CHAPTER - 1

INTRODUCTION

Training is munching like constructing a multi storey building. We need various kinds of building materials such as aerobic and anaerobic running, comprehensive conditioning and flexibility. Several kinds of materials like training intensities and modalities should be utilized in an ongoing fashion to complete the goal of a finished building or competitively fit athletes. Depending on the progress in the construction plan, the relative mix of all these materials will vary: Training is now universally recognized that a scientifically based and systematized program which is fundamentally based and systematized program which is fundamental to the pursuit of high level performance in sports. All sports have drawn the attention of maximum number of sports scientists and coaches to devise new training methods in order to achieve an optimum performance. Due to this, a vast variety in the approaches to devise training loads have been made and this has created a situation where players, in spite of following different methods of training have attained comparable levels of performance.
1.1 SPORTS TRAINING

Sports training is a planned and controlled process in which, achieving a goal, change in complete sports motor performance, ability to act and behaviour are made through measures of content, methods and organization.

Sports training must be understood as a specialized process of all-round physical conditioning aimed at the methodical preparation of athletes.

Hardayal Singh (1981) stated that, training is Pedagogical process, based on scientific principles, aiming at preparing sportsman for higher performance in sports competition.

The Physical fitness or condition is the sum total of five motor abilities namely Strength, Speed, Endurance, Flexibility and Coordinative abilities. These five motor abilities and their complex forms are the basic requirements for human motor actions. Therefore, the sports performance in all sports depends on a great extent on their abilities. The improvement and maintenance of physical fitness or condition is perhaps the most important aims of Sports Training.

Sports Training represents a long-term endeavour. Athletes are not developed overnight and a coach cannot create miracles by cutting corners through overlooking scientific and methodical theories.
Sport training is a basic preparation for better performance through physical exercise. It is based on scientific principles aiming at education and performance enhancement. Sports activities consist of motor movement and action, and their success depends on a great extent on how correctly they are performed. Techniques of training and improvement of tactical efficiency play a vital role in a training process. Performance can be increased or improved to a great extent only by causing biological adaptation and this is possible only through systematic and scientific training. Specificity of exercise and overload principle should be followed in order to enhance the functioning efficiency of the various systems of the body.

1.2 MEANING OF TRAINING

The word “Training” has different layers of meaning. In sports, it means physical exercise, in a narrow sense, Training is, doing a physical exercise to better one’s performance. Training means a systematic scientific programme of conditioning exercise and physical activities designed to improve the physical fitness and skills of the players or athletes.

Tudor.O.Bompa (1999) Training means preparing for something say an event of athletic competition or a nursing corner or an operative
performance of military combats much growth and change occur during training.

Training is not a recent discovery. In ancient times people systematically trained for military and Olympic endeavours. Today athletes prepare themselves for a goal through training.

Training has been a part of human language since ancient times. It denotes the process of preparation for some task. The preparation of a sportsman represents a multisided process of purposeful utilization of the total complex factors, which help in the development of the sportsman and ensure a necessary level of his sports performance ability

Sports training aims at achieving high performance in sports competition. It is a process which is spread over a long period of time. It is competition and performance oriented process.

According to Fox (1984) sport training is a programme of exercise designed to improve the skills and increase the energy capacities of an athlete for a particular event. These basic training procedures will serve better when utilized with modification suited to individuals or a group dealt with. The training programme should look into improving the performance of the Athletes and at the same time should prevent from injury.
Astrand (1977) A certain amount of training of the oxygen-
Transporting organs is necessary for all categories of athletes, regardless
of the nature of the athletic event. Thus the individual will be better able to
cope with special training required for the event. Furthermore, even the
warm up prior to the event requires a certain amount of fitness.

1.3 NEED AND IMPORTANCE OF TRAINING

Training unveils periodic assessment of the athlete's status and
progress. Training usually various regular increases in the difficulty of task
performance. Training suggests some form of gradual increase in
performance output over an extended period of time. Training is a
programme of exercise designed to improve the skills and to increase the
energy capacities of an athlete for a particular event.

Green Berg (1986) stated that, sports training is done for improving
sports performance. The sports performance as any other type of human
performance is not the product of one single system or aspect of human
personality. The personality of a person has several dimensions, example,
physical, physiological, social and psychic. Sports training is not more
physical activity involving physical movements or action. Such type or
physical activity is common to several types of human activities.

Aneleson (1971) stated that, physical training brings a lot of
changes in the body that is an increase of maximum respiratory minute
volume in exercise A slight increase in oxygen diffusion capacity Ten to thirty percent increase in maximum oxygen uptake. An increase in stroke volume and maximum cardiac output an increase in size of the heart. An increase in total haemoglobin and blood volume.

Willmore (1988) stated that Training results in a number of changes that improve the transportation function of the cardio vascular and respiratory systems during exercise. The heart rate at rest will decrease markedly as a result of endurance conditioning. Initial heart rate is 80 beats per minute, and the resting heart rate will decrease by approximately one beat per minute for each week of training during the first few weeks. Highly conditioned in endurance athletes typically have resting heart rates of 40 beats per minute or lower.

The body is the temple of the soul and to reach harmony of body, mind and spirit, the body must be physically fit. The body fitness of a player of any individual could be obtained by the systematic training. Training involves periodic assessment of the athletes, player’s status and progress. Training varies regular increase in the difficulty of task performance. Training suggests, some form of gradual increase in performance output over an extended period of time. Specific physical fitness is readiness of each system of the body to meet special demands. The good system of the human body being required strong muscle and nerves co-ordination. This strong muscle and nerves co-ordination is
called neuro muscular co-ordination. This neuromuscular co-ordination requires continuous training to build the strength of the body muscles and nerves. The physical fitness is also expected through various kind of training to access factors such as speed, strength, endurance, agility and physical body growth which go to makes a person efficient and creates effective changes in the performance of the skills.

Costil (1970) The purpose of training programme is to produce metabolic, physiological and psychological adaptations that allow sports persons to perform better. When training increases the demand for aerobic energy, the number of mitochondria and size of muscle will increase so that in these chemical factories where aerobic metabolism becomes larger and more numerous. This will enable athletes to provide more energy from aerobic metabolism.

1.4 TYPES OF TRAINING

Training is universally recognized that a scientifically based and systematized programme which is fundamental to the pursuit of high-level performance in sports. All sports have drawn the attention of maximum number of sports scientists and coaches to devise new training methods in order to achieve an optimum performance. Experts have emphasized various systems of exercises for physical development. Most often individuals select any one system based on the information available to him or subjectively fascinated by the rational attributed to the given
system. Some people adopt athletic method of conditioning mixing exercise from number of systems.

Jerrold (1986) stated that to achieve optimum performance a vast variety in the approaches to devise training loads have been made and this has created a situation where players, in spite of following different methods of Training have attained comparable levels of performance. Various systems of exercises for physical development have been emphasized by experts, most often individuals select anyone system based on the information available to him or subjectively fascinated by the rational attributed to the given system. Some people adopt athletic method of conditioning mixing exercise from number of systems without any clear idea of potential outcomes.

Success in competitive sports and games can be attributed to many factors, training being one of the most important factors. Different training methods have been commonly lead to improve physical fitness and its related standards of performance of athletes or players. The training methods include, interval training, fartlek training, hollow sprint training, Resistance training, Altitude training, Alternative pace training, Weight training, Aerobic training and Anaerobic training etcetera.
The package of this study includes the following training

1. Run and walk Training
2. Interval Training

1.4.1 RUNNING

Running not only an athletic event but also a very important part of other sports. Speed and maneuverability in running are very important in almost all court and field games. Running and walking are similar except the actions are greatly accentuated in running.

Saunders(2004) Running is an aerobic exercise that involves whole body large muscle activities performed repetitively. This muscular activity requires energy, so calories are expanded during the activity. Thus, many people run as a means of controlling weight and burning additional calories.

Although many people run to control weight and attain a healthful physical appearance. Other people run for other physiological benefits, a running programme offers. A physically active person seems to be less prone to vascular system and alters the build up of cholesterol on the arterial walls. Running also produces a psychologically stimulating effect.

Prentice William(1998) The athletes were breathing more easily, and of course that meant that the work load of the respiratory muscles, the
diaphragm and the intercostal muscles were lighter, since they were required to drag in more than three gallons less air per minute of running. Another factor was probably that with improved fitness, lactic acid production was lower and therefore fewer hydrogen ions poured out of the runners muscles into their blood streams, an effect which would calm breathing. The brain reacts to the presence of increased hydrogen ions by stepping up respiratory system activity.

Running speed is a product of stride length and stride rate. Stride length is a product of leg muscle power, flexibility, and postural mechanics. Stride rate is influenced by many factors, including neuromuscular coordination, the rate of energy creation in the leg muscles, and the ability of the leg and hip muscles to relax properly. Greater leg muscle power and flexibility as well as heightened coordination will lead to an improved running performance.

Franch.J (1998) Quick little arm movements in synchrony with the swings of the legs are the one, which produces the most economical running course. Excessive motions of the upper body hurt economy. Both speed and amount of rotation of the shoulders and hips around the center axis of the body increase during running. Such washtub like motions are controlled by the "core" muscles of the body, bringing into focus once again the importance of utilizing core exercise to promote efficiency, control motions. There are lots of possible changes you can make in your
running form, but not all of them produce improvements in economy and performance, in fact, some may actually make you less efficient, one of the worst things you can do is to simply decide that you need to take longer strides and then begin reaching out for more turf as you train. If you attempt to take longer steps in your workouts and races, you will probably hurt your economy rather than help it. Expansions of stride length are good, but they should occur the natural way by improving your coordination, flexibility and explosiveness not by making adjustments in your running style.

1.4.2 WALKING

Walking is a great place to start. Walking is for everyone. It is convenient, inexpensive, and healthy form of activity that contributes to one’s health and physical fitness.

Prentice William (1988) the ability to walk is an essential component for enabling people to live and work independently and to function safely in their homes and in the community. Many senior citizens often just talk the talk, but what they really need to do is walk the walk.

The benefits from walking are the same as for other types of exercise, in that you get aerobic and cardiovascular workouts and you can improve your conditioning, muscle tone, and circulation. It also can increase your stamina that can carry over into other areas of your life.
Willmore (1988) says the hidden benefits of walking maybe the best benefits of all walkers very often lose fat and gain some muscle tissue and walking helps to lower blood pressure, can help lower cholesterol and in some cases, helps control diabetes. If you start walking and keep doing it. You will probably notice that you feel more relaxed and you often sleep better and you have increased energy. If you burn just 2,000 calories per week easily accomplished through walking. It could add several years to your life expectancy.

Winningham (1991) says, walking is easier on the joints and muscles than running and walkers are less likely than runners to suffer muscle strains or other injuries. It is often prescribed for persons recovering from heart attacks. Walking also increases muscles strength, improve blood flow, reduces the risk of hypertension, lessens lower back pain, increases the amount of good cholesterol, helps in weight loss, and since it is a weight bearing exercise, it helps in maintaining strong bones.

Arthur F. Kramer (1974) says, just as important, walking affects how we think. Even if individuals have not walked during their younger years, small increases in exercise, such as walking, improve mental fitness, particularly for “Executive control functions of the brain” involved in the ability to plan, coordinate and schedule activities.

A possible explanation is that walking improves cardio respiratory fitness, which in turn improves blood flow to the frontal and prefrontal
areas of the brain, which control the executive function processes. Also on the mental front, walking helps to overcome several depressions in some people on a par with antidepressant drugs. Exercise such as walking increases brain chemical such as serotonin and norepinephrine, the same as anti depressant medication.

According to Hausdorff, he cautions, though that several factors contribute to the decline in walking performance, including genetics, the environment, life style, previous activity levels and nutrition.

Some walking changes with aging, such as those resulting from neurodegenerative disease, may not always be preventable. Nonetheless, routine participation in appropriate exercise and walking programs will significantly reduce the risk of later age-associated decline in walking performance.

1.4.3 INTERVAL TRAINING

Tudor o Bompa (1980) Interval training is a method of repeating stimuli of various intensities with a previously planned rest interval, during which the athlete does not fully regenerate. The duration of the rest interval is calculated by the heart rate method. The portions of distance to be repeated could be performed either by time or precise distance.

Jack (1988) Interval training, a form of endurance training has existed for a number of years in one form or another with interval training.
Short to moderate periods of rest or reduced activity. This concept has a firm foundation in physiological principles. Research has demonstrated that athletes can perform considerably greater volume of work by breaking the total work into short, intense bouts with rest or reduced activity intervals interspersed between consecutive work bouts. The intervals of work and rest are usually equal and can vary from several seconds to five minutes or more. The vocabulary of interval training includes the terms Sets, repetition, training time, training distance and frequency in addition to the work interval and the rest, recovery or relief interval.

Fox (1984) Interval method is perhaps the most versatile method for improving various types of endurance. Interval method the exercise is done at medium (Extensive) and higher (Intensive) Intensity with intervals of incomplete recovery. Interval method is based on the principle of doing work with sufficient speed and duration. So that the heart rate goes up to 180 beats per minute. There should be recovery period when the heart rate comes down to 120 – 130 beats per minute and the work should be started again. The training load in interval method therefore can be controlled by repeatedly checking the heart rate.

By proper manipulation of the above-mentioned variables, the interval method can be used in several ways. Each having a different physiological and Training effect. However, from general point of view interval training method is of two types.
i) Intensive interval training

ii) Extensive interval training

In Intensive interval training method, the intensity is from 80-90 %. Whereas in extensive interval method, the intensity is from 60-80 %. Interval method by proper manipulation of the variables can be used for the improvement of any type of endurance or any prerequisite of endurance.

After a systematic Interval training, the human body shows some physiological changes, that is slight increase in body weight, Increased ability to endure effort before exhaustion, Decreased pulmonary ventilation during moderate work and ability to attain a greater minute volume of ventilation at rest. Ability to attain greater oxygen consumption during exhausting work. Greater utilization of aerobic energy reserves, smaller increase in pulse rate during moderate work and a lower increased glycogen and creative content of the muscles. In the blood, lower blood lactate concentration for the performance of a given volume of work and ability to tolerate higher blood Lactate concentration before exhaustion occurs. Improved Vascularization of the skeletal muscles and increased strength of the muscles and improved neuro muscular coordination.

Richard A. Berger (1982) This is a system of conditioning in which work is provided by rate and distance of the work, number of Times the
work is repeated, length of rest periods between work pouts, and number of Training sessions per work.

Mac Dougall (1978) Interval Training involves activities that are more intermittent. It consists of alternating periods of relatively intense work and activity recovery. It allows performing more work at an intense work load over a long period of Time than working continuously.

1.5 PACKAGES OF TRAINING

Packages of physical training is a method of physical conditioning that consists of various methods of training like continuous run, extensive interval run, intensive interval run, Hallow sprinting, Weight training, Speed workout, Technique training, Isotonic training, Isometric training, Circuit training, Slope running etcetera.

Baumgartner (1987) states, physical training provide a means of acquiring optional fitness in systematized controlled fashion. The intensity, load and vigor of packages of physical training are indeed challenging and enjoyable to the performer. The package of training has contained all the above said qualities.

Ramaswamy (1992) Training consists of varied packages of exercise. It should results in a level of personal fitness and should be associated with good health. During the systematic physical training, the
players acquire knowledge of sports, skills and attitudes through experience, reelection, study or instructions regarding sports performance.

Fox and Mathew (1985) Exercise physiology and scientific training methods have been advanced so much during the past few years that a single group training programme is no longer applicable to people of all age groups. The research findings are rather conducive to exercise and training should be based on individual's specific needs, goals and physical capacities.

Tudor O. Bompa (1999) Training is done for improving sports performance. The sports performance as any other type of human performance is not the product of the total personality of a sportsman. In other wards the total personality of a sportsman has to be improved in order to enhance his performance. Sports training there fore, directly or indirectly aim at improving the personality of the sportsman.

1.5.1 PACKAGES OF TRAINING ON PHYSIOLOGICAL VARIABLES

Effect of packages of training on physiological variables is considered as both scientific discipline and applied science as a sub discipline of physical education, it is concerned with the study of cardiovascular, cardio respiratory, neuromuscular and metabolic process and the effects of packages of training exercises on them. Its study includes the sources of
energy for movement, the process of energy generation and the effects that movement has on the body system. Through the research it is proved that the packages of training programme of both maximal and sub-maximal levels brings about the changes in various systems in the human body. Among the various physiological variables the investigator has chosen, Haemoglobin concentration, mean Arterial pressure, blood glucose, and blood lactic acid concentration.

Jacekman (1994) The physiology of sport encompasses a wide and diverse range of scientific interests. The intention, and major challenge of the review, is to collate the most pertinent of these interests into a coherent strategy for future research in sports physiology. The unifying concept of this review is the potential contribution of future research in sports physiology to the development of the elite competitor. The review promotes this theme through an in depth appraisal of current knowledge and identification of key areas of research that would most profitably advance the understanding and application of sports physiology. Central to this theme are the physiological limitations to exercise performance of the elite competitor and the adaptation of these physiological systems to further training, possibly leading to over training. An individual's physical fitness depends on the co-coordinated functioning of the various physiological systems, namely respiratory system, blood circulatory system, skeleto-muscular system, nervous system, Digestive system, excretory system and endocrine system. Each system has several
parameters to assess its functions and its effect on the whole of physiology of a person. For example, Respiratory system has the following parameter, namely vita capacity, oxygen-consumption, gas exchange, tidal volume and carbon dioxide production. In the same way the blood circulatory system has the following parameter. Pulse rate, stroke volume, systolic and diastolic pressure in the arteries.

1.5.2 EFFECTS OF PACKAGES OF TRAINING

Prentice William (1988) Due to systemic training, the heart becomes more efficient and is able to circulate more blood while beating less frequency. The contraction of heart becomes more powerful and thus empties itself more completely at each stroke. The stroke volume and cardiac output (Stroke volume/per minute) are increased for a standard amount of work. Because of these reasons, the heart rate or resting pulse rate becomes slower due to systematic packages of training. These heart rate changes indicate a decreasing load on the cardiovascular adaptation to exercise.

Singer (1976) stated that, cardio – respiratory endurance is considered the ability of the circulatory and respiratory system to supply oxygen to the cells of working tissue to sustain the oxidative energy demands of the body and to remove the waste materials of the metabolism. Most of the physiologists agree that gas transport; especially oxygen is the primary
determinant of the cardio-respiratory endurance. Gas transport (O\textsubscript{2}, CO\textsubscript{2} transport) depends on the cardiac output and the oxygen carrying capacity of the blood. The oxygen carrying capacity is increased by the increasing haemoglobin contents and the number of red blood cells (RBC) per unit of the blood and ability of heart and lungs for gaseous exchange. Thus, one reason for developing cardio-respiratory endurance is to improve the circulation of the blood to the working muscles being exercised. Systematic packages of training will improve cardio-respiratory endurance through the development of circulatory and respiratory system.

Frost, (1975) For the physiological system of the body to be fit, They must function well enough to support the specific activity, the individual is performing moreover different activities make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurological process which are specific to the activity.

The Lungs, heart and blood vessels perform vital function on the body’s supply system. They supply the muscles with the necessary fuels, oxygen and carry wastes such as carbon dioxide and lactic acid. Consequently the cardio respiratory system in the Athlete needs to be developed

Nichols (1986) Cardio respiratory endurance is the ability to sustain physical exercise and to recover from vigorous physical activity in a responsible time with no lasting side effects. It is concerned with the
aerobic efficiency of the body, which is the ability of the body to supply fuel and oxygen to the muscles being used. The heart's capacity for pumping blood is a major factor in cardio respiratory endurance. A conditioned heart is able to exert greater force with each heartbeat, and as a result a greater volume of blood is released into arteries to be carried through the body.

1.6 EFFECTS OF TRAINING ON ENDOCRINE SYSTEM

Riorder Manam stated that, the endocrine is a ductless glands. The ductless glands are distinguished from the glands of the body, by the fact they have no ducts. The products of their activity being discharged into the blood either directly or indirectly through the lymphatic vessels. Each of these ductless glands produces an internal secretion, which contains one or more active substances and is distributed to other organs and tissues by the blood stream.

The endocrine system is one of the two great control systems of the body other being the nervous system. The endocrine system operates through chemical messages or glands, which circulates in the blood to their respective target organs and modify their activity.
1.7 THE ADRENAL GLANDS

Robert and Mathew (1990) The adrenal glands are complex, multifunctional endocrine organs. The adrenal glands are located in the retro peritoneum just above each kidney and within that organs investing fat. Their total weight is 6 to 10 gm. Each adrenal gland is really a combination of two separate functional entities. The outer zone or cortex, which comprises 80 % to 90 % of the gland, is derived from mesodermal tissue and is the source of steroid hormones. The inner zone or medulla, comprising the other 10 % to 20 % is derived from neuroses to dermal cells of the sympathetic ganglia and is the source of catechola mine hormones.

1.8 HAEMOGLOBIN

Ramarao (1990) Haemoglobin is the red pigment of blood present inside the erythrocytes. The most characteristic property of haemoglobin is the case with which it combines with $O_2$ and dissociates from it. Haemoglobin is the chief participant in respiratory phenomenon as well as acid base homeostasis. The physiological importance of haemoglobin is due to its capacity to combine reversibility with $O_2$. Oxygen combines with haemoglobin to form Oxy-haemoglobin readily at high partial pressure as existing in lungs. Oxygen is also readily released from Oxy-haemoglobin at low $O_2$ pressure as prevailing in the tissues. This property of haemoglobin
provides an effective and excellent system for the transport of O₂ from the atmosphere to the cells of the body.

Bowers (1992) Although research in this area has not always produced consistent data, physical training is generally found to result in increased blood volume and total haemoglobin content. Most of the increase in blood volume reflects an increase in the amount of plasma rather than an actual rise in the red blood cell volume. The blood Haemoglobin concentration is therefore usually unchanged or slightly decreased after training. Both total blood volume and haemoglobin are important respect to the oxygen transport system particularly during exercise at altitudes above sea level.

Wright (1982) In males, the mean blood haemoglobin concentration is 15.5 g d⁻¹, in 90 percent of cases the range is 14 – 18 g d⁻¹. In females, the mean hemoglobin concentration is 14.0 g d⁻¹ with a range of 12 - 15.5 g d⁻¹. At birth the haemoglobin concentration is 23 g d⁻¹, falling to 10.5 g d⁻¹ at the end of the third month. The concentration then rises gradually to reach 12 g d⁻¹ at year. It is most important to remember that one-gram of haemoglobin when fully saturated. Combines with 1.34 ml Oxygen. Thus, the haemoglobin is an index of the oxygen carrying capacity of the blood.

Peg Jordan (1998) A fitness expert, from a scientific view point observes that “when you are fired and poorly conditioned, with week
muscles, poor lung capacity, low haemoglobin counts and low cardiac stroke volume, you often tell like you cannot expend the energy, but you must try to set small, realistic goals and accomplish a little

Walking and lifting each-day “Eventually, the goal should be to accumulate 30 minutes of physical activity a day in the beginning. This number should grow as your strength grows

Haemoglobin

Richerd W (1992) physical training is generally found to result in increased blood volume and total haemoglobin content. Most of the increase in blood volume reflects an increase in the red blood cell volume. The blood’s haemoglobin concentration is therefore, usually unchanged or slightly decreased after training. Both total blood volume and haemoglobin are important with respect to the oxygen transport system particularly during exercise at altitudes above sea level.

1.9 MEAN ARTERIAL PRESSURE

Kumar (1989) Blood enters the right or left atrium at a pressure near zero. The left ventricle pumps the blood into the aorta where it reaches a peak value during the cardiac concentration phase (systolic) of 120 mm Hg or so. During diastolic the aortic pressure subsides to some 80 mm Hg due to the elastic recoil of the arterial system and to the resistance to outflow offered by the peripheral arterioles. This combination
of elasticity and resistance. Converts the pulsative ejection of the heart
into a steady outflow.

Arterial blood pressure changes can be caused by alteration in
cardiac output, blood vessel size, and blood volume. Increase cardiac
output increases the flow of blood into arteries; this causes greater
pressure within the vessels. Constriction of arteriole causes greater
resistance to blood flow; so that the heart must pump more forcefully to
drive blood through the narrowed arteries. This raised pressure
vasodilatation reduces arterial pressure. Greater blood volume increases
arterial pressure and lesser volume decreases it, if other factors do not
compensate for the volume changes.

Devries (1986) The effects of exercise upon blood can best be
described as the result of the balance struck between the increased blood
flow due to the increased cardiac output and the decreased peripheral
resistance caused by the vasodilatation of the microcirculation. In rhythmic
exercise that involves moderate to strenuous work loads, the typical
response is an elevation of systolic pressure on average 8 mm Hg for
each increase in workload of 2,000 foot pounds per minutes. Diastolic
pressure follows the course of systolic, but to a lesser degree, thus the
mean arterial pressure rises approximately 3 mm Hg pounds for each
2000-foot pounds per minute increase in workload. The mean arterial
pressure is usually calculated at one third of the way between diastolic and
systolic pressure because of the shape of the arterial pressure wave form, and therefore the mean arterial pressure is little affected by exercise.

Berne and Levy (1988) explain that the mean arterial pressure is the pressure in the arteries averaged over time. It may be obtained from an arterial pressure tracing by measuring the area under the curve and dividing this area by the time interval involved. The mean arterial pressure $p_a$, usually can be approximated satisfactorily from the measured values of the systolic $p_s$ and diastolic $p_d$ pressure by means of the following formula.

$$p_a = p_d + \frac{1}{3} (p_s - p_d)$$

The mean pressure will be considered to depend only on the mean volume of blood in the arterial system and the elastic properties of the arterial walls. The arterial volume $V_a$ in turn depends on the rate of inflow, from the heart into the arteries (cardiac output) and the rate of out flow $Q_0$ from the arteries through the capillaries (peripheral run off). If arterial inflow exceeds outflow, then arterial volume increases and the arterial walls are stretched more and pressure rises. The converse happens when arterial outflow exceeds inflow when inflow equals outflow, arterial pressure remains constant.

Kumar (1989) The Pressure in the pulmonary artery is much lower than those in the systemic arteries. In man the mean pulmonary arterial pressure is about 10 – 15 mm Hg, the systolic pressure is about 20 – 25
mm Hg, and the diastolic is 6 – 12 mm Hg. The pulse pressure is 12 – 15 mm Hg. The left arterial pressure is about 5 mm Hg and the pulmonary capillary pressure is usually taken as 8 mm Hg and it will be noted this is far below the plasma colloid osmotic pressure of 25 mm Hg.

Devries (1986) There is a sharp increase in pressure, both systolic and diastolic which reflects the increase in intra thoracic pressure. After a period of several seconds during which blood in the lungs furnishes the venous return, the decreased venous return brings about a decreased pulse pressure. After release of the straining activity, there is an increase in both mean pressure and pulse pressure. No increased difference in pressure across the walls of the heart and great vessels can exist, as the pressure increases with in these wall it increases proportionately outside them in fact the pressure difference decreases.

Daniel.D (1985) Training exerts considerable effect on blood pressure, because of the increase in the systemic system, as a result of using blood from the splanchnic pool; there is more volume under high pressure. As a result of prolonged effort in the untrained individual systolic pressure falls progressively, an indication of approaching exhaustion. On the other hand, training retards this phenomenon and work can be continued for a longer time with scarcely any perceptible changes in blood pressure. During exercise of endurance the rise in blood pressure is much greater than during exercise of speed.
1.10 BLOOD GLUCOSE

Ramakrishnan (1972) states that physical exercise could increase blood flow in trained subjects and improve the microcirculation. There will be increased peripheral blood flow, which brings greater amount of glucose to the site of utilization. Such increased utilization of glucose may bring about desirable decrease in blood sugar. In the fasting state, mild exercise leads to hyperglycemia, excess of sugar in blood due to glycogenolysis. But severe exercise leads to hypoglycemia. In addition, if the respiratory quotient is about 0.75 in fasting state, there is a possibility of developing ketosis. Even with adequate diet, if the duration of exercise is very long as in marathon race, it can lead to hypoglycemia. The practice of taking glucose during exercise is aimed more at preventing hypoglycemia than giving energy for the exercise. Dietary glucose also spares the fatty consumption. It is not clear whether the free fatty acids directly metabolized in muscle are required to be converted to glucose.

Repin (1988). In sports where the athlete is subjected to protracted physical strain, different people react differently to stress. In some adrenaline intensively enters the blood, while in others it is insulin, a hormone that reduces the glucose level of the blood. With more insulin, glucose is used to better advantage in muscle tissue, but the athletes themselves endure lengthy strain poorly because low level of blood glucose impairs function of the nervous system. With the knowledge of
such important facts about each athlete's body, every beginning athlete can be given recommendations for a particular type of sport where he or she can be successful.

Carbo Force uses mostly dextrose as its source of sweetener and fuel for the body, which is the most rapidly utilized form of glucose. The fructose in Carbo Force is used to buffer the possible insulin effect, which many people think of as a sugar crash, due to the rapid blood glucose increases created by the glucose polymers, dextrose and soluble starches. It allows for a slower return to resting blood glucose levels. It is also a good source for muscle glycogen replacement during recovery.

Leatt and Jacobs (1988) Hypoglycaemia may be evident in prolonged exercise, and can contribute to fatigue. This normally occurs as a result of an inadequate to fatigue. This normally occurs as a result of an inadequate restoration of the liver glycogen stores, as it appears that liver gluconeogenesis is unlikely to produce sufficient glucose for maintenance of blood concentrations once glycogen stores are low. The brain and the central nervous system are dependent on glucose for their metabolism. Blood glucose concentrations of about 3.0 mmol\text{L}^{-1} can cause nervousness and trembling, whilst levels below 3.0 mmol\text{L}^{-1} can lead to loss of consciousness.
1.11 BLOOD LACTIC ACID

Philip.D.Gollnic (1995) The elevation in blood and muscle lactate concentration in response to exercise is one of the oldest observations of the bio chemical events of muscular activity. Over the years, controversy has ranged and continues to exist concerning the reasons for this rise in lactate, its consequence to exercise how training influences it, and diet on the concentrations of lactate in muscle and blood. This is followed by consideration of the biochemical events in muscle including the relationship between oxygen supply and production as elevated during exercise. Finally, the fact of lactate as a fuel for direct oxidation during and after exercise is elevated from students who have used radio-activity tracers both with animals and human beings as subjects.

Neumann, Georg. (1994) "lactic acid" is used most commonly by athletes to describe the intense pain felt during exhaustive exercise, especially in events like the 400 metres and 800 metres. When energy is required to perform exercise, it is supplied from the breakdown of Adenosine Triphosphate (ATP). The body has a limited store of about 85 grms of ATP and would use it up very quickly if we did not have ways of resynthesising it. There are three systems that produce energy to resynthesise ATP: ATP-PC, lactic acid and aerobic.
The process of lactic acid removal takes approx. one hour, but this can be accelerated by undertaking an appropriate warm down that ensures a rapid and continuous supply of oxygen to the muscles.

The normal amount of lactic acid circulating in the blood is about 1 to 2 millimoles/litre of blood. The onset of blood lactate accumulation (OBLA) occurs between 2 and 4 millimoles/litre of blood. In non athletes this point is about 50% to 60% VO2 max and in trained athletes around 70% to 80% VO2 max.

Most runners still believe that lactic acid is released during hard or unaccustomed exercise and that this is what limits running performance, as well as being the cause of stiffness. Neither is correct. But not even is the terminology of “lactic acid”.

Lactic acid does not exist as an acid in the body: it exists in another form called “lactate”, and it is this that is actually measured in the blood when “lactic acid” concentration is determined, as is done from time to time. This distinction is important not only for the sake of correctness, but more importantly, because lactate and lactic acid would have different physiological effects.

While coaches have been very interested in measuring lactate production after a maximal effort, many are now more interested in controlling sub-maximal lactate production during training. Spot Testing
the monitoring of lactate levels during practice) is becoming one of the
more important uses of Lactate testing. It is used by coaches to confirm
the threshold pace, to ensure an athlete is not overreaching during a set
and generating too much lactate and to educate athletes on the feel of
certain lactate levels. This latter use helps athletes identify the proper
practice paces the coach wants and also helps them with the proper pace
during a race.

This use of lactate testing is very important for runners, cyclists and
triathletes as they spend much of their training on roads with uneven
surfaces and frequent hills. It is important for the runner to know just how
much lactate is being generated. Until the introduction of the Accusport,
this was practically impossible. Now mature athletes can be trained to take
their own lactates at some appropriate spot in their run or ride. This is
especially important since heart rates can drift higher at constant lactate
levels for some runners and the athlete may not be putting enough stress
on the metabolism to get the desired training effect

Cruze vsm.(1993)Lactic acid the end product of anaerobic
glycolysis is seen both at rest and at low intensity. Lactate values are low in
the working muscles, in the less worked muscles and those with high
enzyme anaerobic abilities. Just the opposite will lead to extreme acid
formation which blocks muscles concentration, The Lactic acid from the
blood jumps in to the muscle and during exercise is utilized by the heart
muscle, liver and muscle itself. After approximately 3 hrs on completion of exercise the lactic acid completely eliminated. The half time values of a concentration of 10mmol/1 is about 15 mins and higher concentration about 20-25mins. Slow jogging and stretching with HR of 110-120 per minute can accelerate the lactic acid elimination.

1.12 OBJECTIVES OF THE TRAINING

To prepare a package of training, the research scholar first has to analyze what are the variables that have to be developed, and by considering the requirement, the research scholar has to review the package of physical training. The research scholar should also consider the aim and objectives of the conditioning programme. The number of subjects and variable to be involved. Their age, sex, experience, facilities and equipments at hand as well as amount of time that can be spared.

1.13 STATEMENT OF THE PROBLEM

The purpose of the study to investigate the effect of packages of training on functions of haemoglobin concentration, mean arterial pressure, blood glucose, blood lactic acid concentration among schoolboys.
1.14 HYPOTHESIS

i. It is hypothesized that there may not be any significant improvement in the functions of haemoglobin concentration due to selected packages of physical training.

ii. It is hypothesized that there may not be any significant improvement in the functions of mean arterial pressure due to selected packages of physical training.

iii. It is hypothesized that there may not be any significant improvement in the functions of blood glucose due to selected packages of physical training.

iv. It is hypothesized that there may not be any significant improvement in the functions of blood lactic acid concentration due to selected packages of physical training.

1.15 SIGNIFICANCE OF THE STUDY

i. This study would help to plan the fitness program for the school boys.

ii. This study would help the physical education teachers to choose the right exercise among the students that is a package of training and considering the need and requirements of the students.
iii. Since a large number of schools in the cities are being run with limited play fields. This study might suggest an alternative program to suit their play facilities.

iv. This study would open up a new channel for future studies by combining activities in various proportions and with some modifications.

1.16 DELIMITATIONS

i. Ninety Schoolboys will be selected as subjects at random and their age will be 15 – 18 years.

ii. The investigator followed strictly the ethic in selecting the place for practice time.

iii. Based on the literatures review and own understanding of the investigator the following variables will be selected in this study.

1.17 LIMITATIONS

i. No attempt is made to relate the subjects, habits, behaviours and other training in this investigation.

ii. The humidity, altitude and such other factors will not be taken into consideration.

iii. There was no control made on their diet.
1.18 DEFINITION OF THE TERMS

1.18.1 Package of Training

Package of physical training is a method of physical conditioning that consists of continuous run and walk, and interval training.

1.18.2 Haemoglobin Concentration

Fox (1984) defines haemoglobin as a complex compound in red blood cells that contains iron (haemo) and protein (globin) and is capable of combining with oxygen to form Oxyhaemoglobin in the red blood cells.

1.18.3 Mean Arterial Pressure

Guyton Arthur (1974) defines the mean Arterial pressure is the average pressure throughout each cycle of the heart.

1.18.4 Interval Training

Tudor o Bompa (1980) Interval training is a method of repeating stimuli of various intensities with a previously planned rest interval, during which the athlete does not fully regenerate. The duration of the rest interval is calculated by the heart rate method. The portions of distance to be repeated could be performed either by time or precise distance.
1.18.5 BLOOD GLUCOSE

Perrot J.W. (1974) Blood glucose refers to the blood sugar circulating in the blood at a constant level and it is used by the muscles during the activity.

1.18.6 BLOOD LACTIC ACID CONCENTRATION

Fox (1985) A fatiguing metabolic of the lactic acid system resulting from the incomplete break down of glucose. (Sugar)