Chapter I

INTRODUCTION

Physical fitness is considered as the most desirable lifestyle component of human beings to lead healthy and very active life. This aspect of the human life is now given so much of importance and studied worldwide very extensively. The physical educators around the world sponsor for the concept of all round development of the human beings through the physical activities. All round development of the individual encompasses the development of the individual’s physical, mental, social and emotional aspects. Since, the development of all these domains in the individuals is sought by the physical educators by means of physical activities; optimum level of physical fitness is an ideal pre-requisite for the individuals to participate in such kind of physical activities. To participate in any kind of physical activity requires minimum or optimum amount of physical fitness and the development of the required physical fitness is an important aspect. But, development of the physical fitness depends on the participation in physical activities. In this way, the physical fitness and participation in physical activities are interrelated and mutual.

The physical aspect of the development denotes the development of the individual’s physique and its various systems to the optimum, so that the bodily status of the individual is optimally high, so as not to get affected by diseases, injuries and also to carry on the physical rigors of the day to day life.
without much stress. This is possible only when the individual’s body is functionally well developed with regard to all the systems of the body and all these systems perform to the best of their required status, then the individual is said to have very good physical development. So, the physical and physiological efficiency leads to the health of the individuals, which in turn makes the individual to participate more efficiently and more vigorously in physical activities so that the individual’s physical and physiological status will grow further.

With regard to mental development, a person should possess a highly developed neuromuscular coordination and latently the intellectual development, which can ensure the person to execute very graceful and coordinated physical movements. Strengthening of the neuromuscular junctions and development of these apparatuses in the body is an essential aspect to have this kind of development in the individuals. Though there are other aspects which intervene in this area of development, the neurological basis is the main component of requisite development. Frequent participation in scientifically molded exercises and physical activities will make an individual to attain more coordination in physical activities and the efficiency in movement patterns grows leaps and bounds. This change is possible through the regular involvement of motor cortex and streamlining of the neuronal patterns thereby strengthening the neuro-muscular junctions, to attain the higher order efficiency in motor activities of complex in nature. This enhancement in the motor activity functioning will make an individual to
develop more interest and easiness in participating the physical activities. This enhances stimulation in participation of the more complex physical skill that makes an individual more agile and dexterous in tackling more complex physical skills. This elevated physical capacity will help an individual to develop one’s physical fitness status further and this increased physical fitness status encourages the person to participate more conveniently in increased physical activities and in this way the person goes on increasing the physical fitness levels. This way a person becomes more physically fit and thereby becomes very healthy. Development of social skill and the emotional balancing capacity of the individuals are other two aspects of the concept of all round development through the physical education programmes.

Physical fitness being the prime factor of consideration for the physical educationists and coaches around the world, as it is essential for the participation of health related physical fitness activities and in highly skilled sporting activities. A person with optimum and sufficient level of physical fitness can participate in the physical activities and vice versa, by participating in the physical activities one can improve the status of the physical fitness. Though optimum physical fitness is an unfathomable phenomenon it would be better to delimit the discussion to the meaning of physical fitness and the components of physical fitness.

Physical fitness, is a specialized concept and the meaning of the term physical fitness, is also highly volatile, since the meaning of this term is drawn
as per the requirement of the specialized area. For physical education teachers and for health professionals the meaning of this term revolves around the health and happy living. In view of physical educationist and a health or fitness experts the meaning of physical fitness denotes, the fitness of an individual in physical terms to meet the exercise demands without getting undue fatigue to develop the optimum health and also to posses higher levels of functional efficiency of various systems of the body so that the individual is not prone to deadly degenerative diseases like diabetes mellitus, hypertension, coronary heart diseases, atherosclerosis, osteoporosis, certain types of cancers etc. In this perspective physical fitness means optimum levels of the fitness of the various systems so as an individual can lead a healthy life and can participate in the health promoting physical activities.

**Physical Fitness**

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.

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

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 coordination. 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 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 view point 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, circulorespiratory 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 healths 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.

Cardio circulatory or Circulorespiratory endurance
There are many adaptations in the cardio-circulatory mechanisms due to the regular exercises. The following are some of the important adaptations in this aspect of the human performance.

**Increase in the efficiency of the Cardiac output** Certain types of exercises especially the endurance type exercises help in increasing the cardiac output, by enhancing the stroke volume of the heart. Endurance training causes the sinus node of the heart to come under greater influence of acetylcholine, the parasympathetic hormone that has a slowing effect on heart rate. This is probably accompanied by a concomitant reduction is resting sympathetic activity. This training adaptation leads to the lower resting heart rates for the endurance trained persons. This phenomenon is called as bradycardia.

Increase in the maximum cardiac output directly affects a person’s capacity to circulate oxygen. An increase in maximum cardiac output clearly results in a proportionate increase in the potential for aerobic metabolism. The maximum oxygen uptake is determined by the maximum cardiac output and the maximum a-VO$_2$ difference, and hence the ability to generate a large a-VO$_2$ difference is enhancing by endurance training. Regularly involving in the physical activities of aerobic type can lead to the increased elasticity in the arterial walls and there by the arterial blood flow is increased with less resistance on the wall of the arteries.

**Muscular Endurance**
There are myriad of positive adaptations in the muscular system through the muscular endurance training. Since, the muscular endurance indicates the ability of a muscle or group of muscles to continue contracting over an extended time against moderate resistance, this ability is very essential to make a person to involve in various sporting activities or physical exercises of moderate intensity and difficulty to enhance the other abilities of the health related physical fitness.

Since, the exercise programmes makes the muscular oxygen consumption increases nearly seventy times above the resting level, there are long term adaptations in the local vascular bed. More mitochondrial efficiency is also seen through the regular involvement in aerobic type exercises. Concentrations of myoglobin in the muscle fibers is also seen increased because of the regular muscular contractions of aerobic type and in this way the person who involves in regular physical activity or exercises can improve the muscular endurance levels and thereby can participate more comfortably in further physical exercises.

**Muscular Strength**

The capacity for the muscular strength is largely determined by physiological factors such as size and type of muscle fibers as well as by the anatomic lever arrangements of bone and muscle. This strength capacity is probably greatly affected by neural influence from the central nervous system also. Regular strength training exercises and participation in physical activities
may lead to the enhancement of the neuro-muscular coordination and there by leading to the expertise in tackling the complex sports skills and participation. Increases in strength with overload training are due to improved capacity for motor unit recruitment and changes in the functional efficiency of the firing pattern of motor nerves. Significantly greater delayed onset of muscle soreness (DOMS) occurs in concentric muscular contractions of regular in nature.

**Body Composition**

This component of the health related physical fitness is very important and hence an exhaustive explanation is essential.

There are three major structural components in the human body. They are muscle, fat and bone portions. Among these three components the muscle and fat portions are dealt with utmost seriousness. The lean body weight portion and the relative fat portion in the total body weight of a person are more importantly considered in health related physical fitness. Lean body weight is derived by subtracting the fat weight of the person from the total body weight, though in L.B.W (Lean Body Weight) some portion of essential fat is also hidden. Only the storage fat portion is deducted from body weight to attain the lean body weight of a person.

\[
\text{Total Body Weight} = \text{Lean Body Weight} + \text{Storage Fat.}
\]

\[
\text{Lean Body Weight} = \text{Muscle Weight} + \text{Bone} + \text{Essential Fat (around 3 \% of the weight)}
\]
There are two components of fat stored in the body. They are essential fat, which is found inherently in the morrow of bones as well as in the heart, lungs, liver, spleen, kidneys, intestines, muscles and lipid rich tissues throughout the central nervous system. This essential fat is required for normal physiologic functioning. The other component of fat called the storage fat consists, which accumulates in adipose tissue. This nutritional reserve includes the fatty tissues that protect the various internal organs from trauma as well as the larger subcutaneous fat volume deposited beneath the skin surface.

The lean body weight in males and the minimal weight in females are composed chiefly of essential fat, muscle and bone. The density of a reference man with 12% storage fat is 1.070 g.cc\(^{-1}\). This is in addition to the approximately 3% essential fat. The density of the lean body weight is 1.094 g.cc\(^{-1}\). If the total fat of the reference man is 15 % (Storage plus essential fat), then the density of the hypothetical fat free body attains the upper limit of 1.100 g.cc\(^{-1}\). For the reference female, the average body density is 1.040 g.cc\(^{-1}\) at a body fat percentage of 27%; of this about 12% is considered to be essential. The density of the minimal weight of 107 lb is 1.072 g.cc\(^{-1}\). In actual practice, densities of 1.075 to 1.080 g.cc\(^{-1}\) are rarely exceeded by the leanest, healthy and normal female. The upper and lower limits of body density in the population are approximately 0.93 g.cc\(^{-1}\) in the very obese and 1.10 g.cc\(^{-1}\) in the leanest males.
a. **Criterion of Obesity**: Percent body fat as the measurement to determine the status of obesity and health risks.

   A person’s fat content is generally evaluated in terms of the percentage of body weight that is fat (percent body fat) or in relation to the size and number of individual fat cells.

b. **Obesity**: Obesity can be defined as excessive enlargement of the body’s total amount of fat.

   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.

c. Health risks of Obesity:  Though it is really difficult to present exactly all the risks involved in the obesity, it is fairly easy to say the indirect effects of obesity on the health status of an individual. The American National Institute of Health concluded that the obesity should be viewed as a disease in itself, because there are multiple biologic hazards at surprisingly low levels of excess fat that represents only 5 to 10 lb above the desirable body weight. In fact, it is now argued rather convincingly, that obesity is a powerful heart disease risk that may be equal to that of smoking, elevated blood lipids and hypertension. It also appears that the distribution of adipose tissue, independent of total body
fat alters the health risks of obesity. For example, high ratios of waist to hip circumferences are associated with an increased risk for death and illness. This may be due to the fact that fat in the abdominal area is more active metabolically than fat located in the hips and thighs.

Although, there is little agreement as to the exact cause or causes of obesity, there is considerable information regarding the associations between excessive body fatness and a number of health risks. Clearly, obesity is associated with multiple atherogenic traits and an excessive fat accumulation contributes to an increased risk of disease.

The following are the health related correlates of obesity:

1. Impairment of cardiac function due to an increase in the heart’s mechanical work, and to left ventricular dysfunction.

2. Hypertension or high blood pressure.

3. Diabetes, as about 80% of adult onset diabetics is overweight individuals.

4. Renal dysfunction and illnesses.

5. Gall bladder diseases and dysfunction.

6. Pulmonary diseases and impaired function due to the added effort to move the chest wall.

7. Problems in administration of anesthetics during the surgeries.
8. Osteoarthritis, degenerative joint disease and gout.

9. Post menopausal woman has a five fold greater than normal risk of developing the cancer of the uterine lining.

10. Abnormal plasma lipid and lipoprotein concentrations.


Weight reduction with accompanying fat loss often normalizes serum cholesterol and triglyceride and has a beneficial effect on blood pressure. In fact, the normally observed relationship between age and blood pressure is partially explained by the tendency to gain weight with age. Although, being too fat may not be a primary heart disease risk, its role as a secondary contributory factor cannot be denied or underestimated.

**Important points on Body Composition**

1. A way to determine and classify obesity is to measure the size and number of fat cells. Adipose tissue increases in two ways:

   a. Existing fat cells are enlarged or filled with more fat - this process is called hypertrophy of the fat cells, and

   b. Total numbers of fat cells are increased - this process is called hyperplasia of fat cells.
2. Excessive quantity of adipose tissue in obesity, occur by the process of fat cell hyperplasia. For comparison, a non obese person has approximately 25 to 30 billion fat cells, whereas the number of fat cells in the extremely obese person may be as high as 260 billion cells.

3. Adipose cells number increases fairly rapidly during the first year of life, being about three times greater at this point than at birth. It is believed that most of the fat cells existing prior to birth are formed during the last trimester of the pregnancy. Beyond age 1, cells number increases gradually to the age of about 10. Like cell size, there is significant cell hyperplasia during the growth spurt in adolescence until adulthood; therefore there is generally little further increase in cell number.

4. In terms of body fat, percent fat increases from about 16% of body weight at birth to between 24 to 30% of weight at 1 year. Then by age 6, body fat decreases to about 14% of body weight.

5. Research in animals suggests that alterations in fat cells size and number can be achieved in two ways:
   a) Modification of early nutrition
   b) Exercise

6. Extreme obese humans show a large increase in the number of fat cells and to a lesser extent, an increase in the size of individual fat cells.
When obese adults lose body weight, the number of fat cells remains unaltered and the decrease in total body fat is achieved almost exclusively by a reduction in fat cells size. So, becoming obese is definitely is a high risk factor throughout the life.

7. It is possible that the introduction of a diet or exercise program during the early stages of growth may aid in controlling the proliferation of new fat cells and the filling up of previously dormant ones. Programmes of exercise and weight control begun later in life and maintained thereafter can be effective in lowering the body total quantity of fat. If exercise and dietary intervention is discontinued, then the existing adipose tissue mass is likely to increase again by expansion of the cellular volume. Early prevention of obesity through exercise and diet, rather than correction of obesity once it is present, may be the most effective method to curb the grossly obese or over fat condition.

8. Exercise stimulates the mobilization of fatty acids through hormones delivered through the blood to act on the fat depots throughout the body. The areas of greatest fat concentration probably supply the greatest amount of this energy. There is simply no evidence, that fatty acids are released to a greater degree from the fat pads directly over the exercising muscles.

9. What is becoming increasingly clear is that people who maintain a physically active lifestyle or who become involved in endurance exercise
programs maintain a desirable level of body composition. Evidence is accumulating to suggest the contention that exercise may be more effective than dieting for long term weight control.

10. Regular aerobic exercise, even without dietary restriction, brings about favorable changes in body weight and body composition. The effectiveness of an exercise program for weight loss is linked to the degree of obesity at the start. As a general rule, persons who are obese lose weight and fat more rapidly than normal counterparts. In addition, exercise provides significant positive spin off in that it alters the body composition (reduced fat and maintenance or even small increase in lean tissue) in such a way that the resting level of energy expenditure is increased. This reduces the body’s tendency to store calories.

**Flexibility**

The component of flexibility of the health related physical fitness is another important aspect considered by medical experts and as well by the physical education specialists for various reasons.

Flexibility, as a component of physical fitness, is the ability of an individual to move the body and its parts through as wide a range of motion as
possible without undue strain to the articulations and muscle attachments (Barry L. Johnson and Jack K. Nelson, 1986).

Since, flexibility is an important factor of physical fitness and also in health related physical fitness, flexibility may be considered as a precondition for skillful performances in sporting activities and physical activities for the following three important reasons:

a. Highly complicated skills require full range of movement of the limbs at the required joints, high levels of flexibility is desirable to excel in the sporting activities and to perform very swiftly the physical skills.

b. To escape from getting injured while performing the physical skill of complex in nature.

c. And also not to develop the stiff back thereby prone to the back problems as identified by the health experts and physical education experts. Stiff back and lack of muscular fitness of the spinal muscles is the reason for frequent injuries to the back and also high levels of discomfort at the spine during the normal course of life. It is also observed that the ideal postural maintenance of the person also depends on the flexibility levels of the whole body.

Health related physical fitness components show maximum impact in determining a person’s health status or the person’s future health status, as the lack of one or some of the components in the required proportions may lead
a person to face the health complications in future. If analyzed separately, each component can contribute appreciable positive effects on the respective system of the body on which the component works and as a whole all the components together makes enormous impact on the overall health of the individual. The individual components are to be developed separately as each component of the health related physical fitness improves by a target exercise of a protocol of exercises specifically designed to target the particular system of the body, which controls the particular component of the health related physical fitness.

Cardio-circulatory endurance or Circulo-respiratory endurance component is influenced and improved by involving in long duration aerobic type activities of the selected intensity and duration. This particular component is also considered as the base component on which other fitness components may be worked out and improved. Highly efficient cardio circulatory system of an individual can pump the blood to the various exercising parts of the body during the exercise programme and also during rest in ample and sufficient quantities, thereby relieving the person from undue fatigue. Improved and efficient circulatory mechanism of an individual can provide ample nutrients and also the additional amounts of oxygen for the tissues thereby making the tissue to nourish properly. Efficient blood circulation also makes the endocrinal function smoother and target oriented, since the endocrinal products or hormones are carried to the target tissues in the required proportions. Highly toned arterial walls enhanced with the elasticity would
produce only the optimum pressure on the heart, thereby not to prone to the high blood pressure or hypertension.

Muscular endurance is another important factor of the health related physical fitness and this factor is very essential for an individual to participate in any kind of physical activity without getting fatigued quickly. Exercise physiologists observed that the factor of muscular endurance is directly proportional to the cardio respiratory endurance of the individual. Though independently some physiological differences are observed between the factors of the cardio respiratory endurance and muscular endurance, the prerequisite of having better cardio respiratory endurance is mandatory. An individual with high levels of muscular endurance can work physically involving the muscular system for longer durations and thereby can further increase the muscular endurance and also the cardio respiratory endurance as well. High levels of muscular endurance accompanies with increased myoglobin levels in the muscles, increased energy reserves like enhanced phosphagens, increased muscle glycogen, increased glycolytic and phosphorilation enzymes. All these increased factors are directly responsible for the increased muscular endurance and increased working capacity of an individual at fatigued conditions also.

Muscular strength is another factor of the health related physical fitness and this is also considered as an important factor in deciding an individual’s physical working capacity. As recognized by the physical education experts,
strength is generally defined as “the muscular force exerted against movable and immovable objects”. Generally, the strength is measured by tests which require one maximum effort on a given movement or position. It is a factor of physical fitness which further contributes for the enhancement of the physical fitness. Through the factor of strength the physical education teachers and sports coaches can determine the level of potential of an individual in specific sports activities. This is also used as a means to determine the achievement of the grades in conditioning. The factor of strength is also used as a means of evaluating the possible solutions to overcoming poor postural positions or to pinpoint areas of weakness which need strengthening for better performance.

The factor of body composition is considered as the very important of the health related physical fitness components, by the physical education teachers and also the health professionals. Now a days the people around the world are more interested in keeping their health at very excellent levels so as to enjoy a qualitative life. This concept of viewing the healthy life is like wild fire and so the importance of the health related physical fitness takes precedence over the skill related physical fitness. Especially the physical education professionals are more serious over the development and protection of the health of the individuals both physically and physiologically. As it has already been identified mere skill related physical fitness does not guarantee a healthy and qualitative life. Skill related physical fitness can only guarantee an individual to perform or excel in the selected field of sport of physical performance. Keeping this particular conception in view, the body composition which alters or show
impact in various ways on the other factors or components of health related physical fitness gets utmost importance over the other components of the health related physical fitness. Body composition determines the composition of the fat and lean body weight to the total body weight of an individual. In this concept the percentage body fat to the total body weight is a major concern. An accurate appraisal of body composition provides an important basis for formulating an intelligent programme of total fitness especially of health related fitness.

Over weight and over fat are not the same of synonymous concepts. The effects of these two concepts may be clearly illustrated with athletes. Many of these individuals are quite muscular and in excess of some average weight for their age and height, but otherwise lean in terms of body composition. For such people, a weight loss programme is unnecessary and may even be harmful to sports performance. On the other hand, it is possible to be average for body weight yet still possess an undesirable excess of body fat. In this situation, a weight loss or body composition modification program may be desirable. Of even greater importance is the need for effective weight control among adults who suffer the insidious consequences of physical inactivity and overeating. For these people, body fat eventually exceeds even the most liberal limits for normalcy and should be reduced. To this end, diet plus exercise can play an important role. So the term overweight in terms of fat percentage and not in terms of lean body mass is a serious concern to the health and physical education professionals. As it is already illustrated the excess of the body fat
above the allowable limit may pose serious health hazards and may lead to many degenerative diseases like hypertension, hyperlipidemia, diabetes mellitus, coronary heart disease, etc.

The ideal body composition is expected to provide the individual with better health and can provide opportunity to prevent these deadly degenerative diseases mentioned. Overweight because of excess fat percentage in the total body weight not only causes the degenerative diseases and also restricts the individual’s physical movements thereby restricting the individual from participating in various physical activities and sporting programmes to improve the physical fitness status. This restriction in the physical activity makes the individual more indolent and dormant and this lack of movement and participation in fitness programmes further enhances the proportion of excess fat to the total body weight. Since, this goes as a chain reaction, the same should be broken at some point or the other and the individual should plan properly to gain the ideal body composition. Health experts and the physical education scientists advise that the children should involve in the active lifestyle and prevent formation of the excessive number of adipose cells in the formative ages.

Flexibility is also an important factor or component of the health related physical fitness and gets the attention of the health and physical education professionals. As for the health related aspect is concerned the component of flexibility is to diagnose the extent of a previous injury or the cause of the poor
posture. Possession of ideal levels of flexibility over the entire body and especially over the hip and spinal column gives the individual a good posture thereby leading to the avoidance of undue strain on the joints of spine. This way, by improving the flexibility of spine and hip portions of the body, an individual can prevent the risk of being affected with the rigid back and back pain. Ideal flexibility at the joints provides an individual to avoid strain on the joints and thereby helps in preventing the risk of joint sprains and ligament damages. Flexible spine also keeps less pressure on the peripheral nerves thereby alleviating the psycho-somatic disorders to a lot extent.

**Effects of Inactivity – Hypokinetic Diseases**

Since ages the human beings got acclimatized and got adapted to movement and on various physical activities for the sake of sustenance and this probably lead the human beings to be very mobile and active to have the same kind of internal environment and thereby not to be myriad of degenerative diseases.

Physiological systems respond to various appropriate stimuli. Sometimes the stimulus is called “stress” and the response is called the “strain”. Repeated stresses on physical systems frequently lead to adaptations resulting in an increase in functional capacity. Physiologically the purpose of any training session is to stress the body so that the response results in adaptation. Dr. Hans selye has done much to make us aware of the phenomenon of stress-
response-Adaptation. He called this process the general adaptation syndrome or G A S Selye described three stages involved in response to a stressor alarm reaction, resistance developed and exhaustion. Each of these stages should be extremely familiar to every physical educator. Athlete, coach, physio therapist and other health professional that who uses exercise to improve physical capacity (George A. Brooks and Thomas D.Fahey, 1990).

The modern heterogeneous population is interested in assuming active lifestyles to derive maximum health and well being. Heart disease and osteoarthritis, which are now considered as primary health problems can be prevented through active life styles and regular exercising habits, since most of these degenerative diseases are amenable to change through modification of the life style, such as ensuring regular exercise. The importance of exercise in a program of preventive medicine has reinforced the role of the physical educator as part of the interdisciplinary team concerned with health care and maintenance.

Physical activity level or cardio-respiratory fitness and risk of fatal and non fatal ischemic heart disease (IHD), indicate that a sedentary life style or a low level of habitual physical activity increases the risk of IHD mortality. The effect graded in the sense that the risk decreases progressively with the increase in the level of habitual physical activity or in cardio-respiratory fitness. The volume of activity necessary to induce some of these apparent benefits is not overwhelmingly high because the risk diminishes rapidly when comparing low with moderate weekly energy expended in physical activity.
Even though moderate levels of habitual physical activity an important effect higher levels reduce the risk even more, for the levels of habitual physical activity and level of cardio-respiratory fitness. The effects on the IHD events or mortality are significant and graded even after adjustment for a variety of common risk factors such as body mass index, blood pressure, smoking, blood cholesterol and parental history of IHD (Haskel WL, 1994).

**Coronary Artery Disease (CAD) – Atherosclerosis**

Atherosclerosis starts as an injury to arterial endothelium because of various factors. The injury to this endothelial wall may be because of chronic hypertension, wear and tear and toxic chemicals. The injury at endothelium allows substances in the plasma, like cholesterol to penetrate into the intima of the artery.

Ordinarily endothelial cells act as barrel to cholesterol and other lipids. However an injury to the endothelial cells results in their inundation with blood fats. This process causes a proliferation of the arterial smooth muscle that eventually results in its encroachment into the intima and arterio-vascular space.

Circulating platelets and monocytes are thought to release substances at the injury site that stimulate the migration of smooth muscle cells also fill with fats. In addition blood cells called platelets cluster around the
exposed smooth muscle and release substances that are thought to result in further proliferation of the arterial smooth muscle. The smooth muscle cells have difficulty in removing cholesterol. So this substance tends to accumulate gradually increasing the size of the lesion. This process is accelerated by a variety of conditions such as hyperlipidemia and hypertension. Eventually, the plaque calcifies and connective tissue forms producing a narrowed and rigid blood vessel. Once the vessel has been narrowed blood flow may be impaired or the vessel can be blocked by a clot, resulting in a coronary thrombosis. In summary, atherosclerosis develops because of smooth muscle proliferation, lipid accumulation and connective tissue formation in the arterial intimae.

It is observed that there is strong direct relationship between blood pressure (hypertension, both systolic and diastolic), cigarette smoking, total cholesterol, stress and tension, family history. Some haemorrhheological factors like platelet count plasma fibrinogen levels. Hyperglycemia (diabetes) and coronary heart disease have indirect relationship between active life style with regular exercise and coronary heart disease.

General triggering may occur when stressors produce homodynamic. Vasoconstrictive and prothrombic forces acute risk factors that in the presence of a vulnerable atherosclerotic plaque cause plaque disruption and thrombosis. The arterial pressure surge and heart rate increase induced by stressors could lead to plaque disruption and rupture. Vasoconstriction could increase shear stress at the plaque site and worsen the flow reduction produced by fixed
stenosis. An increase in platelet reactivity and blood viscosity could create a prothrombic state increasing the likelihood of thrombus formation and infraction (Tofler GH. Brezinski DA. Shafer Al, et al., 1987).

**Hyperlipidemia**

Higher level of lipid circulation, than the desired level in person’s blood circulation, and this may be a strong cause for the incidence of cardiovascular disease (CVD) among such people. The circulating lipids in the blood may be categorized into five types of lipoproteins according to their density, composition and size. Very low density lipoproteins (VLDL), low density lipoprotein (LDL), intermediate density lipoprotein (IDL) and high density lipoproteins (HDL) and chylomicrons. Again there are subfractions in HDL like HDL-1, HDL-2, and HDL-3. Total cholesterol is the sum total of cholesterol carried by VLDL, LDL HDL and chylomicrons.

The percentage of LDL is most significant risk factor in the development of coronary heart disease (CHD). LDL cholesterol is the main component in atherosclerotic plaque formed in the term of blood arteries, causing blockage of blood stream. Incidentally, the HDL cholesterol acts as reverse cholesterol transfer stem that resist the development of atherosclerosis.

**Low Density Lipoprotein (LDL)**
LDL cholesterol is a specific kind of lipoprotein that is the form in which cholesterol is transported in the blood. LDL cholesterol is called ‘Bad’ cholesterol.

**High Density Lipoprotein (HDL)**

HDL cholesterol is a group of proteins found in the blood plasma and lymph that are combined with lipids. They transport cholesterols from the tissue to the liver and to be broken down. Excreted HDL cholesterol is called “Good” cholesterol.

**Triglycerides**

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

**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 cardiovascular fitness. Briefly, aerobic exercises are the activity that can be sustained for an extended period of time without building an oxygen 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).

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.

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 Exercises**

Aerobic exercise, also known as cardio-vascular exercise, is an activity that is sustained for a long period of time, that is rhythmic and that affects large muscle groups. Aerobic exercise 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 exercises 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 exercises 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 exercise 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.

**Anaerobic Activity**

Anaerobic activity is a short-duration exercise that is powered primarily by metabolic pathways that do not use oxygen. Such pathways produce lactic acid, resulting in metabolic acidosis. Examples of anaerobic exercise include sprinting and weight lifting. It is a physical activity, which instigates a metabolism that does not depend on oxygen. Examples include isotonic, in which the muscles contract against an object of resistance with movement (eg., weight lifting); isometrics, in which muscles contract against resistance but without movement; and calisthenics (eg., sit-ups and knee-bends), which increase flexibility and improve joint mobility.

Anaerobic metabolism is otherwise called anaerobic glycolysis which is particularly important and necessary to attend physical activities when the body is unable to supply oxygen sufficiently or when the activity is very short and high intensity short duration. For example, when the body is unable to supply oxygen to the cells insufficient quantities such as in sprinting 220 yards run, anaerobic metabolism is able to furnish energy for muscular contraction, but this is an inefficient mechanism in which fatigue sets in quickly with accumulation of lactic acid. Readily available phosphagens (ATP and CP) and stored glycogen to certain extent are used as fuels for this mechanism. Those
Exercises that are performed using the anaerobic metabolism are called anaerobic activities.

**Anaerobic Exercises**

Anaerobic exercise is an activity that is sustained for a short period of time that uses muscles at a high intensity. These exercises use resistance to build muscle and even bone as an additional benefit. While most people think that aerobic exercises are more beneficial for health, but anaerobic exercises are just as important. They raise your heart rate on a smaller scale; however, anaerobic exercises actually burn more calories than aerobic exercises based on a ratio of five to one and even up to as much as a ratio of seven to one, while aerobic exercises burn 75 percent fat and 25 percent muscle, anaerobic exercises burn 100 percent fat. A popular form of anaerobic exercise that includes the use of some kind of equipment is weight lifting. Weight lifting can be done using dumbbells and barbells. Machines that use resistance can also be effective forms of weight lifting.

Anaerobic exercises can also be done without having to use equipment. Sprinting is a common form of anaerobic exercise because it is a short distance, high energy activity rather than a long distance activity. Push-ups and pull-ups are also examples of anaerobic exercises that require no equipment. Although gyms usually have equipment that makes doing pull-ups more efficient, pull-ups can ultimately be done just about anywhere that the space and weight capacity is available.
Yoga

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 and Physical Exercises

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. Physical exercises 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. Physical exercise causes fatigue. Rapid movements of the muscle cause
tremendous strain on the heart. Muscular development of the body does not necessarily mean the healthy body. In yoga, all the movements are slow and motionless and gradual with proper breathing.

Yogic postures and breathing exercises unlike physical exercises do not strain the cardiovascular system, and they improve physical fitness and endurance. Physical exercises are 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 physical exercises 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 physical exercises varies from 3 to 20 calories per minute.

The main purpose of the physical exercises 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. Physical exercises cannot be done in old age. But there is no age limit to practice yoga. Physical exercises need more food. Yoga need moderate food. Fatigue appears after doing physical exercises. Fatigue disappears if yoga and pranayama is practiced. Tension increase and nerves are more tightened through physical exercise. Nerves and body muscles are relaxed by yoga. Physical exercise need instruments, large place, etc. Yoga can be practiced in open space without any instruments. Physical exercises 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 most other physical exercises there is mainly an increase in respiratory rate. Physical exercise should not be standard without thorough physical examination. Yogic posture are generally mild and one is less likely to get in to complication, but physical exercise, especially the type known as jogging, 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 electro cardiogram at rest and after exercises to detect an over sub clinical heart disease.
The 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).

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.

The Curative Effect of Some Yogasanas
1. Sarvangasana

Sarvangasana means ‘A posture for every part of the body’. This asana strengthens the muscles of the abdomen. Acts upon cervical section of the spinal column and consolidates the neuronal network and causes for the increase in blood supply to brain. The inverted posture and special position of the neck, which accentuates the bend in the carotid artery, acts together with the compression induced in the region of the thyroid induces calm self-assurance and as long as no over-eating it stabilizes the weight. The asana also helps to remedy prolapsus and drains the abdomen, ridding it of blood stases in the viscera and eliminating at least temporarily congestion in the lower abdomen.

2. Halasana

This asana by acting on the entire spinal column and working on the basal ganglia and their fibers thereby streamlining the automatic functions of the body. Under compression the thyroid gland benefits from an increased flow of blood which helps to regularize its functions. By controlling the metabolism this gland has a considerable influence on the youthfulness of the body and by secreting hormones acts upon various other glands as well as upon intestines blood pressure the mobility of migratory cells and stimulates the nervous system. Thereby the metabolic condition is nicely monitored. The organ especially affect is liver, which is cleansed decongested and stimulated. Moreover the slightest state of congestion or blood stasis in the liver has an
immediate effect on the function of the whole digestive tract. The pancreas is likewise massaged purified and toned up.

3. Matsyasana

This asana produces especially good effects upon the thorax, spinal column and abdominal region. The lungs being joined with the thorax and the vital capacity increases. Produces good effect on sympathetic nervous system. Tones the viscera in the abdominal cavity. The liver and the spleen are among the beneficiaries. The adrenal glands are toned up and the production of adrenalin and cortisone is normalized, there is no risk of overstepping their normal level of production. The posture in stimulating the pancreas helps in cases of false diabetes of nervous origin.

4. Paschimottanasana

This asana stimulates the whole nervous system network along the spine. The abdominal muscles are strengthened. Stimulating the sympathetic and parasympathetic systems of the pelvis is effected by stretching the base of the back and this in turn reacts on the organic activity on the abdominal region. This asana removes the excess fat from the stomach and the hips.

5. Bhujangasana

This asana leads to suppleness in the spine which is a source of health, vitality and youthfulness. The chains of ganglia and their associated nerves receive abundant blood supply and hence the health of the organism is
improved. During the static period and deep respiration the liver, gall bladder, spleen and pancreas are stimulated by the gentle and deep massage.

6. Shalabasana

This posture is invaluable, because it tones up the sacral portion of the parasympathetic system by drawing blood into the back of the spine through the powerful contractions in the muscles there. The asana acts on the neck and nape particularly at the point where the Vegas nerve branches from the column. That is why the shoulders must stay on the ground while the chin is pushed as far as forward as possible. The locust posture considerably improves the functions of the liver and pancreas and regularizes the workings of the intestines so that the peristaltic action increases.

7. Dhanurasan

This asana combats cellulites, the causes of which are insufficient respiration, general nervous tension, poor assimilation of food and reduced circulation in the cellulitic pitches. Bow posture helps by increasing the breathing, decongestion of the solar plexus and improving the circulation in the cellulitic or fat masses by gentle and regular massage. The pancreas resumes its normal function manufacturing the insulin an essential to the metabolism of the glycogen. According to Swami Chidanand Saraswathi this asana also acts on the thyroid gland. This increases in the intra-abdominal pressure works upon the whole digestive apparatus and its accessory glands.

8. Ardha – Matsyendrasana
This asana prevents and removes the soreness in the muscles of the spine. The chains of sympathetic ganglia on either side of the spinal cord are rejuvenated. This asana is having being action on the supra renal glands. This asana helps in removing constipation. Apart from the large intestine the liver and the right kidney (compressed on the right side) are stimulated during the first half of the asana and the spleen pancreas and left kidney during the second half. Also combats obesity and cellulites in the stomach.

9. Shirhasana

Shirhasana banishes in a matter of seconds the backache which is caused by prolonged standing. The return of venous blood is stepped up the lungs receive an extra supply of blood to be purged of toxins. One of the principal organs to feel the benefit of this asana is the digestive tract and its accessory glands notably the liver. The blood assisted by gravitational force rinses the network of blood vessels in the brain. This asana regulates the action of pituitary gland together with that of thyroid gland and controls the metabolic activities.

10. Uddiyana Bandha

This is a fundamental exercise which visibly affects the abdomen thoracic cage and lungs. Its occult effects concern the awakening of Kundalini – the vital powers. The daily practice of this asana not only massages and tones
up the bowels to regain their normal rhythmic action but in addition this exercise restores in a permanent and definite manner the unbalanced activity of the autonomic nervous system within the limits of the normal physiological fluctuations.

**Statement of the Problem**

The purpose of the present study was to analyze the effects of aerobic training, anaerobic training, and yogasanas on the selected blood lipid profiles i.e. LDL, HDL and triglycerides, which normally considered as risk factors in the coronary heart diseases. The study was conducted on the untrained young men to know how for aerobic training, anaerobic training and yogasanas would influence on the selected blood lipid profiles of coronary heart disease.

**Delimitations**

1. The study was confined to sixty sedentary young men selected from Government College for Men, Anantapuramu, Andhra Pradesh and Sathya Sai Baba National Degree College, Anantapuramu, Andhra Pradesh which are affiliated to Sri Krishnadevaraya University, Anantapuramu, and Andhra Pradesh, India.

2. The selected subjects were divided into three experimental groups and one control group with fifteen subjects (n=15) in each group. Experimental Group-I (AG=15)) underwent aerobic training, Group-II
(ANG=15) underwent anaerobic training, Group-III (YG=15) underwent yogasanas training for six months, during the initial one month they were asked to walk and slow jog for five to ten minutes before going to light calisthenics and stretching exercises. And Group-IV served as control group (CG=15).

3. The experimentation i.e. training was conducted for a period of five months, and to make them ready for their intensity of the training one month is allotted to the individuals for their preparation.

4. The age group of the subjects ranged between 18 and 22 years only.

5. Three types of physical activities i.e. aerobic training, anaerobic training, and yogasanas were used as experimental variables.

6. The study was delimited to one selected intensity of load i.e. medium intensity (60% - 70%)

7. The study was further delimited by selecting yogasanas protocol established by Swami Chidanand Saraswathi of Paramarth Niketan, Rishikesh, India. Yogasanas was limited to ten which already identified as medium intensity yogasanas by the researcher.

8. All the groups took relevant physical exercises in the morning and for five days per week.
9. The training schedule for all the three experimental groups were decided by the researcher after having consultation with some eminent physical educationists and physical fitness experts.

**Limitations**

1. Hereditary and endogenous factors could not be controlled, which might have influenced the results of the study especially the LDL cholesterol, HDL cholesterol and triglyceride cholesterol levels.

2. The time period of experimentation i.e. five months or twenty weeks was considered as medium range period to elicit the responses physiologically was on the knowledge of relevant material.

3. The study was conducted during the months July to November, 2012 and this could have influenced the metabolic rate and this might show some impact on the results of the study.

4. Social status, food habits and the way of life style which could influence on the results could not be controlled by the researcher personally though orientation was given about these aspects to the subjects.

**Hypotheses**

The following hypotheses were formulated at the beginning, to guide the researcher in conducting the research experiment.

1. It was hypothesized that the resting HDL cholesterol levels may increase and LDL cholesterol and triglyceride levels may decrease significantly
because of the effect of the selected aerobic, anaerobic and yogasanas training protocols.

2. It was hypothesized that the medium intensity aerobic training may reduce resting LDL cholesterol levels significantly than the medium intensity anaerobic training and yogasanas training.

3. It was also hypothesized that the medium intensity aerobic training may increase resting HDL cholesterol levels significantly than the medium intensity anaerobic training and yogasanas training.

4. It was also hypothesized that the medium intensity aerobic training may reduce triglycerides levels significantly than the medium intensity anaerobic training and yogasanas training.

**Significance of the Study**

The physical fitness has become an important asset of human beings and the modern day man is sincerely interested to improve and maintain this aspect as this would ensure the man a happy and healthy qualitative life. The contribution of physical educationists and physical fitness experts in this area praise worthy. Throughout the world the researches are conducted to know the various exercises or exercise protocols which could prevent and cure the deadly ailments like coronary heart disease, hypertension, diabetes, etc.

The researcher endeavored in this research to contribute at least minute constructive information in this direction.
1. More constructive evidence will be available regarding the effect of various selected exercises or protocols of conditioning on the status of the selected risk factors that cause or precipitate the occurrence of the diseases like coronary heart disease, atherosclerosis of small blood vessels, etc.

2. This study also creates a path to conduct several researches in the same direction and area with different experimental variables and with different combinations of variables on the risk factors of various diseases.

**Definitions of the Terms**

**Physical Fitness**

Physical Fitness is the ability to carry out day to day task with vigor and alertness without undue fatigue and with ample energy to enjoy leisure time pursuit and to meet unusual situation and unforeseen emergencies (Harrison H.Clarke, 1987).

**Agility**

Agility is the ability to make successive movements in different directions efficiently and rapidly.

**Balance**

Balance is the ability to maintain equilibrium when one’s centre of gravity and base of support are altered.

**Coordination**
Coordination is the ability to effectively and efficiently integrate the movements of body parts.

**Speed**

Speed is the ability to perform rapidly successive movements over a short period of time in a single direction.

**Power**

Power is the ability of a muscle or group of muscles to generate maximal force in a single explosive effort.

**Reaction Time/Movement Time**

Is the ability to respond rapidly to a stimulus.

**Endurance**

Endurance is the ability of the circulatory and respiratory systems to efficiently adjust to and recover from exercise. This is also called as the cardiovascular endurance or aerobic capacity or aerobic fitness.

**Muscular Endurance**

Muscular endurance is the ability of a muscle or a group of muscles to continue contracting over an extended time against moderate resistance.

**Muscular Strength**
Muscular strength is the ability of a muscle or group of muscles to generate force in a single maximal effort.

**Body Composition**

Body composition is determination of the contributions of body fat and lean tissue to total body weight.

**Flexibility**

Flexibility is the range of movement present at body joints.