and normal exercise. Yoga teaches the concept of focusing awareness while performing specific postures.

The benefits of yoga are numerous, including improved physical fitness, stress control, general well-being, mental clarity and greater self-understanding. The poses enhance muscle strength, coordination, flexibility and agility and can help a back feel better.

According to the Natural Institutes of Health, when people actively seek to reduce the stress in their lives by quieting the mind, the body often works to heal itself. In this sense, yoga can be seen not only as a way to get into shape on several levels, but also as a tool for self-healing.

As for athletes, yoga can be a powerful enhancement in regular training exercises. Adding yoga in a routine training programme helps develop strength, flexibility, range of motion, concentration, cardiovascular health and reduces stress, tension and tightness. The most significant benefit of adding yoga to a training programme is its effect on performance. Yoga allows an athlete to train harder and at a higher level because the range of motion is greater and the fear of injury is lessened.
RECENT DEVELOPMENT IN YOGA

Nowadays yoga is becoming more and more popular. It attracts the attention of the whole world. Thousands of people both men and women who are aware of the importance of personal growing has adopted yoga as a part of their life. Gradually, yoga is becoming a life style, almost a fashion of the modern world. People adopt yoga as a tool to keep the body and mind fit, to cure diseases by improving functions of the vital organs of the body. Yoga and yogic practices awaken the inner strength of the body. The health of our body and mind depends upon the soundness of the health of internal organs.

Yoga is universal and benefits people of all ages. Yogic research has proven its efficiency in effectively maintaining and for bringing about the psycho physiological equilibrium and emotional stability and so far as the functional development is concerned, the yogic system is perhaps the best.

In good olden days, the citizen of Rome had recognized that regular exercise and temperature would ensure 'positive' life-style.

New researches help people to understand Yoga in its modern aspects. Yoga in general, meditation and pranayama in particular, have provided means to reach the sublier layers of the mind. It has been shown through experimental results on the pranayama and meditation that knowledge and creativity are structured in the sublier layer of the mind or the deeper state of consciousness (transcendental state). These
creative and critical faculties of mind lay hidden in these higher state of consciousness (transcendental state).

AEROBIC EXERCISES

Aerobics refers to a “variety of exercises that stimulate heart and lung activity for a time period sufficiently long to produce beneficial changes in the body”.

MEANING OF AEROBICS

"Aerobics" basically means living or working with oxygen. Aerobics or endurance exercises are those in which large muscle groups are used in rhythmic repetitive fashion for prolonged periods of time.

Aerobics refers to a variety of exercises that stimulates heart and lungs activity for a time period sufficiently long to produce beneficial changes in the body. Running, swimming, cycling and jogging are typical aerobic exercises.

AEROBICS IS AN EXCELLENT FITNESS ACTIVITY

Aerobic exercise means the exercise where all body parts/muscles are supplied with enough oxygen with the increased heart rate.

Aerobic exercises include brisk walking, jogging, swimming, cross-country skiing, hopping, skipping. By doing aerobics, the whole body is used and major muscle groups including legs, trunk and arms get involved.
In aerobic exercise the heart rate increases substantially, but never reaches its maximum level. The heart is always able to deliver sufficient oxygen-rich blood to muscles so that they can derive energy from fat and glycogen aerobically. Aerobic exercises builds stamina for sports and it also is the most important form of exercise for health, since it increases the efficiency of heart, circulation and muscles. Aerobic exercise is the keystone of fitness by doing aerobics it increases the capillary network in the body.

BENEFITS OF AEROBICS

Aerobics is a good way to decrease our percentage of body fat and to attain the other metabolic benefits of fitness. Aerobics is also a very good way to develop musculo skeletal fitness while building strength, flexibility, and co-ordination.

Aerobics is a progressive physical conditioning programme that stimulates cardio respiratory activity for a time period sufficiently long to produce beneficial changes in the body. To do any work we need energy and even while at rest some physiological functions have to be carried within our body and for that purpose some calories of energy will be burnt. As the intensity and duration of work increases the demand for the fuel in the working muscles also increases. The organs which supply the needful should cope with the demand.

Aerobics, and calisthenics are performed to the rhythmic pulse of disco music and strength together in what amounts to a modern
dance form, so as to make the exercise more enjoyable and encouraging without extra effort.

By doing exercise, the whole system of our body carries oxygen-rich air enters through the organs and tissues of the muscles has been called "the aerobic system" and for this reason training the system for stamina is called aerobic training.

Mitchell and Daka (1980) Aerobics refers to a variety of activities like walking, jogging and running for a measured time. This is sufficient for a short distance runner and yet in short time helps to produce beneficial changes in the body, especially in the action of the lungs, heart and blood circulation.

Training to improve aerobic endurance capacity involves four basic elements. Mode, intensity, duration and frequency of exercise. A training program which does not contain all four to an adequate degree is not likely to be effective.

A typical aerobic exercise work out consists of 8 to 10 minutes of stretching, calisthenics and low intensity exercise. This is followed by 15 to 45 minutes of either high or low impact aerobic dancing according to the target training intensity. The heart rate should be monitored at least 6 times during the exercise to ensure that the heart rate, stays within the target zone. The 10 minutes cool down period usually includes more stretching and calisthenic type exercises (Hayward, 1989).
Improved cardio respiratory endurance is often one of the most important benefits of aerobic training programs.

An aerobic exercise work out is divided into four phases: warm up, skill review, aerobic and cool down. Each phase has its own purposes, without which the work out is incomplete. Each phase of the program is necessary if aerobic dance is to provide the desired benefits.

According to Bucher (1983) aerobic exercise is any physical activity that requires the heart rate to reach at least 60% of the maximal heart rate for an extended period of time. Also it is an activity that can be sustained for an extended period of time without developing an oxygen deficit.

The main objections of an aerobic exercise program is to increase the maximum amount of oxygen that the body can process within a given time. This is called “Aerobic capacity”. It is dependent upon an ability to (1) rapidly breathe a large amount of air, (2) forcefully deliver large volumes of blood and (3) effectively deliver oxygen to all parts of the body. In short, it depends upon efficient lungs, a powerful heart, and a good vascular system. Because it reflects the conditions of these vital organs, the aerobics capacity is the best index of overall physical fitness.

The Aerobic dance is a good way to decrease percentage of body fat and to attain the other metabolic benefits of fitness.
According to Payne and Halus (1986) aerobic fitness helps to (1) complete the daily activities with enjoyment, (2) strengthen the heart muscles and make it more efficient, (3) increase the proposition of high density lipoproteins, (4) increase the capillary network in the body (5) improved collateral circulation (6) control the weight, (7) cope stress, (8) improve the efficiency of the body system (9) achieve self directed fitness goals (10) reduce negative dependency behaviours, (11) sleep better, (12) recover more quickly from common illness.

**PHYSIOLOGICAL CHANGES ON AEROBICS**

Can be seen in the increased number and size of mitochondria, increased muscle glycogen, reduction in triglycerides, increased activity of enzymes of involved in fatty acid activation, transport and oxidation.

There is normally an increase in the number of red blood cells, but not in the concentration of haemoglobin in the blood. Some of the benefits of aerobic exercises include the productivity of less lactic acid and greater endurance. Physiologists have found that it reduces blood pressure and change blood chemistry. It also improves the efficiency of the heart.

**RECENT DEVELOPMENTS IN AEROBICS**

Aerobics boasts millions of followers in numerous countries throughout the world. It is well accepted that aerobics confers health and fitness benefits upon those who practice it regularly.
Millions of people who eagerly enroll in aerobic classes, swim or jog regularly and participate in a multitude of other activities such as already determined and that these activities are not only fun but they contribute to their mental, physical and social development.

**YOGA AND AEROBIC EXERCISES**

Physical exercises are repetitive movements whereas yoga exercises involve very little movement and only postures maintained for a period of time. Physical exercises lay emphasis on strong movements of muscles whereas yoga oppose violent movements.

Yogic postures tone up the body and the mind whereas physical exercise affect mainly the body. The caloric requirement in yogic asanas varies from 0.8 to 3 calories per minute while the caloric requirements of a physical exercise varies from 3 to 20 calories per minute. The main purpose of physical exercise is to increase the circulation of the blood and the intake of oxygen. This can be done by Yoga's simple movements of the spine and various joints of the body with deep breathing, but without violent movements of the muscle. By doing yoga exercises of the twist movements and asanas, the various blood vessels are pulled and stretched and blood is equally distributed to every part of the body. The stretched muscles and ligaments during yoga practices are immediately relaxed and they carry more energy to the muscle fibre. So more energy flows into the relaxed muscles. Fatigue appears after doing physical exercises. Fatigue disappears if yoga and pranayama is practiced.
Tension increases and nerves are more tightened through physical exercise. Nerves, and body muscles are relaxed by Yoga.

Yogic exercise aims at both prevention and treatment of various diseases. Breathing exercise aims at both prevention and treatment of various diseases. Breathing exercises like pranayama including Kapalabhati is very effective for keeping the lungs healthy and prevent lung infections. With deep breathing air circulates to every part of the lungs whereas with most other physical exercises, there is mainly an increase in the respiratory rate. However, Physical exercise wastes more energy due to quick movements and more lactic acids are formed in the muscle fibres. But energy is not wasted in yoga practices. Yoga postures and breathing exercises unlike physical exercises do not strain the cardiovascular system, and they improve one's physical fitness and endurance.

**IMPORTANCE OF DEPENDENT VARIABLES**

One of the AAHPERD youth fitness test variables is shoulder strength. It depends largely on the energy liberation process in the muscle strength. All movements in sports are caused by muscle contractions and therefore strength is a part and parcel of all motor abilities, technical skills and tactical actions. Strength and strength training, therefore assume high importance for achieving good performance in all sports.

Physical strength determines one's abilities, capacities and potentialities that an individual does exhibit. There are a number of
physical exercises and activities which develop arm strength to a great extent.

The shoulder strength can be determined by the individuals performance in the flexed arm hang for women.

Another important variable of AAHPERD youth fitness test is abdominal strength. The abdominal strength helps to maintain the body posture thereby involving in many activities in the field of sports and games. A sit up is basically an exercise for the lower back but it also brings the abdominal muscles into action.

Power is another variable of AAHPERD youth fitness test. Performance in "standing broad jump" reveals the explosive power of an individual.

Explosive power is the ability to release maximum muscular force in the shortest test as in executing a standing broad jump by explosive power is most important field events that is standing broad jump, running broad jump and high jump.

Another variable of AAHPERD youth fitness test is speed. The fastest man can be determined by his performance in a 50 yards dash. Speed is a conditional ability. Speed is an important ingredient in many sports.

Muscular Exercise and certain emotional states cause a temporary increase in the number of red cells as a result of an outpouring
of concentrated blood from spleen. This may be looked upon as an emergency measure and like that which occurs at high attitudes, is the response of the body to the tissues call for oxygen.

The major function of the red blood cells, also known as erythrocytes, is to transport haemoglobin which in turn carries oxygen from the lungs to the tissues.

In a normal man, the average number of red blood cells per cubic millimeter is 5,200,000 (+ 3,00,000) and in normal women 4,700,000 (+ 300,000).

The total mass of red blood cells in the circulatory system is regulated within narrow limits, so that an adequate number of red cells is always available to provide sufficient tissue oxygenation and yet so that the cells do not become so concentrated that they impede blood flow.

Tissue oxygenation is the basic regulator of Red blood cell production. Any condition, that causes the quantity of oxygen transported to the tissues to decrease ordinarily increase the rate of red blood cell production. When a person, becomes extremely anemic as a result of hemorrhage or another condition, the bone marrow immediately begins to produce large quantities of red blood cells. At very high attitudes, where the quantity of oxygen in the air is greatly decreased insufficient oxygen is transported to the tissues and red cell production is considerably increased. It is not the concentration of red blood cells in the blood that controls the rate of red cell production but the functional ability of the
cells to transport oxygen to the tissues in relation to the tissue demand for oxygen.

Haemoglobin is a coloured pigment. It is present in the blood and binds with the red blood cells. It gives red colour to the blood. It is very important in carrying oxygen to various tissues for energy production.

Blood contains plasma and formed elements which form about forty five per cent of the blood. When the blood was centrifuged the total volume of formed elements that has been packed in a tube is called packed cell volume.

Heart Rate (HR) is one of the simplest and most informative of the cardiovascular parameters. Measuring it involves simply taking the subject’s pulse, usually at the radial or carotid site. Heart rate reflects the amount of work the heart must do to meet the increased demands of the body when engaged in activity. To understand this, we must compare the heart rate at rest and during exercise.

Resting heart rate averages 60 to 80 beats/min. In middle-aged, unconditioned, sedentary individuals, the resting rate can exceed 100 beats/min. In highly conditioned, endurance trained athletes, resting rates is in the range of 28 to 40 beats/min have been reported. Your resting heart rate typically decreases with age. It is important to understand that, a relatively slow heart rate, coupled with a relatively large stroke volume, signifies an efficient circulatory system. During exercise the heart rates of the athletes increased at a lesser rate and to a lower level.
Hence it is possible for the athlete to do more work and achieve a high oxygen consumption before reaching the maximal heart rate.

Cholesterol is an odourless, tasteless, white fatty alcohol found in all cell membranes and is vital to cell survival and growth. Cholesterol is also a key precursor or intermediate compound in the production of numerous biologically important substances collectively called as steroids.

Cholesterol is present in certain foods mainly though not exclusively in fatty foods. If cholesterol rich food is limited from the diet, it will lower the cholesterol content of the blood only by about 15% which however makes all the differences between the healthy functioning of the system and the development of life threatening disorders. High cholesterol levels in blood almost lead to narrowing of the arteries as a result of the formation of large deposits of atheroma in the arteries.

Cholesterol has been linked statistically with atherosclerosis (the building of fatty deposits in arteries) whether this buildups eventual clog of the arteries and cause heart diseases may depend upon the type and quantity of the lipoproteins in an individual’s blood stream. Lipoproteins are molecules of fat and protein that serve as a two day delivery system of cholesterol.

Low density lipoprotein cholesterol (LDL-C) digests cholesterol from the liver and distributes it throughout the body. High density lipoprotein cholesterol (HDL-C) gathers excess cholesterol and
returns it to the liver for excretion. Studies indicate that high level of cholesterol and LDL-C lead to heart diseases, but high level of HDL-C prevents harmful cholesterol buildups and offer a measure of protection from heart disease.

Like every other fatty substance, cholesterol is insoluble in plasma unless combined with carrier molecules, the lipo proteins. There are four classes lipoproteins namely, a) chylomicrons carry absorbed dietary fat chiefly triglycerides, b) very low density lipoprotein (VLDL) that carry mainly triglycerides produced within the body, c) low density, lipoproteins (LDL) carry about 175-80% of cholesterol in blood plasma, d) high density lipoproteins (HDL) that carry mainly phospholipids and the remaining 20-25% of blood cholesterol.

Increased physical activity induces a number of positive changes in the metabolism of lipoproteins. Serum triglycerides are lowered by the increased lipolytic activity and the production of native high density lipoprotein is increased. The increased lecithin cholesterol acetyltransferase activity leads to an increased production of HDL, which in addition is catabolised more slowly due to a decreased activity of hepatic lipase.

The effects have been demonstrated in cross sectional studies as well as longitudinal studies and induced by training independent of changes in body weight. It has been shown that small dense LDL particles present a particular risk for atherosclerosis, and there is strong evidence that the claim that LDL level and composition can be influenced favourably by physical activity.
One of the biological mechanisms underlying the preventive effects of physical exercise seems to be the beneficial modification of plasma lipoprotein concentration in particular, the reduction of atherogenic lipoproteins (LDL, VLDL) and the increase of protective lipoprotein (HDL). The exact process by which exercise affects cholesterol levels has not yet been determined. However, factors resulting from endurance training viz. body weight loss and changes in body composition, plasma volume and hormone and enzyme activities alter the rates of synthesis, transport and clearance of lipids and synthesis, transport and clearance of lipids and lipoproteins from the blood. Exercise also influences triglyceride synthesis, lipoprotein lipase (LPL) activity, lecithin cholesterol acetyltransferase (LACT) ratio and cholesterol ester transfer protein (CETP) regulation, resulting in enhanced cholesterol transport. The average exercising subjects were found to have a reduction in total cholesterol, triglycerides and LDL cholesterol and an increase in HDL cholesterol and it has been proved that mild intensity exercise training is capable of reducing serum TG levels.

Lipids and sterols circulate as a part of macromolecular complexes known as lipoproteins. These are the means by which insoluble lipids are able to circulate in an aqueous medium. Lipoproteins consist of various combination of cholesterol, triglycerides and phospholipids which are specifically known as apoproteins. Lipoproteins are divided by their ultra centrifugal properties into chylomicrons, very low density lipoproteins (VLDL), low density lipo proteins (LDL) and high density
lipoproteins (HDL). Lipoproteins are the organic compounds formed from lipids and proteins that transport fat and cholesterol through the bloodstream and lymph.

LDL-C is a specific kind of lipoprotein that is the form in which cholesterol is transported in the blood. HDL-C is a group of proteins found in the blood plasma and lymph that are combined with lipids. They transport cholesterol from the tissue to the liver to be broken down and excreted. VLDL-C is a specific kind of lipoprotein when found in excess in the blood is thought to increase in risk of atherosclerosis by carrying cholesterol to the tissue.

Triglyceride is a cluster of three fatty acids and glycerol, which are the main components of animal and plant lipids. They are the most concentrated source of usable energy in the human body and are stored as subcutaneous fat deposits where they contribute to insulation.

Blood plasma contains about nine percent of solids of which seven percent are protein in nature. All the proteins serve to maintain the osmotic pressure of the blood and it gives viscosity to the blood and this helps to maintain the blood pressure. The proteins in the blood aid in the regulation of acid base balance of the blood by acting as primary buffers. It is also necessary for blood coagulation, and also serves as antibodies against antigen in the immune system.
STATEMENT OF THE PROBLEM

The purpose of the study was to investigate the effect of Yoga and Aerobic Training on Physical, Physiological, Haematological and Bio-chemical variables of women students.

HYPOTHESIS

1. There would be a significant improvement as a result of Yoga and Aerobics training on Physical, Physiological, Haematological and Bio-chemical variables when compared to the control group.

2. There would not be a significant differences in the changes in Physical, Physiological, Haematological and Bio-chemical variables between Yoga and Aerobic training groups.

SIGNIFICANCE OF THE STUDY

1. The study will assist many to avoid medicines to make themselves fit but to make use of one’s own physique to feel healthy.

2. The findings of the study may help the individuals to compare and contrast the changes that occur in selected physical, physiological haematological and biochemical variables before and after the training programmes.

3. The study as such will create significant health awareness among people, especially among the women.

4. The study will promote research and growth in applying choreography in the field of Aerobics and Yoga training.
5. The study will serve as reference to researchers and statisticians to explore new areas in the field of physical fitness.

DELIMITATIONS

1. The study was confined to forty five women students of Madras Veterinary College, Chennai-7, Tamil Nadu in the age group ranging from 19 to 23 years.
2. The selected training methods were Yoga and Aerobics exercises.
3. The experimental period was limited to 12 weeks.
4. The study was restricted to physical variables of Shoulder strength, Abdominal strength, Speed and Explosive power.
5. The study was also limited to physiological variables of breath holding time, Pulse Rate and Blood Pressure.
6. The study was limited to haematological variables of Red blood cells, Haemoglobin and Packed Cell Volume.
7. The selected biochemical variables were Total Cholesterol, High Density Lipoprotein Cholesterol, Triglycerides, Low Density Lipoprotein Cholesterol and Total protein.

LIMITATIONS

The following aspects could be considered as limitations of this study and may be taken into consideration in interpreting the results.

1. Atmosphere, climatic conditions and percentage of humidity could not be controlled during the training period.
2. Activated other than the training schedule of the subjects were not fully controlled.

3. Though the total work of these two training programmes was equated, the intensity of the load which varies from individual to individual was not taken into consideration.

DEFINITIONS OF TERMS

Yoga

The word ‘Yoga’ is derived from the Sanskrit root ‘yug’ which means ‘to join’ or ‘to yoke’ the related meaning is to focus attention or ‘to use’.

‘Asanas’ one of Yoga’s most significant ‘tools’ helps in the positioning of the body in various postures with the total involvement of the mind and self in order to establish communication between our external and internal selves (Iyengar, 2001).

Aerobic Exercise

This exercise is designed to produce a sustained increase in heart rate and whose energy cost can be met by the body from aerobic sources i.e. from increased oxygen consumption (Yadav and Rachna, 1998).
Strength

Strength is the force that a muscle or muscle group can exert against resistance in one maximal effort (Gothi, 1993).

Speed

Speed has been defined as "the capacity of the individual to perform successive movements of the same pattern at the fastest rate". It is operationally defined as the time measured to the nearest one hundredth of a second and is expressed in seconds and milliseconds (Johnson and Stalberg, 1975).

Explosive Power

Explosive power is defined as "the capacity of the individual to release maximum force in the shortest period of time (Hardayal Singh, 1991).

Breath Holding Time

Breath Holding Time is defined as the duration of time through which one can hold his breath without inhaling or exhaling after a deep inhalation.

Pulse Rate

Pulse rate or heart rate is the rate of beats of the heart per minute (Morehouse and Miller, 1976).
**Blood Pressure**

Blood pressure is the lateral pressure exerted by the blood on the vessel walls flowing throwing it (Chatterjee, 1980).

**Red Blood Corpuscles**

Blood is a tissue consisting of different types of cells - the red blood cells (RBC), the white blood cells (WBC) and the platelets that are suspended in a liquid medium called plasma. It circulates in a closed system of blood vessels. The red colour of blood is due to haemoglobin present in the red blood cells.

**Haemoglobin**

Haemoglobin is a complex protein present in the blood cell which gives the red colour to the blood. Haemoglobin is a complex protein rich in Iron. The amount of haemoglobin in normal blood is about 15 gm/100 ml blood and this ammunition is called “100 per cent” Anything over 90% is considered as normal (Evelyn c. Pearce, 1985).

**Packed Cell Volume**

The total volume of blood cells packed in a tube by centrifugal force is called Packed Cell Volume (Benjamin, 1976).

**Cholesterol**

Cholesterol is the fatty substance formed in the blood.
Cholesterol is a white fatty alcohol of steroid group, found in body tissue, blood and bile, assists in synthesis of Vitamin D and various hormones. Excessive deposits of cholesterol inside arteries are associated with arteriosclerosis and coronary heart disease.

High Density Lipoprotein Cholesterol

High Density Lipoproteins comprise the smallest portion of lipoproteins and the largest quantity of protein. These High Density Lipoproteins may be associated with a lower risk of heart disease.

Triglycerides

Triglycerides are the most common lipids. These fats do not circulate freely in the blood but are carried on a protein called lipoprotein.

Low Density Lipoprotein Cholesterol

Low density lipoprotein is the major cholesterol carrying lipoprotein. Elevated LDL levels herald a strong predisposition to coronary heart disease, stroke and peripheral vascular disease.

Total Protein

Proteins are the crucial components of muscles and other systems for converting chemical energy into mechanical energy. Proteins are polymers of amino acids and have molecular weights ranging from 10,000 to more than one million.