Chapter I

INTRODUCTION

“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)

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 a 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 randomised 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 over-weight 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 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)

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:

1. Physical Exercise training and
2. Yogic Practices

**Physical Exercise Training**

Physical conditioning programme provides an opportunity for the development and maintenance of physical fitness. It offers an opportunity for the facilitation of normal growth of a child and prevents the reversal factors of the performance such as strength, endurance, flexibility, speed and skill. By undergoing a physical conditioning programme, one experiences a number of changes that make better performance and faster recovery possible. Through repeated muscular
work, strength is gained and as a result one can produce more power as there is a faster contraction, which means, gain in both power and speed. Conditioning the body through regular exercise enables an individual to meet emergencies more effectively.

Training and conditioning are the best known ways, to prepare the players for efficient performance and healthful living. Efficient performance is possible only through a carefully planned programme of progressive practice, which will perfect the co-ordination, eliminate unnecessary movements and accomplish a result at the expense of minimum energy as well as conditioning the muscle structure and the circulation to withstand without harming the intensive demands made upon them. *(Kirtani, 2003)*

The exercise intensity of an activity or movement indicates how much power or force is used in performing that exercise. The intensity of an activity determines how much and what type of fuel is needed to provide the energy required for that exercise. Any activity that burns 3.5 to 7 kcal/8/min or the equal end of 3 to 6 metabolic equivalents and results in achieving 60 to 73 percent of peak heart rate. An estimate of a person’s peak heart can be obtained by subtracting the person’s age100m/220. Example moderate physical activities include walking briskly moving the lawn, dancing, swimming, or bicycling a level terrain. A person should be some excretion but should be able tom carry and a conversation comfortably during the activity. Any activity that burns more than 7 kcal/min or the equivalent of 6 or more metabolic
equivalent and results in achieving 74 to 88 percent of peak heart rate. An estimate of person’s peak heart rate can be obtained by subtracting the person’s ages obtained by subtracting the person’ age from 220. Example of vigorous physical activity includes jogging moving. The lawn with a no motorized push mover, chopping wood, participating in high impact aerobic dancing, swimming continuous laps, or bicycling uphill. Vigorous intensity physical activity may be intense enough to represent a substantial challenge to an individual and results in a significant increase in heart and breathing rate. Vigorous activity full of physical or mental strength or active force carried out forcefully and energetically. *(Mc Donald, 2010)*

If one is in good health, there are many exercises one probably can begin safely without seeing a doctor. The decision in each case depends on the exercise and one’s age, weight and level of physical activity. The more vigorous the exercise, the more important a physical checkup becomes. The bathroom scale is an untrustworthy instrument for measuring how fat one are the table that relates weight to overweight are crude. But an easy to use home procedure for gauging one’s percentage of body fat requires only three body measurements for male: forearm, buttocks and calf. Female: abdomen, thigh, buttocks and upper arm. A percentage above 15% for men or more than 25% for women is considered a health hazard and should be reduced by exercise and diet. Exercise can help one shed excess weight if it makes one expend more energy in physical activity than one get from the food one
eat. Some exercises are better than others as reducing aids, and some help hardly at all. Best for reducing are endurance exercises such as running and bicycling, which burns calories faster than the others. Despite the obvious benefits that exercise can confer, some people seem unable to start an active program and continue it regularly. Exercise can be pleasurable. If one can manage to get through the initial weeks, when the dropout rate is highest, one will probably discover, as millions of others have before one, that one want to continue not because of the uncertain promise of some future benefit, but because regular exercise soon becomes a pleasure and makes one feel good. One will be more relaxed and confident. One will sleep better, and one may even lose weight. Once one has started exercising regularly, one may one hooked for life. Every exercise in which muscle contract makes them stronger. With aerobic exercise, heart muscle is strengthened so that it can pump a greater volume of blood through one’s body. Sit-ups done in search of a trimmer middle strengthen abdominal muscles. In those examples, muscular strength is an incidental benefit of exercise done for some other purpose. One can become stronger faster. However, if one exercise in a way that is designed to promote strength. For fastest progress with the least wasted effort, exercise two or three times a week, a schedule similar to one for strengthening one’s heart or shaping up one’s body.  

*(Gilmore, 1981)*

Using short-term exercise training studies to predict how long-term exercise training will affect a body composition is fraught with
problems since the changes are likely to be exponential in nature and eventually plateau. Cross-sectional comparisons between habitual exercisers and sedentary individuals provide some insight as to how long-term exercise training may affect the body composition, but these comparisons suffer from self-selection bias. Since exercise training-induced changes in body composition are dependent on various external factors (e.g., gender, age, genetic makeup), changes in body composition following an exercise training program vary greatly among individuals. 

(Ballor, 1996)

Physical Exercise 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 moderate-intensity physical 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
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 physical activity 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. *(Durstine, et al., 2002)*

**Yoga Training**

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 massage to the internal organs, stimulates the glands, enhances endocrine functions, normalizes body weight, provides great conditioning for weight loss, improves skin tone and complexion. 

*(Sugumar and Raghavan, 2010)*

**Yoga and Lipid Profiles**

The dynamic series known as surya namaskara (salutation to the sun) is most important for the treatment of obesity. Surya namaskara is a complete practice in itself because it includes asana, pranayama, mantra and meditation. This practice has a unique influence on the endocrine and nervous system, helping to correct metabolic imbalances that cause and perpetuate obesity. Being a dynamic practice, it is also an excellent exercise equated to cycling, jogging or swimming. There are several fairly obvious physical factors in the yogic lifestyle that would influence health and aging, as well as more subtle factors. Calorie restriction (CR) is widely accepted as the only method so far proven to extend longevity and reduce the physical manifestations of 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)*

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 lipid profiles. Hence, the scholar made an attempt to find out
the influence of physical exercise and yoga practices on health related physical fitness, basal metabolic rate, and lipid profiles among the obese adolescents. Tons of people are on bettering their cardio-respiratory health and maintain the lipid profile with yogic practices and physical exercise by stretching the main muscles or muscle groups.

**OBJECTIVES OF THE STUDY**

- To determine the prevalence of ascertain factors related to obese school boys in and around Tirunelveli town area, Tamil Nadu, India.
- To find out the influence of physical exercises and yogic practices on health related physical fitness such as cardio respiratory endurance, flexibility, muscular strength and endurance and body composition of obese adolescents.
- To find out the influence of physical exercises and yogic practices on body fat, body mass index, and fat free mass of obese adolescents.
- To assess the influence of the physical exercises and yogic practices programme on basal metabolic rate.
- To identify the lipid profile variables such as total cholesterol, triglycerides, LDL-Cholesterol and HDL-Cholesterol before and after the twelve weeks of the physical exercises and yogic practices programme of obese adolescents.
STATEMENT OF THE PROBLEM

The purpose of the present study was to find out the effect of physical exercises and yogic practices on health related physical fitness, basal metabolic rate, and lipid profile variables of obese adolescents.

DELIMITATIONS

The study was delimited to the following factors.

1. To achieve the purpose of the study, 45 obese adolescent school boys were selected at random from in and around Tirunelveli town, TamilNadu, India.
2. Selected subjects were divided into three equal groups namely experimental group I (PEG=15) underwent physical exercise training. Group II (YPG=15) underwent yogic practices, and Group III served as control (CG=15).
3. The age of the subjects were ranged between 13-18 years.
4. The following dependent variables were selected for this study cardio-respiratory endurance, flexibility, muscular strength and endurance and body composition (BMI), Basal metabolic rate and lipid profiles were HDL-C, LDL-C, TC, and TG.
5. The physical exercise and yogic practices were considered as independent variables.
6. The duration of the training period was restricted to twelve weeks and the number of days per week was confined to three.
7. The level of significance was fixed at 0.05 level, which was considered to be appropriate.
8. 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.

1. 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.

2. Though the subjects were motivated verbally, no attempt was made to differentiate their motivation level during the testing and training period.

3. 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.

4. The quantum of physical exertion, lifestyle and physiological stress and other factors that affect the metabolic functions were also considered as limitations.

5. 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 physical exercises and yogic practices on health related physical
fitness variables such as cardio respiratory endurance, flexibility, body composition and muscular strength and endurance of obese adolescents.

2. There would be significant differences due to the influence of physical exercises and yogic practices on basal metabolic rate of obese adolescents.

3. There would be significant differences due to the influence of physical exercises and yogic practices on lipids profiles such as total cholesterol, low-density lipoprotein, high-density lipoprotein and triglycerides of obese adolescents.

4. There would not be significant difference between a physical exercises group and yogic practices group on health related physical fitness variables, BMR and lipid profiles of obese adolescents.

**SIGNIFICANCE OF THE STUDY**

Though there are several training methods, which are recommended for the change of health related fitness, basal metabolic rate and lipid profile variables on obese adolescents the physical exercise and yogic practice 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:

1. The findings of the study may add to the existing source of knowledge with regard to the training among obese adolescents on health related physical fitness, basal metabolic rate and lipid profiles.

2. This study may help to know the increase/decrease the lipoprotein levels among male due to the effect of physical exercise and yogic training methods.

3. The findings of this study may also help the doctors/coaches to identify the appropriate methods among the two types namely, physical exercise and yogic practices, to improve the health related physical fitness and maintain the level of lipid profiles.

4. The findings of the study will add to the quantum of knowledge in the level of improvement on selected criterion variables among the obese adolescents.

5. 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 physical exercise and yogic practices.

6. The study promotes research and growth in applying choreography in the field of physical exercise and yogic practice.
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. Overweight is defined as a body mass index (BMI) between 25 to 29.9 kg/m$^2$. Obesity is defined as a BMI of 30 kg/m$^2$ and more. (Heyward, 2002)

Adolescents

An adolescent is the time of growing up from childhood to adulthood or the period of life between puberty and maturity. The age span is defined differently, depending on the conceptualization of adolescents. The world health organization (WHO) defines adolescents as the period between the ages of 10 and 19 years. An adolescent is a transitional stage of development involving intense biological, social and psychological changes. (Wilhelm, 2008)

Obese Adolescents

The students who suffered with the obese problem are referred as obese adolescents 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)
Yoga

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

Asanas

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

Pranayama

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

Yogic Practice

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.

Physical Exercise training

Physical exercises are generally grouped into three types, depending on the overall effect they have on the human body: Flexibility aerobic and anaerobic exercises.

In the current study, the physical exercise during supervised sessions was the various types of exercises were performed namely
aerobic type of exercise, running and skipping exercise. During unsupervised sessions, the physical exercise could have included stretching, short sprints and relaxation exercise.

**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.