Chapter I

INTRODUCTION

Health is a state of complete physical, mental and social well-being and not merely the absence of disease of infirmity (WHO).

Health is considered as an outcome to proper wellness management and appropriate follow up in that direction. Since, the degenerative diseases like obesity, diabetes mellitus, cardio-vascular morbidities, etc. are multi factorial in nature; it may be difficult but ideal to understand the various markers of these diseases. Physical wellness has been emphasized very much among all the dimensions of human wellness and health. This significance to this dimension may be due to its emphatic effect of influence on the other dimensions of human health.

“Aim for a Healthy Body Weight”. Health and longevity are threatened when a person is either overweight or underweight. Overweight and obesity increase one’s risk of developing serious CVD. Likewise, individuals who are underweight may have a higher risk than others of cardiac, musculoskeletal and reproductive disorders. Thus, healthy weight is key to a healthy and longer life. One will learn about weight control principles and practices, as well as guidelines for designing exercise programs for weight loss, weight gain and body composition change. Individuals with body fat levels falling at or near the extremes of the body fat continuum are likely to have serious health problems that reduce life expectancy and threaten their quality of life (Heyward, 2002).
**Obesity**

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health, leading to reduced life expectancy and/or increased health problems.

Obesity can be defined as excessive enlargement of the body’s total amount of fat. Obesity means having too much body fat. It is different from being overweight, which means weighing too much. The weight may come from muscle, bone, fat, and/or body water. Both terms mean that a person’s weight is greater than what’s considered healthy for his or her height.

Obesity increases the likelihood of various diseases, particularly heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer, and osteoarthritis. Obesity is most commonly caused by a combination of excessive food energy intake, lack of physical activity, and genetic susceptibility, although a few cases are caused primarily by genes, endocrine disorders, medications, or psychiatric illness. Evidence to support the view that some obese people eat little yet gain weight due to a slow metabolism is limited. On average, obese people have a greater energy expenditure than their thin counterparts due to the energy required to maintain an increased body mass.

The worldwide epidemic of obesity or excess weight is due to imbalance between physical activity and dietary energy intake. Sedentary lifestyle, unhealthy diet, and consequent overweight and obesity markedly increase the risk of cardiovascular diseases.
Obesity occurs over time when you eat more calories than you use. The balance between calories-in and calories-out differs for each person. Factors that might affect your weight include your genetic makeup, over eating, eating high-fat foods, and not being physically active.

Exercising and Dieting are the main treatments for obesity. Diet quality can be improved by reducing the consumption of energy-dense foods, such as those high in fat and sugars, and by increasing the intake of dietary fiber. With a suitable diet, anti-obesity drugs may be taken to reduce appetite or decrease fat absorption.

Regular physical activity 45-60 min per day prevents unhealthy weight gain and obesity. Regular exercise can markedly reduce body weight and fat mass without dietary caloric restriction in overweight individuals. An increase in total energy expenditure appears to be the most important determinant of successful exercise - induced weight loss. The best long-term results may be achieved when physical activity produces an energy expenditure of at least 2,500 kcal/week. Yet, the optimal approach in weight reduction programs appears to be a combination of regular physical activity and caloric restriction. A minimum of 60 min, but most likely 80-90 min of moderate-intensity physical activity per day may be needed to avoid or limit weight regain in formerly overweight or obese individuals. Regular moderate intensity physical activity, a healthy diet, and avoiding unhealthy weight gain are effective and safe ways to prevent and treat cardiovascular diseases and to reduce premature mortality in all population groups. Although the efforts to promote
cardiovascular health concern the whole population, particular attention should be paid to individuals who are physically inactive, have unhealthy diets or are prone to weight gain. They have the highest risk for worsening of the cardiovascular risk factor profile and for cardiovascular disease. To combat the epidemic of overweight and to improve cardiovascular health at a population level, it is important to develop strategies to increase habitual physical activity and to prevent overweight and obesity in collaboration with communities, families, schools, work sites, health care professionals, media and policymakers.

Obesity is a leading preventable cause of death worldwide, with increasing rates in adults and children. Authorities view it as one of the most serious public health problems of the 21st century. Obesity is stigmatized in much of the modern world, though it was widely seen as a symbol of wealth and fertility at other times in history and still is in some parts of the world. In 2013, the American Medical Association classified obesity as a disease.

Being obese increases your risk of diabetes, heart disease, stroke, arthritis, and some cancers. If you are obese, losing even 5 to 10 percent of your weight can delay or prevent some of these diseases.

To understand the status of obesity of a person, two terms called ‘Normal range of body fat’ and ‘Average value of body fat’ are essential. The average value of the body fat is the percentage of body fat that is approximately sufficient to the person of a recommended age and sex. The normal range of body fat indicates the range of percentage value that may be allowed to be
higher or lower than the average value of fat. If the body fat percentage of a person is less than the range value prescribed, when compared to the average value of that specific aged person, the person’s fat status is called as obese. For men and women aged between 17 and 50 years, this variation range is approximately 5% body fat. Using this statistical boundary, ‘over fatness’ would then correspond to body fat that exceeds the average value plus 5%. For example, in young men whose body fat averages 15% of body weight, the borderline for obesity would be 20% of body fat. For older men, whose average fatness is approximately 25% obesity would be defined as a body fat content in excess of 30%. For young women, aged between 17 and 27 years obesity would correspond to a body fat content in excess of 30% for older women aged between 27 and 50 years the borderline between the average and obesity would be about 37% body weight.

Standards for over fatness or obese:

Men = above 20%

Women = above 30%

It should be kept in mind that there is a gradation in obesity, that progresses from the upper limit of normal 20% for men and 30% for women to as high as 50 to 70% of body weight in massively obese people. This group includes people whose weight in the range of 375 to 600 lbs or higher. In this situation, the body fat often exceeds lean body weight and obesity may be life threatening.
The overall average prevalence of obesity in adults for the year 2000 was 8.2% of the global population. The prevalence of obesity progressively increases with the degree of development of countries, as seen in the data for undeveloped countries (1.8%), developing countries (4.8%), countries in transition (17.1%), and developed countries (20.4%) (WHO, 2001).

Excess body weight and fatness pose a threat to both the quality and quantity of one's life. Obese individuals have shorter life expectancy and greater risks of CHD, hypercholesterolemia, hypertension, diabetes mellitus, certain cancers and osteoarthritis. For a comprehensive report and roundtable discussion of the role of physical activity in the prevention and treatment of obesity and its co-morbidities, Obesity may be caused by genetic and environmental factors. As an exercise specialist, one play an important role in combating this major health problem by encouraging a physically active lifestyle and by planning exercise programs and scientifically sound diets for one’s clients, in consultation with trained nutrition professionals. Restricting caloric intake and increasing caloric expenditure through physical activity and exercise are effective ways of reducing body weight and fatness while normalizing blood pressure and blood lipid profiles (Morrow, et al., 2005).

The incidence of obesity is increasing rapidly. Research efforts for effective treatment strategies still focus on diet and exercise programmes, the individual components of which have been investigated in intervention trials in order to determine the most effective recommendations for sustained changes in bodyweight. The foremost objective of a weight-loss trial has to be the
reduction in body fat leading to a decrease in risk factors for metabolic syndrome. However, a concomitant decline in lean tissue can frequently be observed. Given that fat-free mass (FFM) represents a key determinant of the magnitude of resting metabolic rate (RMR), it follows that a decrease in lean tissue could hinder the progress of weight loss. Therefore, with respect to long-term effectiveness of weight-loss programmes, the loss of fat mass while maintaining FFM and RMR seems desirable. Diet intervention studies suggest spontaneous losses in bodyweight following low-fat diets, and current data on a reduction of the carbohydrate-to-protein ratio of the diet show promising outcomes. Exercise training is associated with an increase in energy expenditure, thus promoting changes in body composition and bodyweight while keeping dietary intake constant. The advantages of strength training may have greater implications than initially proposed with respect to decreasing percentage body fat and sustaining FFM. Research to date suggests that the addition of exercise programmes to dietary restrictions can promote more favourable changes in body composition than diet or physical activity on its own. Moreover, recent research indicates that the macronutrient content of the energy-restricted diet may influence body compositional alterations following exercise regimens. Protein emerges as an important factor for the maintenance of or increases in FFM induced by exercise training. Changes in RMR can only partly be accounted for by alterations in respiring tissues, and other yet-undefined mechanisms have to be explored. These outcomes provide the scientific rationale to justify further randomized intervention trials on the
synergies between diet and exercise approaches to yield favourable modifications in body composition (Stiegler and Cunliffe, 2006).

Combating obesity is not an easy task. Many overweight and obese individuals have incorporated patterns of overeating and physical inactivity into their lifestyles, while others have developed eating disorders, exercise addictions, or both. In an effort to lose weight quickly and to prevent weight gain, many are lured by fad diets and exercise gimmicks: and some resort to extreme behaviours, such as avoiding food, bingeing and purging and exercising compulsively. Most of the individuals exercised 30 minutes or longer per session; but only a minority exercised at least five times per week. Therefore, low frequency of physical activity was the main reason that the physical activity recommendation was not met.

The terms android obesity and gynoid obesity refer to the localization of excess body fat, mainly in the upper or lower body. Android obesity (apple shaped) is more typical of males; gynoid obesity (pear shaped) is more characteristics of females. However, some men may have gynoid obesity, and some women have android obesity. Other terms are also used to describe types of obesity and regional fat distribution. Android obesity is frequently simply called upper-body obesity, and gynoid obesity is often described as lower-body obesity (Heyward, 2002).

Food and assessment of the nutritional status of Spanish Adolescents (AVENA) and the European Youth Heart Study (EYHS) respectively, highlight physical fitness as a key health marker in childhood and adolescence.
Moderate and vigorous levels of physical activity stimulate functional adaptation of all tissues and organs in the body (i.e. improve fitness), thereby also making them less vulnerable to lifestyle related degenerative and chronic diseases. To identify children and adolescents at risk for these major public health diseases and to be able to evaluate the effects of alternative intervention strategies in European countries and internationally, comparable testing methodology across Europe has to be developed, tested, agreed upon and included in the health monitoring systems currently under development by the European Commission (EC): the Directorate General for Health and Consumer Affairs (DG SANCO); the Statistical Office of the European Communities (EUROSTAT), etc. The Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study group plans, among other things, to describe the health-related fitness of adolescents in a number of European countries. Experiences from AVENA and EYHS will be taken advantage of. This review summarizes results and experiences from the developmental work so far and suggests a set of health related fitness tests for possible use in future health information systems (Ruiz, et al., 2006).

Human body is a complex organism composed of a variety of tissues that change as the body develops, matures and ages. It is important to recognize how these body compartments may be affected by age, gender and ethnicity. An understanding or basic knowledge of body composition is relevant to many disciplines, including health and medicine, nutrition, exercise science, human performance, and other biological sciences. Nutritional status assessment,
charting the course of diseases from diagnosis to recovery, growth and development, aging and conditions of physical work are a few examples of situations and topics for which measurements of body composition can add to the understanding of physiological processes and aid in the treatment of diseases like obesity and anorexia. Childhood, adolescence may last almost a decade and is a bridge between childhood and adulthood. Adolescence includes puberty and the years that follow until sexual maturation is complete. During these period, adult body composition characteristics and patterns of adipose tissue distribution are developing. Chronological ages cannot be used as precise points of demarcation for these developmental periods. Nevertheless, chronological age is important, since there are numerous major differences between values and in the rates at which these values change (Van Loan, 1996).

Knowledge of the typical body composition of athletes in a sport is helpful in determining suitable target weights and in evaluating the effects of training programs. Unfortunately, the ideal weight and fat content of an athlete for optimum performance are not known precisely. Extensive data are available on wrestlers due to research on weight reduction and the need to establish minimum weight. Adolescent wrestlers are especially of concern because of potential effects of extreme weight loss on health and growth (Sinning, 1996).

Body weight is dependent on the first and second laws of thermodynamics. Weight gain is inevitable when total energy intake exceeds total energy expenditure. Contrariwise, when total energy expenditure exceeds
total energy intake, body weight will decrease. Thus, the energy balance equation (i.e., weight change = energy intake minus energy expenditure) governs to change in weight. Exercise training, especially aerobic-type training, is commonly undertaken to promote weight loss since it can potentially increase energy expenditure without changing energy intake. Aging is associated with increased body weight, most of which is fat. Because older adults are more likely to be overweight, they are also more likely to lose body weight in response to an aerobic exercise training program. The loss of weight due to participation in an exercise training program is related to the degree to which one is overweight (Ballor, 1996).

Body composition is a key component of an individual’s health and physical fitness profile. Obesity is a serious health problem that reduces life expectancy by increasing one’s risk of developing coronary artery diseases, etc. Too little body fat also poses a health risk because the body needs a certain amount of fat for normal physiological functions. Essential lipids, such as phospholipids, are needed for cell membrane formation: nonessential lipids, like triglycerides found in adipose tissue, provide thermal insulation and store metabolic fuel. In addition, lipids are involved in the transport and storage of fat-soluble vitamins (A, D, E and K) and in the functioning of the nervous system and the reproductive system, as well as in growth and maturation during pubescence (Morrow, et al., 2005).

Exercise is a key component in the prevention of obesity. This is a condition in which energy intake, in the form of food, exceeds the energy
expenditure of daily living and the excess energy is stored in the form of adipose tissue made up of fat cells. Two factors facilitate the onset and progressive nature of obesity. The first is the age related reduction in the energy expended to maintain waking bodily functions the basal metabolic rate of about 2% every 10 years. The second is the lowered metabolic rate of obese individuals. Combine these two factors with reduced physical activity and the development of obesity is inevitable. Regular aerobic exercise not only increases energy expenditure during the exercise but also for some time afterwards because the non-exercising metabolic rate remains elevated during the post-exercise recovery period. A combination of exercise with reduced dietary intake provides the best strategy for counteracting obesity and the associated CVD (Hale, 2003).

Physical Fitness

Physical fitness is the individual’s ability to meet the requirements of their environments (Harold M Barrow, Rosemary McGee, et al., 1979).

The term physical fitness in view of a coach or a sports trainer is something different. In their view the term physical fitness denotes the physical capacity to tackle the external load that is placed by various exercises and excel in physical performances of the various sports and games situations. These people describe the physical fitness in terms of the capacity to do work.

A student may be physically fit and may participate in various exercises without developing undue fatigue quickly. In this way a student may be closer
to the better health condition. The physical education teacher should concentrate on the skill and movement efficiency aspect of the children and also the physical capacity of the students simultaneously.

The concept of physical fitness has become a major aspect of research in the field of physical education and sports. As illustrated by the definitions of the physical fitness proposed by the scholars of physical education and sports, the term physical fitness is the ability of the body of the individual to meet the physical demands of the physical activities. Physical fitness is an embodiment of speed, strength, endurance, flexibility and co-ordination. This physical fitness may also be termed as the skill related physical fitness, since this kind of fitness is highly essential to meet the physical exigencies of the physical skills in various sporting activities. Taking into consideration of the meaning extended by various scholars of physical education, the following important components make the physical fitness.

Harold M Barrow, Rosemary McGee, et al., (1979) denotes the following as skill related physical fitness components:

Agility
Balance
Coordination
Speed
Power
Reaction Time/Movement Time
All the above components are very essential to perform various skills of the sporting activities very gracefully and rhythmically. Very high levels of skill related physical fitness coupled with very good levels of motor fitness, an individual can learn and perform difficult skill of the sporting skill very efficiently. So, to perform the sporting skill efficiently and without undue fatigue, one needs high levels of skill related physical fitness.

**Health Related Physical Fitness**

In the modern days people are more desirous of having good health and would like to lead a qualitative life. For this the wellness experts throughout the world are sponsoring the idea of possessing high levels of health related physical fitness than simply having the skill related physical fitness. So, a physical education teacher should be able to understand the concept of health related physical fitness and its individual components and strive to develop these components in the students, so that the students would be able to lead a healthy and happy life. This taste of the healthy life during the childhood makes the individual to develop the right kind of aptitude towards the health concepts and the most desirous health related physical fitness. It is the strong viewpoint of the modern day physical education experts that the mere possession of the skill related physical fitness does not ensure the individual proper health.

The health of the body depends directly on the functional efficiency of various organs of the various systems and in turn the functional efficiency of
the various systems of the body. It has been found that simple speed development is in no way helpful in increasing the health status of an individual and in the same way the simple strength improvement is not an essential aspect to keep the health at appreciable levels. Development of agility may be very essential and highly useful for functional efficiency in tackling the complicated movements in various sporting activities, but this ability may not be that essential or important to enhance one's health status. The prime institution involving in this kind of research activities, The American College of Sports Medicine endorses the same opinion and hence, the possession of health related physical fitness is more important now a days than possessing the skill related physical fitness. But, to improve the health related physical fitness, one essentially needs to have an optimum amount of the skill related physical fitness, so as to participate in various sporting and physical activities. So both the fitness concepts need attention. Since, the large numbers of people in India are lacking the aptitude towards the physical culture to keep and preserve the health in an optimum level, it is highly essential to develop this quality from the childhood days onwards. Hence, the role of physical education teachers is really Herculean in developing this aptitude in the school children.

Many researches in the field of health related physical fitness indicate that various physiological variables are responsible for maintaining the desired health related physical fitness. These physiological variables in turn are dependent on various components of health related physical fitness. Possession of high levels of the components of this health related physical fitness will
ensure right proportion of physiological variables to attain the desired level in health status, so as to be free from disease and can lead a happy and qualitative life.

The concept of health related physical fitness includes the elements of muscular strength, muscular endurance, Circulo-respiratory endurance, flexibility and freedom from obesity (Barry A Franklin and James R Wappes, 1998).

Though the term physical fitness is sometimes defined in terms of the capacity to do work, this capacity to do work is negatively influence by the level of obesity of the person. Thus the avoidance of the obesity qualifies as a viable component of health related physical fitness. Among all the components of the health related physical fitness, the component of freedom from obesity gets the prime importance. This impetus came from the medical profession. The many medical problems associated with obesity call for cooperative effort between the medical field and physical education. Although, the causes of obesity are complex, lack of physical activity is a major behavior characteristic held in common by a large percentage of experts. Moreover, regular physical exercise has been shown to be an effective means for reducing fat and maintaining sufficient muscle mass.

Harold M Barrow, Rosemary McGee, et al., (1979) denotes the following as the health related physical fitness components:

Cardio-respiratory/Circulo-respiratory Endurance

Muscular Endurance
Muscular Strength

Body Composition

Flexibility

Cross sectional studies proved statistically positive correlation between the health related physical fitness scores and health of individuals. This understanding in general lead to further exploration to identify exact reasons not to be affected by degenerative and chronic disorders that are prone to inactivity of individuals. It is also understood that the various components of health related physical fitness depend on the factors like heredity, nutrition, health habits, the type of physical activity, etc. All the components of the health related physical fitness are to be developed in optimum proportions, so as to enable the very best of healthful living. Hence, the modern research in physical education and health sciences is now diligently concentrating on the variables both physical and physiological on which an individual’s health status may be predicted.

Each component of the health related physical fitness has a unique way of importance in promoting the holistic fitness of the individual to lead towards a healthy lifestyle.

An energy imbalance in the body results in a weight gain or loss. There is an energy balance when the caloric intake equals the caloric expenditure. A positive energy balance is created when the input (food intake) exceeds the expenditure (resting metabolism plus activity level). For every 3500 Kcal of excess accumulated, 1Lb (0.45kg.) of fat is stored in the body. A negative
energy balance is produced when the energy expenditure exceeds the energy input. This can be accomplished by reducing the food intake or increasing the physical activity level. A caloric deficit of approximately 3500 Kcal produces a loss of 1 Lb of fat. Proper nutrition and daily physical activity are key components of a weight management program. In weight management programs, most clients are interested in losing body weight and body fat, but some need to gain body weight. The basic principle underlying safe and effective weight loss programs are that weight can be lost only through a negative energy balance, which is produced when the caloric expenditure exceeds the caloric intake. The most effective way of creating a caloric deficit is through a combination of diet (restricting caloric intake and exercise (increasing caloric expenditure) (Heyward, 2002).

Based on the above cited literature, the scholar has designed the following two modes of training to enhance the selected parameters among the obese adolescents.

They are:

Aerobic training
Yogic practices

**Aerobic Activity**

Aerobic is a new work, but not a new Idea (Jackson, 1985). The old concept of calisthenics or physical jerk was essentially the same. Both involve various exercises which are not too energetic, but when repeated many times
they result in an excellent form of aerobic training which improves flexibility as well as aerobic fitness. In other words aerobics is a progressive physical conditioning program that stimulates cardio respiratory activity for a time period sufficiently long to produce beneficial changes in the body.

Walking, jogging, swimming, cycling, rope-skipping, dancing, ball games and racket games are aerobic exercises. They are classified as aerobic activities because they work the larger muscles in the body, particularly those in the lower limbs. They can also be done fairly continuously or repetitively and at a reasonably high intensity using up large amount of oxygen and energy. Such activities are particularly useful for improving and maintaining cardio respiratory endurance fitness or aerobic fitness. They are generally considered to be the most important activities for everyone irrespective of age, sex, level of health, fitness or socio-economic status. This is the most effective exercise for reduction of obesity. Aerobic exercises are usually the most highly recommended of all the exercises, and are suitable for all including patients with cardio-respiratory problems.

Aerobic exercise is essential to healthy cardio vascular fitness. Briefly, aerobic exercises are the activity that can be sustained for an extended period of time without building an oxYPGen deficiency in the muscle. It is the type of exercises that overloads the heart and lungs and causes them to work harder than that do when person is at rest.
Any exercise or activity that elevates the heart rate to one hundred and twenty beats per minute for athlete twelve minutes is said to be aerobic (Creggaing, 1984).

The traditional index of aerobic fitness is the maximum oxygen intake or aerobic power. Aerobic power is not synonymous with health related fitness, nevertheless, a large aerobic power is one of the most important physiological indicators of good physical conditions. It is necessary in many forms of strenuous occupational activity and the maintenance of aerobic power makes a major contribution of quality of life to old age.

Aerobic refers to a variety of activities like walking, jogging and running for a measured time. These produce beneficial changes in the body, especially the action of the lungs, heart and blood circulation (Mitchell and Dalc, 1980).

When oxygen is available in sufficient quantities aerobic metabolism provides energy for the working cells of the muscle. While the breakdown of glucose from glycogen is some for aerobic metabolism as like of anaerobic metabolism. But pyruvic acid molecules are not converted to lactic acid, instead they diffuse from the sarcoplasm fluid across the mitochondria membrane to the inside of the mitochondria, where a series of chemical reactions take place simultaneously. Performances of long duration activities like recreational jogging and long walking are aerobic activities. While the anaerobic breakdown of glycogen phosphagens contribute at the beginning of this sort of exercises, the energy provided for this type of work is provided for this type of work is provided nearly from the aerobic breakdown of fat glycogen
and glucose with little or no lactic acid productions. As the work is prolonged and the glucose supply is nearly depleted a greater contribution of the energy fuel comes from the stored fat as well as from the fatty acids in the blood (Larry G Shaver, 1982).

**Aerobic Training**

Aerobic training, also known as cardio-vascular training, is an activity of aerobic exercises that is sustained for a long period of time, that is rhythmic and that affects large muscle groups. Aerobic training impacts the cardio-vascular and circulatory system and makes your heart stronger and more efficient. Aerobics, step classes, water aerobics and swimming are examples of aerobic training involving the use of some type of equipment. Specific kinds of equipment that can be used specifically for aerobic exercises include treadmills, elliptical machines, bicycles and jump ropes. Also, active sports like football, basketball, hockey and such others are great for aerobic exercises.

Aerobic training is a type of exercises that improves the cardio-vascular system, strengthens the heart, and improves the body’s ability to deliver oxygen to the muscles, activities suitable for aerobic training includes rapid walking, running, swimming, bicycling, rowing and cross country.

Aerobic training can also be done without the use of equipment. Many people who do not have gym memberships or who do not want to purchase any kind of equipment engage in this option for aerobic exercise. Once again,
Aerobic exercises include activities that last for a long period of time with a high heart rate.

Jogging and running long distances are the most common forms of aerobic exercises that can be done without any kind of equipment. Another example of aerobic exercise, which is an alternative to jogging and running that many people actually find enjoyable and fun, is dancing. Specific kinds of dance include jazz, tap, hip hop and others.

**Aerobic Training and Lipids**

Consumed from foods of animal origin, including meat, fish, poultry, egg and dairy products, plant food, such as grains, fruits and vegetables and oils from these sources contain no dietary cholesterol. Serum Cholesterol Travels in the blood in district particles containing both lipid and proteins. Three major classes of lipoproteins are found in the serum of a fasting individual, low density lipoprotein (LDL) high-density lipoprotein (VLDL). Another lipoprotein class, intermediate-density lipoprotein (IDL) reseed between VLDL and LDL in clinical practice, IDL is included in the cholesterol not a fat but rather a lipid, which is a classification of molecules that includes fats. Cholesterol is vital to life and is found in all membranes. It is necessary for the production bile acids and steroid hormones. Dietary cholesterol is found only in animal foods. Abundant in organ meals and egg yolks, cholesterol is also continued in meals and poultry. Vegetable oils and shortenings are cholesterol free. Cholesterol high blood cholesterol is a risk factor in the development of coronary heart
disease. Most of the cholesterol that is found in the blood is manufactured by the body in the liver at a rate of about 800 to 1,500 milligrams a day in the form of lipoproteins. The most abundant lipoproteins include low density, high density and very low density lipoproteins LDL seems to be the culprit in coronary heart disease and is popularly known as the bad cholesterol by contrast, HDL is increasingly considered desirable and known as the good cholesterol (Durstine, et al., 2002).

Participation in aerobic activity on a daily basis produces significant health benefits, even if fitness levels do not increase. Improvements in health benefits depend on the volume (i.e., combination of frequency, intensity, and duration) of physical activity. HDL increases in response to endurance training. This response appears to be related to the exercise training dose and is less dramatic in women than in men. Moderate-intensity (60% of heart rate reserve) walking program is as effective as a high intensity (80% of heart rate reserve) program improving the HDL profile of women as long as the total training volume is similar (Morrow, et al., 2005).

Increasing daily physical activity and planned exercise contributes to health in many ways. Daily physical activity also increases the body’s capacity to do work, which increases the body’s ability to meet daily physical needs and the unexpected demands of life and reduces strain to many body systems and organs, including the heart. Furthermore, the more physical activity one completes each day the greater one’s daily energy expenditure and health-related benefits. This greater energy expenditure can also assist in weight loss.
Increased daily physical activity or planned exercise may in some instance reduce appetite while increasing basal metabolic rate, or the speed at which one’s body expands energy while at rest. These physiologic changes brought on by the increase daily physical activity is in part the reason why exercise is associated with reduced body weight and fat. Reduced body weight and reduced fat are also helpful in reducing blood cholesterol values and in changing the way that cholesterol is carried in the blood.

Regular aerobic training positively affect the blood lipid and lipoprotein profile. The scientific understanding is that physical activity or planned exercise positively alters blood triglyceride levels. However, total blood cholesterol is not usually changed after exercise training unless body weight is lowered or dietary composition is changed. What does happen is that the way cholesterol is carried by the blood lipoprotein is changed so that more of the good high density lipoprotein cholesterol is found in the blood \textit{(Durstine, et al., 2002)}. 

**Yoga**

Yoga comes from the Sanskrit word ‘Yuj’ which means ‘to unite’ or ‘to join’. People generally think that yoga is a series of exercises with twisted body poses, it is not so. The main aim of yoga is to help one connect with one’s inner spirit, which is connected to the universal spirit or God. Yoga creates a balance between the body and the mind and to attain self-enlightenment.
Yoga brings stability to the body and the wavering mind. In order to accomplish it, Yoga makes use of different movements, breathing exercises, relaxation technique and meditation. Yoga is associated with a healthy and lively lifestyle with a balanced approach to life.

Yoga is the union between the mind, body and spirit. It involves the practice of physical postures and poses, which is referred to as ‘Asana’ in Sanskrit. Our modern day lifestyle is too hectic and puts a lot of stress on us which in turn causes a lot of lifestyle problems like obesity, hypertension, high cholesterol, diabetes etc. Yoga is the answer to all these problems. It offers harmless solutions to these problems in the form of relaxation. Studies in the field of medicine suggest that yoga is the only form of physical activity that provides complete exercise to the body as it incorporates different aspects of science, philosophy and art. It is one of the most effective and integrated systems for gaining control and experiencing supreme joy in life.

Yoga helps one achieve optimum physical and psychological health. It is a system of physical, mental and spiritual techniques and is a practical, lively approach to life. It is the master key to open the realms of everlasting bliss and deep-residing peace. Major branches of yoga in Hindu philosophy include Raja Yoga, Karma Yoga, Jnana Yoga, Bhakti Yoga, and Hatha Yoga.

Yoga has gained immense popularity during the last few years and today over 30 million people practice yoga on regular basis. Yoga is the most rapidly growing health movement of today, despite having existed for thousands of years already.
Yoga is a simple and easy practice, acceptable to the people of all professions. In India, yoga exercises have been practiced since thousands of years. During the early days, yoga was confined to be practiced by the chosen few like the rishies, kings and princess, sidhas, religious heads, etc. Now it is accepted that many yoga exercises are suitable for all people and are recommended for long living and healthy life. The practice of yoga has also been made systematic by the exponent of the system, Patanjali being an important teacher. The yoga exercises, according to Patanjali have to practice in a systematic way; he advocates eight steps of progressive achievement, namely abstention (yama), regulations discipline (niyama), easy posture (asana), control of breathing (pranayama), sense of control (pratyahara), concentration (dharana), meditation (dhyana) and super conscious state (samadhi). Of these asanas and pranayamas are very popular and very few people go beyond the steps. These yoga exercises improve the functioning of organs and upgrade the mental and body efficiency of the practitioners.

Yoga, a vedic science has been applied in the field of therapeutics in modern times. Yoga has given patients the hope to reduce medication besides slowing the progression of the disease. Yoga employs stable postures or asana and breath control or pranayama. It has already proven its mettle in the improvement of oxidative stress as well as in improving the glycaemic status of diabetics through neuroendocrinal mechanism (Yadav, et al., 2005).

Pratyahara should be aided by quiet breathing. When all are agitated our breathing is fast and jerky, but if we breathe quietly and evenly tranquility of
mind is promoted. Oxygen is the vital fuel of life. It powers all human activity, from the metabolism of a single cell to the concentration of a muscle. Breathing is the activity that takes oxygen into the body from the air— in rough terms. 20 percent of air is made up of oxygen and 80 percent of nitrogen— and expels carbon dioxide, which is the waste product produced using oxygen. And since the body does not store oxygen, except for a small amount that is held in the muscle, its supply must be continuous. As we inhale, air is sucked into the lungs, where it passes through tubes of descending size—the trachea, bronchi, and bronchiole— until it reaches tiny sacs called alveoli (Sunder, 2009).

Yoga is an ancient form of relaxation and exercise that has many health benefits, including lowering cholesterol. Pranayama also helps to connect the body to its battery, the solar plexus, where tremendous potential energy is stored. When tapped through specific techniques this vital energy, or prana, is released for physical, mental and spiritual rejuvenation. Regular practice removes obstructions, which impede the flow of vital energy. When the cells work in unison, they bring back harmony and health to the system. 20 to 25 minutes (every morning or evening) of pranayama practice increases lung capacity, breathing efficiency, circulation, cardiovascular efficiency, helps to normalize blood pressure, strengthens and tones the nervous system, combats anxiety and depression, improves sleep, digestion and excretory functions, provides massATGe to the internal organs, stimulates the glands, enhances endocrine functions, normalizes body weight, provides great conditioning for
weight loss, improves skin tone and complexion (Sugumar and Raghavan, 2010).

**Concept of Yoga**

Yoga is the seeking and the effort. Conscious and subconscious for a longer and fuller life, the plentitude of being for knowledge power love and bliss for the union of the human individual with the universal and the transcendent for the growth of consciousness in depth in width and in height for the fullest development of the potentialities of human nature for the union of man with god and the manifestation of the divine on earth.

Hatha-yoga is the first and foremost yoga - although this fact is often forgotten. The term ‘Yoga’ which is in etymology related to the French ‘Joug’ meaning ‘Yoke’ a word reappearing in the adjective ‘conjugal’ is taken to have two principal meanings which are furthermore closely connected. The state of yoga is that in which man is ‘yoked together’ with the divine an idea expressed in the word religion. In a slightly different sense, yoga satisfies the state in which the apparent man binds himself like wise to the real man that is to say recovers his true nature and lives. According to it the technique of yoga is the discipline in water from it is practiced by which man attempts to attain the state of yoga.

According to literature sources, ‘yoga’ is not doing various kinds of asanas as perceived by the present day generation, but practicing eight stages of yoga as suggested by the ancient sages of India. These eight stages together
they called as ‘Astanga Yoga’. These eight stages of yoga are yama or social discipline, niyama or individual discipline, asanas or postures, pranayama or breath control, prathyahara or discipline of the senses, dharana or concentration, dhyana or meditation and samadhi or self-realization.

Performing asanas is only one aspect of integral yoga. The group of dharana, dhyana and samadhi is called ‘Samyama’ or the internal yoga in the science of yoga. The first five stages yama, niyama, asana, pranayama and prathyahara constitute the external yoga. If all these five stages are practiced and followed in life virtues like morality, sound conduct and good character are developed in man. Besides there is all round progress in human life. Physically, intellectually and spiritually man attains physical fitness and mental equanimity (Dr. P.D. Sarma, 1996).

**Yogic Practices**

The present age of speed and competition has increased the stresses and strains. It is resulting in lifestyle related health problems such as obesity, diabetes mellitus, hypertension and coronary artery disease (Deshpande, et al., 2008).

Yoga and pranayama can solve the above problems by free of cost. Hence, yoga and pranayama has been incorporated into modern medicine during recent decades. Yoga is the best lifestyle modification which aims to attain the unity of mind, body and spirit through asana/exercise, pranayama and meditation. Breath is a dynamic bridge between the body and mind. Hence, life
experiences can distort breathing pattern. Pranayama is the art of prolongation and control of breath that helps in bringing conscious awareness to breathing and reshaping habits and patterns (Ankad, et al., 2011).

The practice of yoga includes suryanamaskara and different types of following pranayamas:

1. Bastrika
2. Kapalabhati
3. Bahya Pranayama
4. Anuloma and Viloma
5. Bhramari Pranayama
6. Udgeetha Pranayama

Asanas

A yoga posture is usually called an asana, though sometimes it is called a pitha. Both these sanskrit words literally means “seat”. Overtime, the term asana in the parlance of yoga became associated with the physical position or posture assumed by the yogin or the practitioner of yoga.

Most of the postures that are learnt in a typical yoga class were developed over the last thousand years by practitioners of hatha-yoga, the yoga of force. These postures aim to improve our physical and mental flexibility and fitness (dridhata) to calm, purify and energize our body, mind and to destroy
disease and death, which delivers us from the distractions and limitations of poor health and establishes a hospitable physical environment for our spiritual training.

**Suryanamaskara**

Suryanamaskar is known variously as prostrations to Sun or Sun Salutation, the suryanamaskar is one of the best exercises that people can perform. The benefits accruing from these exercises are unique and excellent. This is a yoga based exercise and it is customary to perform suryanamaskar after performing loosening yoga exercises. The human being can be thought of consisting of ‘pancha kosas’ (or five sheaths) consisting of the Annamaya (Body), Pranamaya (or Breath), Manomaya (Mind), Vijnanamaya (Intellect) and Anandamaya (Bliss) sheaths. These same five kosas can be further grouped into Gross (Sthula), the Annamaya or body sheath, Subtle (Sukshma) consisting of the pranic, mental and intellectual sheaths and the Causal (Karana), the Bliss sheath. Properly performed suryanamaskar impacts and influences all five sheaths – the body, the breath, the mind, the intellect and the bliss - thus providing to the performers of these exercises the benefits for the Sthula (Gross), Sukshma (Subtle) and Kaarana (Causal) bodies. Whereas conventional exercises of all forms including aerobic, weight lifting, walking, jogging and running are designed to provide benefits to the physical body and its various component organs including joints and muscles, suryanamaskar provides benefits of a holistic nature by working on the physical body, praana
(breathing), mind, intellect and the bliss components (kosas) of the entire human personality. In that sense, suryanamaskar can be considered to be a personality development tool and must be included as part of one’s wellness program.

The suryanamaskar is performed usually early in the morning facing the morning rising Sun. The Namskar is done in 12 steps, each step having its own posture (including position and form) with its own breathing pattern (inhalation or exhalation), and its own mantra.

**Bhastrrika Pranayama**

In this, sit in any comfortable position and inhale till diaphragm is full and exhale with force, this is known as Bhastrrika Pranayama and should be done according to individual capacity in three different ways, slow, medium and fast. This pranayama should be practiced for three to five minutes *(Ramdevji, 2000)*.

**Kapalbhati Pranayama**

‘Kapal’ means ‘brain’ and ‘bhati’ means ‘light or shine or brightness’. This is slightly different from Bhastrrika Pranayam. In this inhaling, exhaling is done with the same speed but in Kapalbhati force is laid on exhaling with full force. In this do not try to inhale but air enters automatically while exhaling. The exhaling process should be with full concentration *(Ramdevji, 2000)*.
Bahya Pranayama

In this sit in Padmasana and exhale all at once completely with full force then do Moolbandha, Uddiyan and Jalandhara bandha and control the breath outside for a long possible. Then remove all three bandha and breathe normally. Inhale and repeat the pranayama without stopping it up to 3-7 times according to capacity (Ramdevji, 2000).

Anuloma-viloma Pranayama

This is one of the most important Pranayama that helps us to bring balance between the distance of the dominance of left and right hemispheres of the human brain. In this press right nostril with right thumb and breath in completely from left nostril then close the left nostril with middle and ring finger and exhale completely from right nostril. Then inhale from right nostril and exhale from left nostril (Ramdevji, 2000).

Brahmari Pranayam

Inhale and press the nostrils with the tips of middle fingers and concentrate in between the two eyes. Close both ears with thumbs and make a sound like ‘Om’. Repeat it once ATGain and do at least 3-21 times according to capacity. This pranayama should be done with full concentration and deep devotion towards God (Ramadevji, 2000).
Udgeetha Pranayama

Inhalation and exhalation should be long, slow, soft and subtle. Inhale slowly and when ready to exhale, chant Om slowly and steadily. With practice, lengthen each breath to one-minute, that is, to say inhalation and exhalation should total one-minute of time. Visualize the breath entering and moving inside the body. Beginners may feel the breath just in their nose but with practice and proper concentration, they may feel the "touch" of the breath inside their whole self (Sharma, 2006).

Ujjayee Pranayama

Bring your mind to the throat and contract it (referring to glottal contraction). Throat contraction is just like when you close the fist by contracting your hand. Beginners should first simply practice inhaling and contracting the throat and making short sounds like "oo" "oo" several times during one inhalation. Having acquired the awareness of throat contraction and some voluntary control over throat contraction, you are ready to practice Ujjayi. Deeply inhale while contracting the throat and making a sharp shrilling sound like "OO" (Sharma, 2006).

Yoga and Lipid Profiles

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

Biochemical advantages of yoga: It lessens in an amount of glucose, sodium, cholesterol, triglycerides, catecholamines, total white blood cell count, boosts the level of cholinesterase, ATPase, hemoglobin, hematocrit, lymphocyte count, vitamin C, thyroxin, total serum protein (Harshika, 2010).

Comprehensive studies done on large populations in the past 15 years have proven that reducing cholesterol and keeping the blood pressure under check can significantly reduce coronary artery diseases. There was a time
when a total cholesterol level of 240 mg was considered normal. However, by 1986 itself, the threshold was fixed at 200 mg. In recent times, though the threshold for total cholesterol has remained at 200 mg, the cut-off point for LDL or bad cholesterol has been lowered to 75 mg. (Howard, 2010).

**Yoga and Aerobic Training**

Yoga principle involves slow movement and maintaining poise and balance. It is based on stretching relaxation, deep breathing and body flexibility and increasing blood circulation and concentration. Aerobic training lay emphasis on strong movements of the muscles where as yoga opposes violent muscle movements, as they produce large quantity of lactic acid in the muscle fibers. Aerobic training causes fatigue. Rapid movements of the muscle cause tremendous strain on the heart. Muscular development of the body does not necessarily means the healthy body. In yoga, all the movements are slow and motionless and gradual with proper breathing.

Yogic postures and breathing exercises unlike aerobic training do not strain the cardiovascular system, and they improve physical fitness and endurance. Aerobic training has repetitive movements, whereas yoga exercises involve very little movement and are only postures which are to be maintained for a period of time. Yogic postures tone up both the body and the mind whereas aerobic training affect mainly the body. Postures involve concentration on certain parts of the body and the result is a toning up of both the mind and the body. The caloric requirement in yogic asanas varies from 0.8 to 3 calories
per minute while the caloric requirement of aerobic training varies from 3 to 30 calories per minute.

The main purpose of the aerobic training 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. The elasticity of muscles plays an important role to keep the body youthful. Yoga gives a good training to spinal column and other joints that they maintain and even supply blood to every part of the body. 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 the yoga practice will be immediately relaxed and they carry more energy to the muscle fibers. So, more energy flows in to the relaxed muscles. Aerobic training can not be done in old age. But there is no age limit to practice yoga. Aerobic training needs more food. Yoga need moderate food. Fatigue appears after doing aerobic training. Fatigue disappears if yoga and pranayama is practiced. Tension increase and nerves are more tightened through aerobic training. Nerves and body muscles are relaxed by yoga. Aerobic training need instruments, large place, etc. Yoga can be practiced in open space without any instruments. Aerobic training wastes more energy due to quick movements and more lactic acids are formed in the muscle fibers. Energy is not wasted in yoga practice.
Yogic exercises are so designed that they help to keep the spine flexible and joint supple. Yogic exercises will be useful for 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 aerobic training there is mainly an increase in respiratory rate. Aerobic training should not be standard without thorough physical examination. Yogic posture are generally mild and one is less likely to get in to complication, but aerobic training, which is most popular in the western world today, should never be undertaken unless the individual is fully evaluated by his physician. The physician should look for signs and symptoms and taken an electrocardiogram at rest and after exercises to detect an over sub clinical heart disease.

The understanding of the various training methodology among the physical education professionals may not be sufficient enough to use the principles in the actual training process. After studying the above training the scholar has concluded that modifications in the training will help for enhancing health related physical fitness, basal metabolic rate, and blood lipid profiles. Hence, the scholar made an attempt to find out the influence of aerobic training and yogic practices on health related physical fitness, basal metabolic rate, and blood lipid profiles among the obese college men. Tons of people are on bettering their cardio-respiratory health and maintain the lipid profile with
yogic practices and aerobic training by stretching the main muscles or muscle groups.

**OBJECTIVES OF THE STUDY**

- To determine the prevalence of ascertain factors related to obese college men in and around Anantapuramu town, Andhra Pradesh, India.
- To find out the influence of aerobic training and yogic practices on health related physical fitness such as cardio respiratory endurance, flexibility, muscular strength and endurance and body composition of obese college men.
- To find out the influence of aerobic training and yogic practices on body fat, body mass index, and fat free mass of obese college men.
- To assess the influence of the aerobic training and yogic practices on basal metabolic rate of obese college men.
- To identify the blood lipid profile variables such as total cholesterol, triglycerides, LDL-Cholesterol and HDL-Cholesterol before and after the twelve weeks of the aerobic training and yogic practices programme of obese college men.

**STATEMENT OF THE PROBLEM**

The purpose of the present study was to find out the impact of aerobic training and yogic practices on health related physical fitness, basal metabolic rate, and blood lipid profiles of obese college men.
DELIMITATIONS

The study was delimited to the following factors.

- To achieve the purpose of the study, 45 obese college men were selected at random from around Anantapuramu town, Andhra Pradesh, India.
- Selected subjects were divided into three equal groups namely experimental Group I (ATG=15) underwent aerobic training, Group II (YPG=15) underwent yogic practices, and Group III served as control (CG=15).
- The age of the subjects were ranged between 18-22 years.
- The dependent variables selected for this study were: health related physical fitness components, i.e. cardio-respiratory endurance, flexibility, muscular strength and endurance and body composition (BMI), basal metabolic rate and blood lipid profiles were HDL-C, LDL-C, total cholesterol, and triglycerides.
- The aerobic training and yogic practices were considered as independent variables.
- The duration of the training period was restricted to twelve weeks and the number of days per week was confined to three.
- The level of significance was fixed at 0.05 level, which was considered to be appropriate.
- The data were collected prior to and immediately after the training period.
LIMITATIONS

The following factors are the limitations of the study since the researcher could not have control over them.

- No effort was put in order to find out the effect of environmental changes during pre and post tests and the training period. However, dry weather prevailed mostly.
- Though the subjects were motivated verbally, no attempt was made to differentiate their motivation level during the testing and training period.
- Since the subjects were non-hostellers, the investigator did not take any effort to control and assess the quality and quantity of food taken by everyone.
- The quantum of physical exertion, lifestyle and physiological stress and other factors that affect the metabolic functions were also considered as limitations.
- Previous physical training in sports and games were not taken into consideration.

HYPOTHESES

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

1. There would be significant differences due to the influence of aerobic training and yogic practices on health related physical fitness variables such as cardio respiratory endurance, flexibility, body composition and muscular strength and endurance of obese college men.

2. There would be significant differences due to the influence of aerobic training and yogic practices on basal metabolic rate of obese college men.

3. There would be significant differences due to the influence of aerobic training and yogic practices on blood lipids profiles such as total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL) and triglycerides of obese college men.

4. There would not be significant difference between aerobic training and yogic practices group on health related physical fitness variables, basal metabolic rate and blood lipid profiles of obese college men.

**SIGNIFICANCE OF THE STUDY**

Though there are several training methods, which are recommended for the change of health related fitness, basal metabolic rate and blood lipid profile variables on obese college men the aerobic training and yogic practices have not been conducted in an exhaustive manner in India. Therefore, the investigator reviewed literature and found the scarcity of studies on training on selected dependent variables.
The findings of this study will be of significant in the following ways:

- The findings of the study may add to the existing source of knowledge with regard to the aerobic training and yogic practices among obese college men on health related physical fitness, basal metabolic rate and blood lipid profiles.
- This study may help to know the increase/decrease the lipoprotein levels among obese college men due to the effect of aerobic training and yogic practices.
- The findings of this study may also help the doctors/coaches to identify the appropriate methods among the two types namely, aerobic training and yogic practices, to improve the health related physical fitness and maintain the level of blood lipid profiles.
- The findings of the study will add to the quantum of knowledge in the level of improvement on selected criterion variables among the obese college men.
- The findings of the study may help the individuals to compare and contrast the changes that occur in health related physical fitness and lipid profile variables before and after the aerobic training and yogic practices.

**DEFINITIONS AND EXPLANATION OF THE TERMS**

**Obesity**
Obesity is an excessive amount of body fat in relation to body weight and is not synonymous with overweight. Over weight is defined as a body mass index (BMI) between 25 to 29.9 kg/m². Obesity is defined as a BMI of 30 kg/m² and more (Heyward, 2002).

**Man**

An adult male human being (Cambridge English Dictionary).

**Obese College Men**

The college male students who suffered with the obese problem are referred as obese college men in this research.

**Training**

Training may be defined as, “systematic process of repetitive progressive exercise or work involving the learning process and acclimatization” (Arnhein, 1985).

**Aerobic Training**

Aerobic training is a progressive physical conditioning program that stimulates cardio respiratory activity for a time period sufficiently long to produce beneficial changes in the body aerobic type of exercise, running and skipping exercise. During unsupervised sessions, the physical exercise could have included stretching, short sprints and relaxation exercise.

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

**Asanas**

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

**Yogic Practices**

In the current study, the yogic practice during supervised sessions was the various types of asanas and pranayama were practiced. During unsupervised sessions, the yogic practice could have included stretching and rotation exercise.

**Pranayama**

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

**Health Related Physical Fitness**

The physical fitness parameters associated with health, i.e. cardio-respiratory endurance, flexibility, body composition, muscular strength and endurance (Morrow, 2005).

**Cardio-Respiratory Endurance**
It is the ability to perform dynamic exercise involving large muscle groups at moderate to high intensity for prolonged periods *(Heyward, 2002).*

**Flexibility**

It is most frequently given as “the range of movement about a joint” *(Mathews, 1958).*

**Muscular Strength and Endurance**

It is defined as the ability of a muscle group to develop maximal contractile force against a resistance in a single contraction *(Heyward, 2002).*

**Body Composition**

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

**Basal Metabolic Rate**

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

**High-Density Lipoprotein**

HDL (high-density lipoprotein) cholesterol, known as "good" cholesterol because elevated levels decrease coronary heart disease risk, should account
for at least 25 percent of one’s total cholesterol. HDL transports cholesterol from the cells back to the liver so it can be excreted.

**Low-Density Lipoprotein**

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

**Total Cholesterol**

The total cholesterol is defined as the sum of HDL, LDL and VLDL.

**Triglycerides**

Cholesterol and triglycerides are two forms of lipid, or fat. Both cholesterol and triglycerides are necessary for life itself. Triglycerides, which are chains of high-energy fatty acids, provide much of the energy needed for cells to function.