CHAPTER-I

INTRODUCTION

Performance sports aim at high sports performance and for most physical and psychic capacities of sportsmen are developed to extreme limits. This normally does not happen in other areas of human activities. As a result, the performance sports field possesses valuable knowledge about the limits to which human performance and various performance factors can be developed. It also leads to the discovery of means and methods for improving various physical and psychic capacities (performance factors) to an exceptionally high level. This knowledge can be faithful by applied to other areas of sports and human activities.

The science of sports training is recent to the field of sports science. The sports science discipline has improved at a very fast pace in the past few decades. The knowledge gained by these disciplines has to be understood by the coaches and trainers to apply it correctly to the training process. But a majority of the coaches do not have sufficient scientific background and training to make full and effective use of the knowledge acquired by the sports science disciplines. This creates a gap between scientists and coaches. The science of training with its workers having sufficient background of science and sports can fill this gap and can become a mediator between the scientists and the coaches.

According to Hardayal Singh (1993), Sports Training is a pedagogical process based on scientific principles, aiming at preparing sportsmen for higher performance in sports competitions.

Sports training aims to improve the performance of sportspersons. Weight training and aerobic rhythmic exercises are very popular nowadays and effective training methods to promote higher performance in sprinting and jumping events. Aerobic rhythmic exercises are included depth jumping, hopping, bounding drills, etc are legs plyometric, and medicine balls exercise are arms plyometric exercises. these exercises are used to improve speed, explosive strength, and other motor ability components. Weight training is on activities of high intensity and short duration and opposite side low intensity and high volume or duration. Weight training exercises help to build muscle, strength, and endurance.

1.1 TRAINING

Sports training is the basic form of an athlete's training. It is the preparation systematically organized with the help of exercises, which is a pedagogically organized process of controlling an athlete's development. (Singh, 1984)

Sports Training is the physical, technical, intellectual, psychological, and moral preparation of an athlete through physical exercise. The word training has been a part of human language since ancient times. It denotes the process of preparation for some task. This process invariable extended to some days and even months and years. The term 'training' is widely used in sports to achieve a high level of performance to a particular competition.

Sports training is a systematic process extending over a long period. For best results, the system of training has to be based and conducted on scientific facts and lines. Where it is not possible to do that, the training has to be based on the results

of successful practice which has withstood the test of time. Sports science has still not been able to provide a scientific base for all the aspects and elements of training. Many things are still based on the results of successful practice which on deeper analysis is also a method of science to prove or disprove a theory.

1.2 IMPORTANCE OF SPORTS TRAINING

According to Mathew (1981), Sports Training is the basic form of preparation of sportsmen. The aim of sports training is to prepare a sportsperson physically, physiologically, and psychologically for a possible highest sports performance at the time of main competition, a specific sport. To make a sports person capable of putting up an optional performance, systematic improvement of performance capacity and readiness of sports performance is to be carried out.

Sports training is based on systematic fact and principles. A systematic and suitable for achieving high performance has to be first made based on which sports training is planned. It is always assessed, planned organized, and implemented by a coach or a sports teacher or some other person.

Sports training aims at improving sports performance through physical, physiological, psychological, social intellectual, and moral aspects thus contributing to the development of the all-round personality of the sports person. In other words, the performance of a sportsperson improves as a result of the development of total personality. Therefore, since sports training directly or indirectly focuses attention on the development of the all-round personality of a sports person, sports training is an educational process (pedagogical process).

1.3 AEROBIC RHYTHMIC EXERCISES

Aerobic exercise is sometimes known as "cardio" an exercise that requires the pumping of oxygenated blood by the heart to deliver oxygen to working muscles. Aerobic exercise stimulates the heart rate and breathing rate to increase in a way that can be sustained for the exercise session. In contrast, anaerobic ("without oxygen") exercise is an activity that causes to be quickly out of breath, like sprinting or lifting a heavyweight. Examples of aerobic exercises include cardio machines, spinning, running, swimming, walking, hiking, aerobics classes, dancing, cross country skiing, and kickboxing. There are many other types.

Aerobic exercises can become anaerobic exercises if performed at a level of intensity that is too high.

Aerobic exercise not only improves fitness; it also has known benefits for both physical and emotional health.

Aerobic exercise can help prevent or reduce the chance of developing some cancers, diabetes, depression, cardiovascular disease, and osteoporosis.

Aerobic exercise plan should be simple, practical, and realistic. Specific equipment (such as cardio machines) may be used but is not necessary for successful aerobic exercise.

1.3.1 THE BEGINNING

It all starts with breathing. The average healthy adult inhales and exhales about 7 to 8 liters of air per minute. Once fill the lungs, the oxygen in the air (air

contains approximately 20% oxygen) is filtered through small branches of tubes (called bronchioles) until it reaches the alveoli. The alveoli are microscopic sacs where oxygen diffuses (enters) into the blood. From there, it's a beeline direct to the heart.

1.3.2 THE HEART OF IT

The heart has four chambers that fill with blood and pump blood (two atria and two ventricles) and some very active coronary arteries. Because of all this action, the heart needs a fresh supply of oxygen, and as just learned, the lungs provide it. Once the heart uses what it needs, it pumps the blood, oxygen, and other nutrients out through the large left ventricle and the circulatory system (cardiovascular system) to all the organs, muscles, and tissues that need it.

1.3.3 LOT OF PUMPING IN HEART

The heart beats approximately 60-80 times per minute at rest, 100,000 times a day, more than 30 million times per year, and about 2.5 billion times in a 70-year lifetime! Every beat of r heart sends a volume of blood (called stroke volume -- more about that later), along with oxygen and many other life-sustaining nutrients, circulating through r body. The average healthy adult heart pumps about 5 liters of blood per minute.

1.4 OXYGEN CONSUMPTION AND MUSCLES

All that oxygen being pumped by the blood is important, may be familiar with the term "oxygen consumption." In science, it's labeled VO2, or volume of oxygen consumed. It's the amount of oxygen the muscles extract or consume from

the blood, and it's expressed as ml/kg/minute (milliliters per kilogram of body weight). Muscles are like engines that run on fuel (just like an automobile that runs on fuel); only our muscles use fat and carbohydrates instead of gasoline. Oxygen is a key player because, once inside the muscle, it's used to burn fat and carbohydrate for fuel to keep our engines running. The more efficient our muscles are at consuming oxygen, the more fuel we can burn, the more fit we are, and the longer we can exercise.

The average sedentary adult will reach a level of oxygen consumption close to 35 ml/kg/minute during a maximal treadmill test (where asked to walk as hard as can). Translated, that means the person is consuming 35 milliliters of oxygen for every kilogram of body weight per minute. That'll get through the day, but elite athletes can reach values as high as 90 ml/kg/minute! How do they do it? They may have good genes for one, but they also train hard. And when they do, their bodies adapt. The good news is that the bodies of mere mortals like the rest of us adapt to training too. Here's how.

1.5 REGULARITY OF AEROBIC EXERCISE

The heart gets stronger and pumps more blood with each beat (larger stroke volume). Elite athletes, as I just mentioned, can have stroke volumes more than twice as high as average individuals. But it's not just that. Conditioned hearts also have greater diameter and mass (the heart's a muscle too and gets bigger when train it), and they pump efficiently enough to allow for greater filling time, which is a good thing because it means that more blood fills the chambers of the heart before they pump so that more blood gets pumped with each beat.

Greater stroke volume means the heart doesn't have to pump as fast to meet the demands of exercise. Fewer beats and more stroke volume mean greater efficiency. Think about a pump emptying water out of a flooded basement. The pump works better and lasts longer if it can pump larger volumes of water with each cycle than if it has to pump faster and strain to get rid of the water. High stroke volume is why athletes' hearts don't pump as fast during exercise and why they have such low resting heart rates; sometimes as low as 40 beats per minute, whereas the average is 60-80 beats per minute.

Downstream from the heart are r muscles, which get more efficient at consuming oxygen when do regular aerobic exercise (remember, "consuming" oxygen means that the muscles are taking the oxygen out of the blood). This happens because of an increase in the activity and number of enzymes that transport oxygen out of the bloodstream and into the muscle. Imagine 100 oxygen molecules circulating past a muscle. 're twice as fit if the muscle can consume all 100 molecules than if it can only consume 50. Another way of saying it is that’s twice as fit as someone if r VO2 max is 60ml/kg/min. and theirs is 30ml/kg/min. In terms of performance in this scenario,’ll have more endurance because r muscles won't run out of oxygen as quickly.

Mitochondria inside the muscle increase in number and activity. Mitochondria are the powerhouses of r cells. They do all the heavy-duty work to keep moving. They use the oxygen to burn the fat and carbohydrate that makes go. The good news is that they increase in number and activity, by as much as 50%, in just a matter of days to weeks in response to regular aerobic exercise in adults of all ages.

1.6 BENEFITS OF AEROBIC EXERCISE

There are two physical activity guidelines in the United States. The first, the Surgeon General's Report on Physical Activity and Health, is a lifestyle recommendation. That is, can modify it to fit into r daily routine and activities of daily living. The recommendation is that all adults should accumulate 30 minutes of moderate-intensity activity on most, if not all days of the week. The keywords are "accumulate" and "moderate-intensity." Accumulate means that can do 10-15 minutes at a time and repeat that a couple of times throughout the day; for example, 10 minutes in the morning, 10 minutes at lunch, and 10 minutes around dinner. Moderate intensity is equivalent to feeling "warm and slightly out of breath" when do it. Recently there has been some controversy about the effectiveness of this guideline and its benefits. At the moment the recommendation stands, but we may hear more about it in the not-too-distant future.

The second recommendation is from the American College of Sports Medicine. The ACSM recommends 20-60 minutes of continuous aerobic activity (biking, walking, jogging, dancing, swimming, etc.) three to five times a week, at 60%-90% of maximum heart rate, and two to three days of resistance training. This is a more formal, "workout" recommendation, although can also accumulate the more intense workout in bouts of 10-15 minutes throughout the day if like. Follow this recommendation and r aerobic fitness and r health will improve.

Which one to choose is a personal choice. They are not intended to compete with each other but rather to provide options and maybe even complement each other. For instance, the Surgeon General's recommendation may be more practical

for individuals who are unwilling, or unable, to adopt the more formal ACSM recommendation. Of course, there's no downside to working out regularly with aerobic exercise and also becoming more physically active as per the Surgeon General (take more stairs, mow the lawn by hand, park far away from the store and walk), so combining them might be a good decision.

1.7. WEIGHT TRAINING

Weight training is an effective tool for improving or maintaining strength, endurance, and overall fitness. It involves controlled movements of skeletal muscle to move an external load. This can be accomplished by using machines, free-weights, and exercises involving body weight. Individuals participating in a weight training program can expect improvement in body tone and strength. Incorporating a weight training program as part of a complete fitness plan will contribute to increased weight loss/control, balance and coordination, and a better overall sense of well-being.

1.7.1. WEIGHT TRAINING VERSUS OTHER TYPES OF EXERCISE

Strength training is an inclusive term that describes all exercises devoted to increasing physical strength. Weight training is a type of strength training that uses weights rather than elastic, Eccentric Training, or muscular resistance to increase strength. Endurance training is associated with aerobic exercise while flexibility training is associated with stretching exercises like yoga or Pilates. Weight training is often used as a synonym for strength training but is a specific type within the more inclusive category.

1.7.2. HISTORY OF WEIGHT TRAINING

The genealogy of lifting can be traced back to the beginning of recorded history where man's fascination with physical abilities can be found among numerous ancient writings. Progressive resistance training dates back at least to Ancient Greece when legend has it that wrestler Milo of Croton trained by carrying a newborn calf on his back every day until it was fully grown. Another Greek, the physician Galen, described strength training exercises using the halteres (an early form of dumbbell) in the 2nd century.

Ancient Greek sculptures also depict lifting feats. The weights were generally stones but later gave way to dumbbells. The dumbbell was joined by the barbell in the latter half of the 19th century. Early barbells had hollow globes that could be filled with sand or lead shot, but by the end of the century, these were replaced by the plate-loading barbell commonly used today, (**Todd, 1995**).Another early device was the Indian club, which came from ancient Persia where it was called the "meels". It subsequently became popular during the 19^{th} century and has recently made a comeback in the form of the club-bell.

The 1960s saw the gradual introduction of exercise machines into the still-rare strength training gyms of the time. Weight training became increasingly popular in the 1970s, following the release of the bodybuilding movie Pumping Iron, and the subsequent popularity of Arnold Schwarzenegger. Since the late 1990s increasing numbers of women have taken up weight training, influenced by programs like Body for Life; currently, nearly one in five U.S. women engage in weight training on a regular basis.

1.7.3. BASIC PRINCIPLES

The basic principles of weight training are essentially identical to those of strength training and involve a manipulation of the number of repetitions (reps), sets, tempo, exercise types, and weight moved to cause desired increases in strength, endurance, and size. The specific combinations of reps, sets, exercises, and weights depend on the aims of the individual performing the exercise; sets with fewer reps can be performed with heavier weights.

In addition to the basic principles of strength training, a further consideration added by weight training is the equipment used. Types of equipment include barbells, dumbbells, pulleys, and stacks in the form of weight machines, and the body's weight in the case of chin-ups and push-ups. Different types of weights will give different types of resistance, and often the same absolute weight can have different relative weights depending on the type of equipment used. For example, lifting 10 kilograms using a dumbbell sometimes requires more force than moving 10 kilograms on a weight stack if certain pulley arrangements are used. In other cases, the weight stack may require more force than the equivalent dumbbell weight due to additional torque or resistance in the machine.

Weight training also requires the use of 'good form', performing the movements with the appropriate muscle group, and not transferring the weight to different body parts to move greater weight (called 'cheating'). Failure to use good form during a training set can result in injury or a failure to meet training goals; since the desired muscle group is not challenged sufficiently, the threshold of overload is never reached and the muscle does not gain in strength.

1.8.PHYSIOLOGICAL VARIABLES

Variables are properties or characteristics of some event, object, or person that can take on different values or amounts (as opposed to constants such as *p* which do not vary). Variables related to physiology are said to be physiological variables.

1.8.1 RESTING PULSE RATE

The rhythmic expansion and contraction of the arteries corresponding to each beat of the heart are referred to as the pulse in the medical field. Pulse is the rate at which the human heartbeats, indicating the heartbeat. The pulse can be felt at any spot in the body, wherein the artery is compressed against the bone.

The most prominent spots wherein one can feel the pulse without much difficulty are Physiological spots, where the pulse rate of the heart's rhythmic tone can be ascertained, are Wrists (Radial Artery), Neck (Carotid Artery), Inside of the elbow (Brachial Artery), Behind the neck (Popliteal Artery) and Ankle Joint (Posterior Tibial Artery).

Measuring the pulse can give very important information about individual’s health. Any change from normal heart rate can indicate a medical condition. Fast pulse may signal an infection or dehydration. In emergencies, the pulse rate can help determine if the patient's heart is pumping. The pulse measurement has other uses as well. During exercise or immediately after exercise, the pulse rate can give information about the fitness level and health.

The rhythm and strength of the heartbeat can also be noted, as well as whether the blood vessel feels hard or soft. Changes in the heart rate or rhythm, a weak pulse, or a hard blood vessel may be caused mainly by Cardiac conditions. The automatic nervous system which supplies parasympathetic or vagus nerves and the sympathetic or acceleratory nerves to the Sino-vial artery node plays a prime role in regulating the heart rate. **(Larry, 1982).**

1.8.2 BLOOD PRESSURE

Pressure is exerted by the blood on the walls of arteries.

When the left ventricle ejects blood into the aorta, the aortic pressure rises. The maximal aortic pressure following ejection is termed systolic pressure. As the left ventricle is relaxing and refilling, the pressure in the aorta falls. The lowest pressure in the aorta, which occurs just before the ventricle ejects blood into the aorta, is termed the diastolic pressure.

Mean arterial blood pressure is defined as the average arterial pressure during a single cardiac cycle. As blood is pumped out of the left ventricle into the arteries, pressure is generated. The mean arterial pressure (MAP) is determined by the cardiac output, systematic vascular resistance, and central venous pressure according to the following relationship, which is based upon the relationship between flow, pressure, and resistance. **(Edward and Mathews, 1981).**

Blood Pressure for healthy individual measures: 120/80mmHg. Systolic BP 120+/- 10 and Diastolic BP 80+/-5 are considered normal. A qualitative deviation from the norm is considered to be regarded as abnormal BP. Hypertension increase

in blood pressure above normal for given age and sex. Hypertension enforces heart to work hard as a consequence it hardens Blood vessel. It paves way for a future cardiac problems. Hypotension is an abnormal reduction in Blood Pressure below the lower limit of the normal range.

A graded relationship has been demonstrated between duration and degree of sustained hyperglycemia and the risk of vascular disease. The micro and macrovascular complications of Type 2 Diabetes can be minimized by strict control of Blood pressure with a target of less than 140/80 mmHg **(Nelson, 1986)**.

1.8.3.VO_2 MAX

VO_2 max (also maximal oxygen consumption, maximal oxygen uptake, or aerobic capacity) is the maximum capacity of an individual's body to transport and utilize oxygen during incremental exercise, which reflects the physical fitness of the individual. The name is derived from V - volume per time, O_2 - oxygen, max - maximum.

VO_2 max is expressed either as an absolute rate in liters of oxygen per minute (l/min) or as a relative rate in millilitres of oxygen per kilogram of bodyweight per minute (ml/kg/min), the latter expression is often used to compare the performance of endurance sports athletes

"Maximal oxygen uptake (VO_2max) is widely accepted as the single best measure of cardiovascular fitness and maximal aerobic power. Absolute values of VO_2max are typically 40-60% higher in men than in women."[1] then, VO_2max varies considerably in the population, with sex being a primary determining factor in this variability.

1.9 HAEMATOLOGICAL VARIABLES

The liver is like a big factory that regulates blood sugar is an important chemical compound. The excess blood sugar is stored in the liver as glycogen and released when the blood sugar level lowers. Glycogen molecules are larger molecules containing thousands of glucose molecules. But glycogenolysis individual muscle cells during exercise breakdown glycogen to glucose to provide energy for contraction. Glycogen is also broken down in the liver, with the free glucose being released into the bloodstream and transported to tissues throughout the body **(Power. L and Howley.S, 1996)**.

The exercises produce biochemical changes in the cardiorespiratory system and other important alterations in body composition such as high - density lipoprotein, low - density lipoprotein, blood cholesterol, blood glucose, and triglyceride levels **(Fox and Mathews, 1981)**.

1.9.1 HEMOGLOBIN

Hemoglobin (Hb or Hgb,) is the iron-containing oxygen-transport metallo-protein in the red blood cells of all vertebrates (with the exception of the fish family Channichthyidae) as well as the tissues of some invertebrates. Hemoglobin in the blood carries oxygen from the respiratory organs (lungs or gills) to the rest of the body (i.e. the tissues) where it releases the oxygen to burn nutrients to provide energy to power the functions of the organism in the process called metabolism. In mammals, the protein makes up about 96% of the red blood cells dry content (by weight), and around 35% of the total content (including water). Hemoglobin has an

oxygen-binding capacity of 1.34 mL O_2 per gram of hemoglobin, which increases the total blood oxygen capacity seventy-fold compared to dissolved oxygen in the blood. The mammalian hemoglobin molecule can bind (carry) up to four oxygen molecules.

Hemoglobin is involved in the transport of other gases: It carries some of the body's respiratory carbon dioxide (about 10% of the total) as carbamino hemoglobin, in which CO_2 is bound to the globin protein. The molecule also carries the important regulatory molecule nitric oxide bound to a globin protein thiol group, releasing it at the same time as oxygen.

Hemoglobin is also found outside red blood cells and their progenitor lines. Other cells that contain hemoglobin include the A9 dopaminergic neurons in the substantia nigra, macrophages, alveolar cells, and mesangial cells in the kidney. In these tissues, hemoglobin has a non-oxygen-carrying function as an antioxidant and a regulator of iron metabolism.

Hemoglobin and hemoglobin-like molecules are also found in many invertebrates, fungi, and plants. In these organisms, hemoglobin may carry oxygen, or they may act to transport and regulate other things such as carbon dioxide, nitric oxide, hydrogen sulfide, and sulfide. A variant of the molecule, called leg hemoglobin, is used to scavenge oxygen away from an aerobic system, such as the nitrogen-fixing nodules of leguminous plants before the oxygen can poison the system.

1.9.2. RED BLOOD CORPUSCLES (RBC)

They are circular, biconcave, disc-shaped cells. They do not have a nucleus. But they have a respiratory pigment called hemoglobin. The normal RBC count is 4.5 to 5 million per cu.mm,. RBCs serve important functions such as transport of oxygen and maintenance of acid- base balance. They are synthesized in the bone marrow found at the ends of long and short bones. The average life span of RBC is about 120 days.

- Rouleaux formation is the tendency of RBCs to stick to one another like a pile of coin. This occurs due to the discoid shape of RBCs.
- Polycythemia is a condition where there is an increase in the number of RBCs.
- Anemia is a condition where there is a decrease in the number of RBCs.

1.9.3.HEMOGLOBIN

It is the respiratory pigment of erythrocytes. The red colour of blood is due to hemoglobin. It contains globin, a protein that is conjugated with heme (hemoglobin = heme + globin). Heme molecule contains four pyrrole rings with ion in the centre. The hemoglobin content of the body is about 15G per 100 ml of blood. Anemia occurs due to a decrease in hemoglobin.

The functions of hemoglobin are:

- Transport of oxygen and carbon dioxide
- Maintenance of acid-base equilibrium

- As a source for the formation of bilirubin (Bilirubin is formed from porphyrin fraction of hemoglobin).

- Hemolysis is the escape of hemoglobin from RBC into the blood. This is caused by hypotonic conditions, certain drugs, and toxins.

1.9.4 WHITE BLOOD CELLS (WBC)

They are colorless cells containing a nucleus. They are larger in size than RBCs. Also, their number is less when compared to RBCs (about 8000 per cu.mm of blood).

1.10. KIN ANTHROPOMETRIC VARIABLES

1.10.1.FAT MASS

The body fat percentage (BFP) is of a human or another other living being is the total mass of fat divided by total body mass, multiplied by 100; body fat includes essential body fat and storage body fat. Body fat mass increases with age in both men and women through middle age; a slow decrease occurs after age 70. Even in those people whose body weight does not increase with age, body fat increases as lean body mass decreases. The homeostatic regulation of fat mass becomes faulty with advancing age.

1.10.2. LEAN BODY MASS

Lean body mass (LBM) is a part of body composition that is defined as the difference between total body weight and body fat weight. This means that it counts

the mass of all organs except body fat, including bones, muscles, blood, skin, and everything else. ... Generally, men have a higher proportion of LBM

1.11. OBJECTIVES OF THE STUDY

1. To find out the effect of aerobic rhythmic exercise on selected physiological variables among college men obese students.

2. To find out the effect of aerobic rhythmic exercise on selected Hematological variables among college men obese students.

3 To find out the effect of aerobic rhythmic exercise on selected kin anthropometric variables among college men obese students.

4. To find out the effect of weight training on selected physiological variables among college men obese students.

5. To find out the effect of weight training on selected Hematological variables among college men obese students.

6 To find out the effect of weight training on selected kin anthropometric variables among college men obese students.

7. To find out the effect of aerobic rhythmic exercise, weight training on selected physiological, hematological, and kin anthropometric variables among college men obese students.

1.12. REASONS FOR THE SELECTION OF TOPIC

The researcher has taken interest in the effect of aerobic rhythmic exercise, weight training on selected physiological, hematological, and kin anthropometric variables among college men obese students. Physiological, hematological and kin anthropometric variables were needed to analyze the various changes takes place in their physiological, hematological and kin anthropometric level before and after the training period.

The researcher took this topic because there is a lack of literature and studies in the same fields, and especially on for college men obese students. Hence Researcher wants to find out the effect of each practice separately on college men obese students.

1.13. STATEMENT OF THE PROBLEM

The purpose of the study was to find out the effects of aerobic rhythmic exercise and weight training on selected physiological, hematological, and kin anthropometric variables among college men obese students.

1.14. HYPOTHESIS

Based on the conclusion drawn through critical and allied literature related to the study, the investigator has framed the following hypotheses

1. It was hypothesized that there would be significant differences in aerobic rhythmic exercise group than the control group on selected physiological, hematological, and kin anthropometric variables among college men obese students.

2. It was hypothesized that there would be significant differences in the weight training group than the control group on selected physiological, hematological, and kin anthropometric variables among college men obese students.

3. It was hypothesized that there would be significant differences between in aerobic rhythmic exercise group and the weight training group on selected physiological, hematological, and kin anthropometric variables among college men obese students.

1.15. SIGNIFICANCE OF THE STUDY

1. The findings of the study would explore the status of the aerobic rhythmic exercise, weight training among college men obese students

2. The study would bring out the relative effect of aerobic rhythmic exercise, weight training among college men obese students

3. The findings of the study will helpful for further research studies, also helpful for the academy of college men obese students.

4. This study would give an exact idea about physiological variables like resting pulse rate, vo2 max, mean arterial pressure.

5. This study would give an exact idea about Hematological variables like Red Blood Cells (RBC), White Blood Cells (WBC).

6. This study would give an exact idea, about kin anthropometric variables like Fat Mass, Lean Body Mass.

1.16. DELIMITATIONS

The following delimitations were taken into consideration in the interpretation of results:

1. The study was confined to men who have college men, obese students only.
2. The age of the subjects were ranging from 18 to 23years only.
3. The total numbers of subjects were 45college men obese students, in which 15 for the control group, 15 for experimental group I (Aerobic rhythmic exercise), and 15 for Experimental group II (Weight training) and were taken for the study.
4. The subjects were selected from college men obese students from Dr..M.G.R. University, Maduravoyal, Chennai only.
5. The subjects were experimentally treated with aerobic rhythmic exercise, weight training only.
6. The study was conducted on dependent variables such as Vo2 max, Resting Pulse Rate, Mean Arterial Pressure, Hemoglobin count, Red Blood Cells (RBC), White Blood Cells (WBC), Fat Mass, Lean Body Mass only.

1.17. LIMITATIONS

The study was limited in the following aspects.

- The socio-economical status was not taken into consideration.

- No attempt was made to control the factors like air resistance, the intensity of light, atmosphere and temperature.
- Certain factors like lifestyle, body structure, personal habits, and family heredity were not taken into consideration for this study.

1.18 MEANING AND DEFINITION OF THE TERMS

1.18.1 AEROBIC RHYTHMIC EXERCISES

Aerobic exercise is sometimes known as "cardio" an exercise that requires the pumping of oxygenated blood by the heart to deliver oxygen to working muscles. Aerobic exercise stimulates the heart rate and breathing rate to increase in a way that can be sustained for the exercise session. In contrast, anaerobic ("without oxygen") exercise is an activity that causes to be quickly out of breath, like sprinting or lifting a heavyweight.

1.18.2 WEIGHT TRAINING

Weight training is an effective tool for improving or maintaining strength, endurance, and overall fitness. It involves controlled movements of skeletal muscle to move an external load.

1.18.3 RESTING PULSE RATE

The number of pulse beats per unit time, usually per minute. The pulse rate is based on the number of contractions of the ventricles (the lower chambers of the heart). The pulse rate may be too fast (tachycardia) or too slow (bradycardia) (**Karvonen MJ, et.al 1957).**

1.18.4 MEAN ARTERIAL BLOOD PRESSURE:

The average of the systemic systolic and diastolic pressures during a complete cardiac cycle is called the mean arterial pressure. Mean arterial pressure is the diastolic pressure plus one-third of the difference between the systolic and diastolic pressures, i.e pulse pressure. (Fox and Mathews, 1981)

1.18.5. VO2 MAX

VO_2 max (also maximal oxygen consumption, maximal oxygen uptake or aerobic capacity) is the maximum capacity of an individual's body to transport and utilize oxygen during incremental exercise, which reflects the physical fitness of the individual. The name is derived from V - volume per time, O_2 - oxygen, max - maximum.

1.18.6. HEMOGLOBIN

Hemoglobin (Hb or Hgb,) is the iron-containing oxygen-transport metallo-protein in the red blood cells of all vertebrates (except the fish family Channichth-yidae) as well as the tissues of some invertebrates.

1.18.7. RED BLOOD CORPUSCLES (RBC)

They are circular, biconcave, disc-shaped cells. They do not have a nucleus. But they have a respiratory pigment called hemoglobin.

1.18.8. WHITE BLOOD CELLS (WBC)

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1.18.9. FAT MASS

The body fat percentage (BFP) is of a human or another other living being is the total mass of fat divided by total body mass, multiplied by 100, body fat includes essential body fat and storage body fat.

1.18.10. LEAN BODY MASS

Lean body mass (LBM) is a part of body composition that is defined as the difference between total body weight and body fat weight. This means that it counts the mass of all organs except body fat, including bones, muscles, blood, skin, and everything else. Generally, men have a higher proportion of LBM.