CHAPTER I

THE INTRODUCTION

1.0 INTRODUCTION

Physical fitness is one of the richest possessions. It cannot be purchased but it can be earned through routine physical exercise. Fitness is determined by how we can do an activity in a day i.e., to work, sit, walk, think, eat and sleep etc. Fitness helps us to enjoy life. Physical fitness includes speed, flexibility, rhythm, power, strength, co-ordination and many more. One of the important components of the physical fitness is athletics skill. The various aspects of physical fitness and the skills are inter-related.

Physical fitness has been compared to pre-historic time that ours is a Paradise on the earth for never has mankind known such as evolutionary explosion. It has been accomplished and perfected things beyond the wildest dream of our ancestors. The industrialists are there to interpret even the slightest whim into a reality by introducing the number of gets gad, and appliances aimed at making our lives even more comfortable and full of ease. Living in luxury but considering the anonymous multitude passing throughout teeming streets their unsmiling dejected, anxious faces with their shoulders hunched, chests constricted, stomachs bulging feel us miserable.

The effort of mankind is a story beyond description. The eternal struggle to seek pills that send them to sleep, medicine to help evacuate their lazy
bowels and eases their aching heads with aspirin and swallow tranquillizers to make their lives more bearable in a painful scenario in the drama of ill health. Diseases of degeneracy such as cancer, diabetes and coronary thrombosis are on the increase. The place of biological degeneration is accelerating to an alarming degree. Advancement in medicine continues daily but medicine alone is ineffective. It might have accumulated a fond of knowledge which rightly commands our admiration and gives us a cause for pride. However medicine with all their trains of incredible side effects engenders in man a false sense of security. No knowledgeable and devoted doctor can ensure for us anything but a precautionous balance of health between this and next illness. A civilization which results in the degeneration of species and its members without granting them some semblance of contentment and happiness may be regarded as having failed. The miraculous solution rests with the individuals. Instead of blaming darkness, one can light a lamp and dispel the smoke of ignorance. Instead of accusing the ill health of a nation or a community, one can take remedial measures and start promoting individual health for, “if you wish to change the world, first change yourself”.

Thus, the civilized man can rediscover his jest for life if he is health conscious. Health is really a blessing that money cannot buy. We need not take giant leaps but a small step in uplifting health and slowly, very slowly, as small drops of water making an ocean, we may get many links in the human chain. Not only has that health, of the people acted as the foundation upon with all their happiness and powers as a state depend. And to have good health which
makes life worth, one should have the best physique. In other words, a sound body makes a sound mind. The soundness of the body refers to its state of fitness which is not just strength, endurance of fat content but a blend of all three. Having understood this fundamental truth one should not allow the opportunity for health and happiness slip from our hands H H Clarke and D H Clarke.(1987)

We, the Indians are very much concerned with the performance and status of the athletes at deferent levels. But, the performance is final out-put and the status includes various other aspects in addition to the performance. In the world of sports, every participating individual and spectator generally, eye to the positioned athletes and they become the lime-light in the field of sports. He as a selector at various levels generally considered the performance in the trial and qualifying competitions, whereas, the physical fitness and physiological basis at most of the time is the ignored variable.

Exercise plays a vital role in the physical fitness. Exercise makes one conscious and fit. It is one of the purposeful physical activity. Exercises are helpful to maintain and organically sound body. To enjoy an optimum state of health and physical fitness, exercise is quite inevitable. Exercise refers to physical activity ranging light to fairly vigorous nature. Regular exercise produce increased strength, endurance and other characteristics associated with good health. Physical fitness is not an end in itself but it is a means to an end.
1.1. FITNESS

To some, fitness could mean a slim waist line. To others, it could be the ability to run up eighteen flights of stairs and to some more it might mean a general feeling of well-being. Thus fitness is highly individualistic. Each person has a different combination of factors that makes up his physical fitness. It is a thing which one cannot afford to neglect. It is a major factor that determines the output of a person’s life. Life will be miserable and unsuccessful without good health. The life without physical fitness, is like “a ship without radar.” ‘One who is physically fit enjoys robot health and has a fine physique and satisfactory levels of social and emotional adjustment’. Fitness represents the capacity to live most vigorously and effectively with one’s own resources. Jack H. Wilmore and David L. Costill. (1988)

1.2. INTERVAL TRAINING

Interval training, a form of endurance training, has existed for a number of years in one form or the other. With interval training, short to moderate periods of work are alternated with short to moderate physiological principles. Researchers have demonstrated that athletes can perform a considerably greater volume of work by breaking the total work into short, intense bouts with rest or reduced activity, intervals interspersed between consecutive work bouts. The intervals of work and rest are usually equal and can vary from several seconds to five minutes or more.

It includes the terms set, repetition, training time, training distance and frequency in addition to the work interval and the rest, recovery or relief interval.
Interval method is perhaps the most versatile method for improving endurance of various types. In interval method the exercise is done at relatively higher intensity with interval of incomplete recovery. Interval method is based on the following principle; work should be done with sufficient speed and duration, so that the heart rate goes up to 180 beats / minute. After this there should be recovery period and when the heart rate comes down to 120 – 130 beats / minute the work should be started again. Therefore the training load in interval method can be controlled by repeatedly checking the heart rate. The effect of interval method is determined by the variables of interval method such as speed of work, duration of work, duration of recovery, number of repetitions and nature of recovery. By proper manipulation of the above mentioned variables, the interval method can be used in several ways, each having a different physiological and training effect. However from general point of view, interval method is of two types.

1. Intensive interval method
2. Extensive interval method.

In intensive interval method the intensity is from 80 – 90 % whereas in extensive interval method the intensity is from 60 – 80 %. By proper manipulation of the variable, the interval method can be used for the improvement of any type of endurance or any prerequisite of endurance Hadayal Singh. (1991)

1.2.1 IMPORTANCE OF INTERVAL RUNNING

Long runs, tempos, short runs, easy days, interval training - all are important components of a well-balanced workout schedule for the intermediate to advanced runner. Interval training involves running relatively fast, usually at race pace or faster, for a particular distance, then taking a short
break of one to three minutes, and then starting in on another run. While interval training can be painful as an athlete pushes their body to the limits, they are universally recognized as a beneficial component of a training regimen. In particular, intervals help improve speed, physical endurance and mental toughness Fox. E.L, and D.K. Mathews.( 1974).

**Speed:** Interval training improves your speed by teaching your body to run fast. On long runs your body gains endurance, but intervals help tone your muscles for that quick at the end of a race. Shorter intervals, such as a 200m or 400m distance, are optimal to gain speed. The key to shorter intervals is to run fast but not to give you much of a break Paish . W. ( 1976).

**Physical Endurance :** One of the most obvious benefits of interval training is physical endurance. A typical interval workout balances the distance with the pace and with the break in between intervals. For example, a runner might do three one-mile intervals with a 3 minute, 400m jog in between, and they might run it a little bit slower than race pace. In contrast, they might run ten 400m intervals with a 200m jog in between, and running intervals slightly faster than race pace. However, the primary objective to improve endurance with interval training is to run quickly during the interval and then not to take too long a break. Yes, it is tempting to take an extra minute to catch your breath after a particularly taxing 400m run, but the key is to keep going. Through interval training you teach your body which do not need as much rest when you run fast, helps in improving your ability to run fast throughout an entire race Novich and Taylor. (1983)
**Mental Toughness:** Perhaps one of the greatest benefits of interval training is also the improved mental toughness. Running mile after mile, well after you think the body should have needed to stop, gives runners the competitive mental toughness to stick it out in a difficult race. The best way to train for mental toughness is to do an interval workout as planned (for example, eight 400m intervals with a 200m rest in between), and then do one more short burst (e.g. a 200m sprint) in order to prove to the body that it has even a bit more in reserve. (Faulding, R. 1977) Through interval training, you can increase your speed, physical endurance, and mental toughness. However, due to the taxing nature of interval workouts, you should not do intervals more than twice a week. Giving yourself ample time to rest between interval sessions and adequately mixing intervals with other types of workouts is the key to improving your running while still staying fresh Reindel L.L., et.al., (1966)

**1.2.2 PHYSIOLOGICAL BENEFIT OF INTERVAL RUNNING**

The main physiological benefit is the development of heart stretch, adjusting the body to oxygen debt so that a minimum amount of oxygen debt is incurred at race pace. Times run can be recorded in a training diary and then compared with similar sessions performed previously progress can be measured.

Originally developed by the German pair of coach Waldemar Gerschler and physiologist Reindel, this training method was used by the flying Finn Paavo Nurmi who won the 1500 metres and 5000 metres within the space of an
hour, by the German Rudolf Harbig who ran the world record for the 800 metres in Milan in 1:46.6 on 15-7-39 and who has a stadium in Dresden named after him.

Interval training was made popular by the success of Emile Zatopek doing 20 x 200 metres, 40 x 400 metres, and 20 x 200 metres as a standard session, and then winning the Olympic gold medals for the 5000 metres, 10,000 metres and the marathon at Helsinki in 1952.

Because of the success of many runners who have used it most serious runners do interval training sessions, at least at some point in the year. Some do not do it at all, but it does have proven benefits. The problem is to do the right type of suitable training at the appropriate time of the year.

However, there is a qualitative difference in the type of interval training a long distance runner should do. The fast distance run can range from 100 metres to a mile (1.6 kilometres or four laps of the track) so there are intensive interval training sessions and extensive ones. Intensive interval sessions have shorter distances such as 200 metres run fast, whereas extensive interval sessions are run over 500, 800, 1500 metres. [www.civemaxwellprestt.(2004)]

1.2.3 BIOCHEMICAL BENEFIT OF INTERVAL RUNNING

The lipid compounds are transported in the body as lipoproteins, which differ in size, density and the contents of lipids and proteins. Three main categories of lipoproteins were discerned: of very low density lipoproteins, of
low density lipoproteins and of high density lipoproteins. Intestinal lipid absorption is associated with the generation of chylomicrons, i.e. very large lipoproteins of very low density, which are rapidly eliminated from the bloodstream. Lipoproteins are generated predominantly in the liver, the VLDL ones being converted in blood into LDL which supply cholesterol to the cells. High-density lipoproteins (HDL) are generated in the liver and the intestine; they transport cholesterol from peripheral tissues back to the liver, the site of cholesterol degradation.

A close association is known between cardiovascular diseases (atherosclerosis, CHD, etc.) and lipid profiles, the concentrations of LDL and of total cholesterol being of particular importance. On the other hand, high levels of HDL in serum are antiatherogenic and protect from CHD. Regular physical exercises induce decreased levels of total cholesterol and LDL and increased HDL. Konrd witek. (2009)

1.2.4 BODY COMPOSITION BENEFIT OF INTERVAL RUNNING

Regular exercise of all types helps to improve your body composition, an important component of physical fitness. Your body composition includes lean body mass and fat. Regular aerobic exercise can help you burn fat, and muscle-strengthening exercises can increase your lean muscle mass. Improving your body composition provides a boost to your health and may reduce your risk of developing some chronic diseases.
Aerobic exercises, including brisk walking, cycling, running and swimming, can help you maintain your lean body mass while decreasing your fat mass. Including interval training as part of your aerobic workouts can also contribute to have improvements in your body composition. Interval training includes alternating short bursts of higher-intensity activity with periods of lighter-intensity activity. The University of Virginia reports that interval training improves your body composition by reducing your abdominal fat.

www.fitness.com Better body journal.(2011)

1.3. AEROBIC DANCE

As more and more people become interested in health and fitness and realize that exercise is an essential part of keeping the body in good shape, all the various ways of keeping fitness are increasing in popularity. Strangely enough, while women are supposed to be more concerned with their looks and their figures than men, the men have led the way in the new revival of interest in most forms of sport and exercise for fitness and general health. However aerobics is also one of exercises from which has really caught on among women and become one of the most popular ways of improving fitness and getting in shape, mainly because it is effective, and it is great fun! And in aerobics, it is the women who are showing the men the road to health and fitness.

Aerobic dance is also a form of training which causes physical and physiological changes. The word ‘aerobics’ simply means ‘with oxygen’ and
can therefore be used to describe many forms of exercise or sport such as jogging, swimming, dancing and so on. The purpose of all these forms of exercise is to make the muscles, including the heart, which is a muscle-work harder than the normal. This increases their need for oxygen, and the body responds to both, by breathing more deeply and raising the oxygen intake through the lungs by speeding up the heart rate, so that more oxygen-rich blood is pumped around the body to supply the muscles. The muscles, therefore, become stronger and more efficient, while the whole cardiovascular system of the heart, lungs and circulatory system is tuned up and improved in efficiency.

Christina Barth. (1984)

Aerobic dance can best be defined as continuous movement of exercise where as locomotors movements and dance steps are performed according to music. The variety and style of the movement and the musical accompaniment provide as many forms of aerobic dance programs as there are interests and tastes of people performing them. In contrast to a competitive or solitary fitness program, aerobic dance provides an opportunity for people of widely different levels of physical ability to participate together in the same facility, with the same musical accompaniment, engaging in exercise and skills which have been choreographed according to the needs of each individual. The workouts aerobic dance is divided into four phases; warm up, skill review, aerobic and cool down. Each phase has its own purposes, without which the workout is incomplete. Each phase of the program is necessary if aerobic dance is to provide the desired benefits Phyllis C. Jacobson. (1989)
1.3.1 IMPORTANCE OF AEROBIC DANCE

In this competitive world, many people find it hard to dedicate time for physical activities like exercises, although one of their first priorities is to stay in perfect shape. Here comes the easy method of maintaining a perfect figure - dance aerobics. As the name suggests, dance aerobics is an exercise that combines the rhythmic steps of aerobics with graceful dance movements. It can be broadly divided into four types - high-impact exercises, low-impact exercises, step aerobics and water aerobics. High impact exercises involve intense jumping actions that are synchronized with the rhythmic beats of the music being played. Low impact exercises, the second type of dance aerobics, involves less jumping action, but more of footwork, which are coordinated with the rhythm of the music being played. Step aerobics is performed in a raised platform, while water aerobics is done in waist-deep water.

BENEFITS OF AEROBIC DANCE

Some of the benefits of the aerobic dance are as follows;

- Dance aerobic workout strengthens the body including the weight bearing bones and cardiovascular muscles.
- It helps you to lose weight as well as builds your body muscles. It is also suitable for those who want to tone their muscles.
- It is one of the easiest aerobic exercises, which can be enjoyed by people of all age groups, both men and women. However, elderly people should
perform the exercise either for short duration or with precautions. It is not recommended for very small children and pregnant women.

- The exercise increases blood circulation and lowers blood sugar and cholesterol levels.
- Aerobic dance workout increases the circulation of oxygen to heart, lungs and blood vessels for smooth functioning of the body.
- The workout enhances the efficiency of heart and lungs.
- It is a great stress buster. It is an interesting activity that deviates you from the drudgery of everyday life.
- It is an effective remedy for depression, anxiety and tension. Thus, it is helpful for the rejuvenation of the mind.
- It gives you the freedom to personalize your dance steps. You can choose music and the dance steps of your choice, say, jazz, disco, hip hop.
- Dance aerobics is a good workout to boost up your immune system.


1.3.2 PHYSIOLOGICAL BENEFIT OF AEROBIC DANCE

In recent years there has been a marked trend for Women to become increasingly interested in the potential health benefits of exercise. It is well established that certain forms of exercise may be used to improve aerobic power which in turn has been linked with physiological parameters such as cardiac output, maximal stroke volume, heart volume and A-VO2 difference.
Although jogging is often recommended as a means of training aerobic power, some women find cultural biases against this type of exercise difficult to overcome. Other forms of exercise, termed "aerobic" due to the utilization of fairly high percentages of maximal aerobic power for sustained periods of time, have been recommended. Unfortunately, such "aerobic" exercises as cycling, cross country, skiing and swimming are dependent on either favourable climatic conditions or special facilities. A possible "aerobic" activity, less often discussed, is dance. Since antiquity, humans have enjoyed dance as an art form and as a means of social intercourse who have always been particularly attracted to dancing as a means of entertainment and enjoyment? But few have thought of dance in the same context as some of the earlier mentioned "aerobic" exercises Martin, et., al., (1977)

1.3.3 BIOCHEMICAL BENEFIT OF AEROBIC DANCE

Cross-sectional studies confirm that active women have higher HDL-C levels than their sedentary counterparts. Apparently, the duration and frequency of aerobic exercise may be more important in altering HDL-C than the intensity of the exercise. However, because of the confounding effects of diet, body composition, exogenous hormone use, contraceptive use, alcohol consumption, and age, the specific exercise recommendations for increasing HDL-C have yet to be determined Taylor & Ward. (1993)

Although resistance training has become more popular with women in the last several years, the effects of this type of training on blood lipid levels
needs more research. Nevertheless, one recently published and well-designed study indicated that five months of sustained resistance training significantly decreased total cholesterol and LDL-C in women. 

**ASCM. (1990)**

### 1.3.4 BODY COMPOSITION BENEFIT OF AEROBIC DANCE

The effect of aerobic exercises on body composition is investigated in many researches. Especially it is seen that the regular and controlled exercise reduces of body fat and increases lean body weight which reported the number of studies increased day by day. Aerobic dance has demonstrated cardiovascular and metabolic benefits such as increased maximal oxygen conception when it performed within a target heart rate between 50 and 80% of the Maximal Heart Rate (MHR) like of other forms of aerobic exercise additionally they have reported that physical activity is part of a comprehensive treatment of weight loss and weight control program. Because it can contribute to that may increases cardio respiratory fitness, may decrease abdominal fat and may help with maintenance of weight loss in overweight and obese adults.

Step aerobics dance exercises have become gradually popular in fitness and weight loss programs, Evrim Cakmakci, et., al., (2011)

### 1.4. PHYSIOLOGICAL VARIABLES

Physiological variables may be defined as the scales that measure the function of human systems. It may also be defined as those variables which are linked with the various physiological systems and which may be voluntary or involuntary such as resting heart rate and anaerobic capacity Charler A Buchar. (1987)
IMPORTANCE OF PHYSIOLOGICAL VARIABLES

Proper training includes specific and identifiable physiological effects or variables like resting pulse rate and anaerobic power. A physically fit person tends to have lower respiratory rate and anaerobic power after given amount of work than does an untrained person. Exercise enhances the body’s ability to utilize oxygen which helps to fuel body functions.

RESTING PULSE RATE: The number of beats felt in exactly one minute is pulse rate. The average of the pulse in healthy adults is 72 beats per minute. There may be variations of up to five beats per minute with in normal range. The rate of pulse as observed in an artery expressed as beats per minute.

IMPORTANCE OF MEASURE PULSE RATE

- The pulse is how many times the heart beats, and usually measured it in beats per minute.

- Usually it is consider a resting pulse rate that is the heart rate to be normal at 68 -72 beats per minute.

- Ninety beats per minute, it could still be considered to be in the normal range.

- Over 90 would be considered poor and 60 or under good.
ANAEROBIC POWER: Anaerobic energy is produced without the use of oxygen.

IMPORTANCE OF MEASURE ANAEROBIC POWER

Sprinting and other high energy output, attacking jumping gaps, climbing the steps etc., are powered by the ATP-PC energy system. The ATP System (Adenosine Triphosphate) is sustainable for one to four seconds and the PC system (phosphate creatine) will power the anaerobic activity from four seconds until the PC System runs out: which is possibly up to twenty seconds in well trained athletes Casperson. C.J, et., al., (1985)

1.5. BIO-CHEMICAL VARIABLES

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

IMPORTANCE OF MEASURE IN BIO CHEMICAL VARIABLES

The several bio-chemical composites such as blood sugar, cholesterol, lactic acid and pyruvic acid, lipids and lipoproteins are two of the most important variables i.e., lipids(cholesterol, HDL, LDL, VLDL, triglycerides) and lipoproteins which were selected for this study.
LIPIDS: Lipids have several important biological functions. Some of them are:

- They serve as the reservoir of high energy value. Its calorific value is 9kilo calories/g as compared to carbohydrates which has calorific value of 4kilo calories/g.

- They can be stored in concentrated form in water free state (as compared to carbohydrates) in the adipose tissue.

- They are important components of cell membranes.

- They form important constituent of nervous tissue.

- In the form of oil soluble vitamins (A,D,E,K) and essential fatty acids (linoleic and linolenic acid), they are important dietary constituent

- Lipoproteins (combination of lipids and proteins) are important constituents of cell membrane and mitochondria Godkar, et., al., (2011)

CHOLESTEROL: Cholesterol as a fat like chemical compound in animal tissues. Cholesterol is white, colorless, tasteless nearly ubiquitous fatty alcohol. It is rich in eggs, meat, butter, and shell fish. It is also manufactured in the body primarily in the liver and it is essential for life. Cholesterol is widely distributed in all cells of the body. The concentration of cholesterol in human-plasma is 150 to 250 mg/100ml of blood Shaver. (1982)
LDL refers to a class and range in lipoprotein particles, varying somewhat pin their size and contents, which carry cholesterol in the blood and around the body, for use by various cell. It is commonly referred to as “bad Cholesterol” due to the link between high LDL levels and cardiovascular disease LDL transports cholesterol and triglycerides away from cells and tissues that produce more than they use, towards cells and tissues which are taking up cholesterol and triglycerides”

HDL refers to a “lipoprotein that transports cholesterol in the blood; composed of high proportion of proteins and relatively little cholesterol; high level are thought too be associated with decreased risk of coronary heart disease and atherosclerosis” Kannel. (1971)

**IMPORTANCE OF MEASURE CHOLESTEROL**

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

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

- Leucocytes and erythrocytes are rich in cholesterol contents. In red cells its concentration on cell membrane helps to detoxify the hemolytic effects of substances ex: bacterial toxins, snake venom etc.
- Transport of fatty acids in the body mainly takes place as cholesterol esters.

- Cholesterol increases the antigen sensitivity. It cholesterol serves as precursor of
  
  1. Crolic acid and bile salts formation

  2. Vitamin D3 formation and ergosterol; the latter is converted to active vitamin D by ultraviolet rays.

  3. Steroids formation; cholesterol is converted into pregnenlone and then progesterone. From this are formed adrenal cortex hormones, androgens and oestrogens.

- Brain tissue has up to 80% cholesterol, white matter being richer in it than gray matter. The cholesterol is presumed to be involved in electrical impulses conduction and insulation mechanisms Scan A.M. (1978)

**HIGH DENSITY LIPOPROTEIN CHOLESTEROL:** High-density lipoprotein, or HDL, is also referred to as the "good" cholesterol because of its role in protecting against heart disease. HDL is made of fat and protein and transports cholesterol and other substances to your liver. A high level of HDL reduces your risk for developing heart disease. Healthy lifestyle habits may help improve your HDL level Taylor, et., al., (1993)
IMPORTANCE OF MEASURE HIGH DENSITY LIPOPROTEIN CHOLESTEROL

Exercise training studies attempting to assess the role of exercise intensity on HDL-C in women are few and report conflicting results. Most of the research suggests that women (pre and postmenopausal) with low levels of HDL-C are more likely to respond positively to exercise training. Spate-Douglas and Keyser (1999) reported that moderate-intensity training over a 12-week period was sufficient to improve the HDL-C profile, and high-intensity training appeared to be of no further advantage as long as training volume (total walking distance per week) was constant. Duncan, et.,al., (1991)

LOW DENSITY LIPOPROTEIN CHOLESTEROL: When it comes to your cholesterol levels, you have a good kind and bad kind. The LDL type is the bad kind. The acronym "LDL" stands for low-density lipoprotein. An excessive amount of this cholesterol in the system can cause plaque build up in the arteries and increase the risk for a heart attack, according to the American Heart Association. Exercise can be used as a treatment for minimizing high LDL Helss. G, et.,al., (1980)

IMPORTANCE OF MEASURING LOW DENSITY LIPOPROTEIN

The link between high blood cholesterol and heart disease risk seems to have earned it the reputation of a "necessary evil." However, not all cholesterol types are bad. Indeed, the American Heart Association reports that high HDL cholesterol levels protect the heart against disease. In contrast, high LDL levels
can increase your risk of both heart attack and stroke. Although broad guidelines exist, healthy LDL cholesterol ranges also depend on how many other risk factors you have (Boyden, et., al., 1993)

**TRIGLYCERIDES:** These are the chemical forms in which most fat exists in the body, as well as in food. They are present in blood plasma. Triglycerides, in association with cholesterol, form the plasma lipids (blood fat). Triglycerides in plasma originate either from fats in our food, or are made in the body from other energy sources, such as carbohydrates. Calories we consume are not used immediately by our tissues but they are converted into triglycerides and stored in fat cells. When your body needs energy and there is no food as an energy source, triglycerides will be released from fat cells and used as energy - hormones control this process Haskell.W. (1984)

**IMPORTANCE OF MEASURING TRIGLYCERIDES**

In fact, triglycerides can be stored inside muscle fibers in the form of small drops surrounding mitochondria, inside of which they become oxidized. Next to glycogen “granules” we find these small drops of fat (triglycerides), all of them are necessary to produce the energy needed for muscular activity. With proper nutritional strategies it is possible to increase both glycogen and triglyceride stores within muscles by 50%, remarkably improving endurance performances. Free fatty acids (FFA) are released from subcutaneous adipose stores in the blood together with intramuscular triglycerides, and with the guidance of albumine they reach muscle fibers to be used as fuel for their activity Martin. R.P, et.,al., (1977)
1.6. BODY COMPOSITION

Body composition is a key component of an individual’s health and physical fitness status. Lean body weight and fat weight are the two component systems of the muscle, bone, internal organs and connective tissues in the body. Fat weight usually is expressed relative to the total body weight of the individuals. Excessive body fat leads to obesity and enhances the risk of developing coronary heart disease. It is important to realize that individuals may be over fat even though they do not appear to be overweight. This may be caused by lack of physical activity.

It is well known that training or conditioning in general produces specific effects on body composition. Usually, after training reduces and depending upon these two factors the total body weight may alter accordingly. Exercise training usually leads to a reduction in body fat content and an increase in muscle mass (lean body mass). In individuals with excessive body fat, the loss of body fat resulting from training generally exceeds the gain in muscular mass. Thus it will produce significant alteration in body composition with four days per week being superior to three days per week. In general, physical training is found to result in increased blood volume and total haemoglobin Edward L. (1984).

IMPORTANCE OF BODY COMPOSITION

When the body composition is talked about, it usually describes the percentage of fat, bones and muscles. No two people are alike even though they
have the same height and weight. There is lot of immunity. Having a healthy body can mean having a heart and the other organs.

**BODY FAT WEIGHT:** Body fat is a compound comprised of glycerol a substance formed in fatty acids and fatty acids which is required as a concentrated energy source for our muscles. Fat is a storage substance for the body's extra calories and it fills fat cells (adipose tissue) that help insulate the body. When the body has used up the calories from carbohydrates it begins to depend on the calories from fat  *Brozek, et.,al., (1963)*

**IMPORTANCE OF BODY FAT WEIGHT**

Physique fat measurement is one of the most definitive and easy ways to figure out the exact physique fat in an individual. It is a known reality that excess fat in the physique results in weight problems associated illnesses like diabetes, higher blood stress, higher cholesterol, gallbladder disease and many much more  *Jackson, et.,al., (1985)*

**BODY FAT PERCENTAGE:** A person's body fat percentage is the total weight of the person's fat divided by the person's weight and consists of essential body fat and storage body fat. Essential body fat is necessary to maintain life and reproductive functions. The percentage of essential body fat for women is greater than that for men, due to the demands of childbearing and other hormonal functions. The percentage of essential fat is 3%–5% in men, and 8–12% in women. Storage body fat consists of fat accumulation in adipose tissue, part of which protects internal organs in the chest and abdomen. The
minimum recommended total body fat percentage exceeds the essential fat percentage value reported above. A number of methods are available for determining body fat percentage, such as measurement with calipers or through the use of bioelectrical impedance analysis Sinning, et.,al., (1996)

IMPORTANCE OF BODY FAT PERCENTAGE

When you shift your focus to measure body fat percentage instead of weight, an amazing thing happens. You’ll have a higher likelihood of maintaining and even building lean muscle mass while shrinking your fat stores. This is because the diet and exercise plan you'll follow as you try to reduce your body fat percentage promotes muscle building and fat burning as opposed to simply weight loss, where you could be losing muscle as well as fat.

The benefits of lean muscle mass are many. First, muscle requires a lot of energy and therefore burns calories even at rest. Having more muscle can therefore result in a higher metabolism. Having lean muscle mass will also make you look firm, lean and fit. Women often worry that if they lift weights or try to build muscle they'll end up looking like a man. This is simply not true and in fact is nearly impossible to achieve due to a lack of testosterone. Instead, women who lift become more compact and lean with great muscle definition Nidhi ,et.,al., (2000)

LEAN BODY WEIGHT: Any sportsman knows that no matter the actual sport being played, the shape of the athlete determines whether the team wins or loses. This is why for an athlete, being in tip top shape is of primary
importance. Many athletes know that lean body weight is ideal for optimum performance regardless of the game being played. In many cases, athletes discover that after a period of time without proper exercise their body weight begins to increase. In order to maintain a lean body weight, an athlete must undertake a number of steps which we will examine next Field, A. (2003)

**IMPORTANCE OF LEAN BODY WEIGHT**

Most people rely 100% on the weight scale when attempting to track changes in body fat. Losing muscle is highly undesirable because your metabolism will decrease and aesthetically, you may not look leaner even if you do lose weight.

Lean body mass is also your set point to determine how much fat you should lose and what your body fat percentage will be if you lose a certain amount of fat. You can check out the Ideal Body Weight Formula, which takes into account your lean body mass to arrive at your ideal weight Morgan, et.,al., (1997)

**BODY MASS INDEX:** Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m\(^2\)). For example, an adult who weighs 70kg and whose height is 1.75cm will have a BMI of 22.9 Whartone, et.,al., (2008)
**Body mass index can be defined as;**

- BMI stands for “Body Mass Index,” a ratio between weight and height.

- BMI is a standard “tool” for helping you judge your body weight and the amount of Body fat you have.

- For older adults the BMI normal range is 18-25. The higher the BMI number above the normal range (18-25), the greater the degree of overweight.

- Generally speaking an adult BMI of 27 is considered overweight and 30 or above is severely overweight.

- People with a higher percentage of body fat tend to have a higher BMI except for body builders.

- Carrying excess body fat, not muscle, puts you at greater risk for health problems

  Such as heart disease, cancer, diabetes and stroke.

**www.encyclopedia.com.**

**IMPORTANCE OF BODY MASS INDEX:**

- If your BMI is high, you may have an increased risk of developing certain diseases

  Including:
- high blood pressure
- heart disease
- high cholesterol and blood lipids (LDL)
- Type 2 Diabetes
- sleep apnea
- osteoarthritis
- female infertility
- gastro esophageal reflux (GERD)
- urinary stress incontinence

- Prevention of further weight gain is important and weight reduction is desirable. [www.encyclopedia.com](http://www.encyclopedia.com).

**TOTAL BODY WEIGHT**: The term body weight is used in daily English speech as well as in the contexts of biological and medical sciences to describe the Earth’s gravitational pull on an organism’s body. Body weight is measured in kilograms throughout the world, although in some countries it is still measured in pounds (e.g. United States) or stones and pounds (e.g. among people in the United Kingdom) and thus some people may not be well acquainted with measurement in kilograms. Most hospitals, even in the United States, now use kilograms for calculations, but use kilograms and pounds together for other purposes. Body weight of a person is theoretically the weight of the person without any items on. However, for all practical purposes, body weight is taken with clothes on but often without the shoes and heavy accessories like mobile phones and wallets [Thorland, et., al., (1981)]
IMPORTANCE OF BODY WEIGHT

Maintaining a healthy body weight significantly contributes to your overall physical health and well-being. It does so in several very important ways. It lowers your risk of developing serious health problems such as cancer, heart disease, diabetes, breathing problems, arthritis, etc. It is also important for you emotionally, as it increases your self-confidence and boosts your energy. When you feel good physically, you tend to feel good emotionally as well.

Ted.A.Baumgarther. (1997)

1.7. STATEMENT OF THE PROBLEM

The statement of the problem is stated as follows, “The Effects of Interval running and Aerobic Dance on Selected Physiological, Biochemical Variables and Body Composition of College Women”.

1.8. OBJECTIVES

1. To find out the improvement due to the interval running among college women in the physiological variables.

2. To evaluate the improvement due to the aerobic dance among college women in the physiological variables.

3. To find out the improvement due to the interval running among college women in the biochemical variables.

4. To evaluate the improvement due to the aerobic dance among college women in the biochemical variables.
5. To access in improvement due to the interval running among college women in the body composition variables.

6. To evaluate the improvement due to the aerobic dance among college women in the body composition variables.

1.9. HYPOTHESES

Based on the available literature, the effects of interval running, and aerobic dance programmes on physiological, biochemical variables and body composition the following hypotheses were listed.

1. It was hypothesized that there would be a significant difference in the physiological variables due to the interval running among college women.

2. It was hypothesized that there would be a significant difference in the physiological changes due to the aerobic dance among college women.

3. It was hypothesized that there would be a significant difference in the biochemical variables due to the interval running among college women.

4. It was hypothesized that there would be a significant difference in the biochemical changes due to the aerobic dance among college women.

5. It was hypothesized that there would be a significant difference in the body composition variables due to the interval running among college women.

6. It was hypothesized that there would be a significant difference in the body composition changes due to the aerobic dance among college women.
1.10. REASON FOR SELECTING THE STUDY

Today it is the world of technology. Man is dependent on machines for each and every work. The modern man is becoming lazy. He eats but do not work. Due to this he is unable to maintain his body fitness. A sound mind lives in a sound body. So it is essential for all to maintain body fitness to achieve success in life. By understanding the present position, I have selected the present study. The following reasons can be identified for the selection of the present study.

1) To motivate the women students to participate in exercise and sports activities
2) To make the women students aware about the importance of body fitness
3) The study helps to understand the internal and external changes of the body due to aerobic dance and interval running. The researcher has selected the variable like physiological, biochemical and body composition. So the study is amalgamation of both physical and mental effects of college women
4) It is impossible to identify the internal factors of the body helpful for body fitness only the over observation of the body of college women

Here the researchers has intentionally identified the responsible internal factors of body such as Resting pulse rate, Anaerobic power, Total cholesterol, High density lipoprotein, low density lipoprotein, Triglycerides, Body fat weight, Total fat percentage, lean body weight, Body mass index and total
body weight. The researcher has made an attempt to study about how the internal bio-chemical, physiological factors effects on body fitness. So the study has torched on the significance of co-ordination between external and internal body system.

The researcher has done a systematic study even on Resting pulse rate, Anaerobic power, Total cholesterol, High density lipoprotein, low density lipoprotein, Triglycerides, Body fat weight, Total fat percentage, lean body weight, Body mass index and total body weight. The researcher has studied the performance of an individual according to her weight like how the weight will affect adversely (negatively) on body fitness and other problems? The researcher has also given controlling measure for body control according to age of college women.

The whole study is spun around the effects of aerobic dance and interval running on internal and external boy fitness. Certainly it is helpful for who do not have time to perform aerobic activities. The simplest forms of exercise like aerobic dance and internal running are helpful to keep his body healthy and wealthy.

1.11. SIGNIFICANCE OF THE STUDY

The study helps in creating awareness about the importance of physical fitness and well-being among the college women. Physical educationist and sports scientists have been constantly examining sports performance in relation to the individual skill and fitness standards. They try to discover those factors
that contribute to high performance so that the findings could be utilized in practical aspects of coaching and training. The study creates significant health awareness among the college women. The study promotes further research and growth in applying choreography in the field of Interval running and Aerobic dance training. The findings of this study may have greater value in designing suitable training program for the improvement of physiological, bio chemical and body composition fitness of the college women.

1.12. DELIMITATIONS

- The study was delimited to the college women students and the age group of the students were between 18 to 22 years only.

- The study was limited to hostel women students of Government First Grade College Haliyal, Karwar district, Karnataka.

- The study was conducted in the selected physiological, bio chemical variables and body composition.

1.13. LIMITATIONS

- The cultural and environmental factors of the subjects were not considered.

- The previous training and food habits of the subjects were not counted.

- The emotional status of the subjects during the training period was not given importance.
- The humidity and temperature were not taken into consideration.

- Though the total workload of these two training programme was equated, the intensity of the load which varies from individual to individual was not taken into consideration

1.14. DEFINITION OF THE TERMS

1. INTERVAL RUNNING: A system of physical conditioning in which the body is subjected to short but regularly repeated periods of work stress interspersed with adequate periods of relief Edward, et. al., (1993)

2. AEROBIC DANCE: Aerobic Dance can best be defined as continuous movement - exercise, locomotors movement, and dance steps performed to music Phyllis C. Jacobson. (1989)

3. RESTING HEART RATE: The number of times your heart beats in one minute when your body is fully recovered from activity and you are at rest Jessica McCahon. (2011)


5. 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 on inside of arteries are associated with arteriosclerosis and coronary heart disease Janold. (1977)

6. **HIGH DENSITY LIPOPROTEIN CHOLESTEROL**: (HDL): 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 Stoll, et., al., (1989)

7. **LOW DENSITY LIPOPROTEIN CHOLESTEROL**: Low density lipoprotein is the major cholesterol carrying lipoprotein. Elevated LDL levels herald a strong predisposition coronary heart disease, stroke and peripheral vascular disease Byrne, et., al., (1991)

8. **TRIGLYCERIDES**: Triglycerides are the most common lipids. These fats do not circulate freely in the blood but are carried in a protein called lipoprotein Kevin, P. Byone. (1991)

9. **BODY FAT WEIGHT**: Body fat is a compound comprised of glycerol -- a substance formed in fatty acids -- and fatty acids which is required as a concentrated energy source for our muscles. Fat is a storage substance for the body's extra calories and it fills fat cells (adipose tissue) that help insulate the body. When the body has used up the calories from carbohydrates it begins to depend on the calories from fat. AAUM. (1990)
10. **BODY FAT PERCENTAGE:** Definition of Percent Body Fat is the Amount of Body Fat You have In Relation to Your Total Body Weight (Chatterjee. (2006))

11. **LEAN BODY WEIGHT:** Scientists define lean body mass as any non-fat substance in the body that contributes to overall mass Smolak. (2004)

12. **BODY MASS INDEX:** A measurement of the relative percentages of fat and muscle mass in the human body, in which weight in kilograms is divided by height in meters squared. The result is used as an index of obesity Chatterjee. (2006)

13. **TOTAL BODY WEIGHT:** Weight in measuring human body weight in the medical sciences and in sports is a measurement of mass, expressed in units of mass such as kilograms (kg) or pounds (lb) Slentz,et.,al.,(2004)