CHAPTER 1

INTRODUCTION
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In the 21st century one of the greatest accomplishments to be celebrated is the continuous pursuit of fitness since the beginning of man's existence. Today though no longer driven by subsistence requirements, fitness remains paramount to health and well-being. Aging produces many physiological changes in the body, as well as increasing the risk of diseases. Breaking out of a sedentary lifestyle and making exercise a regular part of your life can have impressive benefits. It can increase the amount of blood your heart can pump, lower your heart rate when you are at rest, improve your cholesterol level, lower your blood pressure and reduce body fat. Regular exercise also can help you mentally by making it easier to manage stress, leaving you more energetic, making daily chores easier to accomplish, helping you sleep better and improving your self-image.

Physical fitness is important for all human being irrespective of their age. A given work may not be carried out if the required physical strength is not available. A body may possess extraordinary skill in basketball if she does not keep herself in the game till the end of allotted time; she may not find a place in the team. So, fitness becomes the first and present it enjoy the life fully.
Modernization and urbanization have reduced the physical fitness of human being. Man depends on machines for all his works. Manual labor has been considerably reduced. Physical activity is considered to be the low in dignity and hence avoided. Therefore, the general physical fitness has come down, and to restore it human beings will have to revert to the age and old habits. Physical fitness includes speed, flexibility, rhythm, power, strength, coordination, and muscular endurance, cardiovascular endurance, agility etcetera. These characters are all equated with the healthy functioning of the body.

Another important component of physical fitness and the skill are interested.

1.1 AIM OF PHYSICAL EDUCATION

Physical education is a course taken during primary and secondary education that encourages psychomotor learning in a play or movement exploration setting. The term physical education is most commonly used to denote they have participated in the subject area rather than studied it.

The primary aims of physical education have varied, based on the needs of the time and place. Most modern schools' goal is to provide students with knowledge, skills, capacities, values, and the enthusiasm to maintain a healthy lifestyle into adulthood. Activities included in the program are designed to promote physical fitness, to develop motor skills, to instill knowledge and understanding of rules, concepts, and strategies. Students learn to either work as part of a team, or as individuals, in a wide variety of competitive activities.
Physical Education trends have developed recently to incorporate more activities into physical education. Introducing students to lifetime activities like bowling, walking/hiking, or frisbee at an early age can help students develop good activity habits that will carry over into adulthood. Some physical educationists have begun to incorporate stress-reduction techniques such as yoga and deep-breathing. (Robert 2007)

The physical education curriculum is designed to allow students to experience at least a minimum exposure to the following categories of activities: aquatics, conditioning activities, gymnastics, individual / dual sports, team sports, rhythms, and dance. Students are encouraged to continue to explore those activities in which they have a primary interest by effectively managing their community resources.

The aim of Physical Education is the wholesome development of human personality or complete living. According to William, a leading authority in the field of physical education should aim to provide skilled leadership, adequate facilities and ample time for the individual and the groups to participate in activities that are physically wholesome, mentally stimulating and socially sound. (cited by Robert 2007)

The aim of Physical Education must be to make every child physically, mentally and emotionally fit and also to develop in him such personal and social facilities as well help him to live happily with others and build him up as a good citizen. And the researches in the field of physical education aims at analyzing.
improving, incorporating, reasoning several new areas which would bring out wholesome man.

1.2 AEROBICS

It is only through physical activity: physical fitness is built and maintained. If one has improved his / her physical fitness, it can be resumed that he / she has improved the efficiency of heart and lungs. Some researchers attribute the beneficial effects of exercise on stress, reduced electrical activity in the muscles and an increased feeling of fitness. Few other benefits of physical activity that leads to physical fitness are the delay in aging process, reduction of lower weight reduction in the rate of heart diseases and the reliance of drugs that induce sleep.

Physical fitness depends on the nature of activity one is involved in for a man who earns her livelihood by doing had physical work, physical fitness. The total physical fitness involves the combination of strength, flexibility, endurance, rhythm, and balance etcetera.

Aerobics is a form of physical activity that combines rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness, flexibility, muscular strength, and cardiovascular fitness. It is usually performed to music and may be practiced in a group although it can be done solo and without musical equipment. With the goal of preventing illness and promoting physical fitness practitioners perform various routines comprising a number of different dance like exercise. Aerobics is a vigorous physical
activity that can provide an inexpensive and practical workout for most people. Aerobic fitness helps to promote the cardio-respiratory system from disease and it promotes physical, mental, emotional and spiritual development. Aerobic program can be started at any age and the intensity of the program can also be suited to meet the larger needs of the individual.

1.3 HISTORY OF AEROBICS

Both the term and the specific exercise method were developed by Kenneth H. Cooper M.D., an exercise physiologist, and Col. Pauline Potts, a physical therapist, both in the United States Air Force. Dr. Cooper, an avowed exercise enthusiast, was personally and professionally puzzled about why some people with excellent muscular strength were still prone to poor performance at tasks such as long-distance running, swimming, and bicycling. He began measuring systematic human performance using a bicycle ergo meter and began measuring sustained performance in terms of a person's ability to use oxygen. His groundbreaking book, Aerobics, was published in 1968, and included scientific exercise programs using running, walking, swimming and bicycling. The book came at a fortuitous historical moment, when increasing weakness and inactivity in the general population was causing a perceived need for increased exercise. It became a bestseller. Cooper's data provided the scientific baseline for almost all modern aerobics programs, most of which are based on oxygen-consumption equivalency.
1.4 FLOOR AEROBICS

Aerobic exercise refers to exercise that involves or improve oxygen consumption by the body. Aerobic means with oxygen and refers to the use of oxygen in the body’s metabolic or energy generating process. The steps that can be choreographed in to an aerobic dance routine can be varied by impact (i.e., high impact versus low impact.) Aerobic dance exercise (ADE) can usually be completed easily by participants of all ages and fitness level. This is one of the unique characteristics of ADE, in that the same step can be modified by the participants to meet the needs of her individual workout. A typical ADE workout fulfills the cardioresporatory training principles (i.e frequency, intensity, duration, and type of activity continuous) and is similar to any cardio respiratory workout classes begins with a warm up of light activity and stretching exercise for 10 minutes, progress to the 20-30 minutes workout phase and then have a gradual cool down period for 10 minutes. Three parts of a typical 60 minutes program. A number of steps have been defined; walk, run, skip, two-steps, march, jog, jumping jack, step touch, side kicks and touch backs.

Traditional aerobic dance consists of mixture of running, hopping, skipping, jumping, sliding, and swimming moments and a variety of dance steps self to music. During performance of these dance routines there is suspension phase of the body during which both feet one momentarily of the floor. This type of a modification of traditional aerobic dance has evolved called “high impact” aerobic dance.
Recently, a modification of traditional aerobic dance has evolved called “low impact” aerobic dance. In this approach, one foot maintained contact with the floor at all times. Therefore, eliminating the suspension phase of the activity, thus the incidence of impact type of influence should be lessened with low impact dance.

1.5 BENEFITS OF FLOOR AEROBICS

Some of other benefits of aerobic exercise include the ability to utilize more oxygen during exercise, a lower heart rate at rest, the reduction of less lactic acid, greater endurance. Also may exercise physiologist have found that it reduces blood pressure and changes blood chemistry. It also improves the efficiency of the heart. More evidence is needed to substantiate the belief by some persons that aerobic exercise is reasonable for the development of supplemental blood vessels to heart which would be held in the event of the heart attack, and also that such exercise results in increasing the size of coronary arteries and thus assisting the flow of blood to the heart if the artery is narrowed by a clot.

1.6 STEP AEROBICS

Step aerobic was innovated by ‘Gin Miller’, circa 1989. It is a variation of traditional aerobics with the addition of a specially designed platform upon which one can step on and off during the workout, which would be more intense than walking but less intense than running.
The step aerobics was developed by Gin Miller while she was recovering from a knee injury, a trend that took the aerobics industry by storm. This extremely popular style involves stepping up and down from a platform 15 to 30 centimeters (6 to 12 inches) high while performing different step combinations. (Donatelle, 2005)

Step aerobics exercises produce forces that will stretch, squeeze, bend, twist and vibrate the bones, muscles, joints, tendons and ligaments. Regular exposure to moderately high level of force is actually desirable because mechanical stress will produce structural changes that toughen important anatomical structures. For example, over a period of time the force exerted on the body during moderately vigorous exercise can increase the density of bone so that it resists cracking and breaking. Exercise can also increase the tensile strength of tendons and ligaments so that they are less likely to be stretched or torn.

Researchers reported that the energy cost of step training increased steadily as platform height was increased. The average values of energy cost of stepping at the lower end of the range (4” and 6” platform heights) is approximately equivalent to the values obtained for brisk walking on horizontal ground. As the upper end (10” and 12” platform heights) the range of values reported is similar to those obtained for jogging at speed of 5 to 7 miles per hour. However, the estimates of energy cost at any one platform height vary from group to group. These differences probably reflect differing fitness level of the
subjects used in the investigations, and the different choreographic routines used by each of the groups.

The overall energy cost of any routine will depend on the combination of steps that is used by the choreographer. Any routine that has a large proportion of steps that has a large proportion of lunges and traveling alternating lead steps will have greater energy cost than a routine that consists largely of basic steps and lateral steps across the top of the platform. (Reebel, 1993)

To ensure safe and effective aerobic exercise programmes with training, educational organizations emerged to help guide the aerobics industry. The fundamental components of the aerobic exercise programme consists of five segments: the warm-up or pre stretch (10 min) the aerobic segment (20 – 45 min) cool down (5-10 minutes), strength work (10-20 min) and the final stretch (5-10 min).(David, 1996)

1.6.1 BENEFITS OF STEP AEROBICS EXERCISES

Aerobics and step aerobics are more efficient methods to decrease the percentage of body fat to attain the other metabolic benefits of fitness. It is also a very good way to develop musculoskeletal fitness while building strength, flexibility, balance and coordination. Aerobic exercise has positive effects on stamina, blood pressure, weight, sleep patterns, energy levels, lipid profiles, and can reduce the risk of cardio vascular diseases, diabetes and certain type of cancer.
Regular and purposive aerobic exercise improve the hearts pumping efficiency and reduce the resting heart rate by strengthening the heart muscles strengthen the muscles involved in respiration to facilitate the flow of air in and out of the lungs, tone muscles throughout the body which can improve overall circulation and reduce blood pressure and increase the total number of red blood cells in the body, to facilitate transport of oxygen throughout the body. Regular vigorous aerobic activity can stimulate bone growth, as well as reducing the risk of osteoporosis for both men and women. (Donatella, 2005)

1.7 AQUA AEROBICS

Aqua fitness is the latest fad in the world of fitness. Aqua exercise is any exercise done in water to complement and enhance your regular training and exercise. Aqua aerobics is refreshing as water calm and relaxes one’s body. As a low impact exercise, any one can do aqua aerobics. The body remains submerged in water and this acts a cushion and prevents any form of injury. Aerobic exercise performed in water, known as aqua aerobics. Water aerobics or "waterobics" is the performance of aerobic exercise in shallow water such as a swimming pool. In some areas it is known as AquaFit or "aqua aerobics", and is a type of resistance training.

Water aerobic workouts usually combine a variety of techniques from land aerobics including walking or running backward and forward, jumping jacks, mimicking cross-country skiing along with various arm movements. The workout also may incorporate equipment such as flotation devices.
Water aerobics are instrumental in improving the cardiovascular fitness and also result in better endurance through use of muscles, which gain in strength. As a result of that bouncy that water provides as well as support that a body receives from water there are few worries about getting muscle, bone or joint injuries. Mainly because water aerobics are mainly performed in chest high water both swimmers and non-swimmers get attracted to it.

Water aerobics can be done by all ages, including the elderly, and skill levels. People who are unable to perform other type of aerobic activities due to problems such as arthritis are able to do water aerobics. Water aerobics uses many rhythmic body movements as well as dance steps that needs to be done in water. With the level of water is higher than the chest level certain flotation devices have to be used in deep water and there are also other equipment such as kick boards, woggles and hand buoys that are used. Mostly, the water aerobic exercise will last forty to fifty minutes plus time being allocated for warming up as well as cooling off and also, stretching routines.

1.7.1 BENEFITS OF AQUA EROBICS

The benefits of exercising in the water are many. Aquatic exercise is not only enhances cardiovascular fitness, but also can improve the muscular endurance and overall stretching. Because water provides bouncy and support for the body the likelihood of muscles, bones and joint injuries is significant reduced when exercise is performed in the water. Water provides more resistance than air because of its increased density. This increased resistance
helps to promote better muscular endurance and tone. Water aerobics can improve flexibility without causing undo pressure to joints. Because of the lessened effects of gravity in the water, the joints can be more easily be moved through a wider range of motion. Water aerobics is cooler and more comfortable than exercise on land. There have been few training studies reported regarding the effects of floor aerobics and aqua aerobics on cardiovascular fitness and body composition. With its increasing popularity it is important to determine if aqua aerobics and floor aerobics will induce a motor fitness components and physiological training effects and changes in body composition.

The different forms of physical activities, floor aerobics, step aerobics and aqua aerobics are aimed at developing specific physical fitness components, physiological components and psychological variables. The selected physical fitness, physiological and psychological variables selected for this research and their importance are detailed below.

1.8 ENDURANCE

Physical fitness is the basic fitness of all other fitness. Physical fitness is not only the most important ways to a healthy body but it is also the basis of dynamic and creative activity. Physical fitness is the combination of strength, speed, flexibility, agility and endurance. It is the ability to enjoy our lives and to achieve our goals without undue fatigue or stress. The goal of physical fitness programme is to improve the performance in activities of daily living, job
demands, sports and recreational activities which was said by Craig Liebenson (2003).

Physical strength is an expression of muscle action which implies the quality of being strong and being capable of demonstrating force, power and vigour. Once a person becomes physically fit, he feels better because he is more relaxed.

Endurance is defined as the capacity to continue to work under strain for a long period of time without undue fatigue. It is the ability to persist in strenuous activity this definition, may apply to the body as a whole, to a particular body system or to a local area of the muscular system. Endurance is one of the basic components of general athletic ability and it is usually considered to be the most important component of physiological fitness. Some activities of which endurance is of prime importance are running, swimming, cycling, wrestling, basketball, handball, soccer, rugby and football. In all these activities endurance training occupies an important place in preparation for performance.

Muscular endurance can be defined as the ability of a muscle group to apply force repeatedly for period of time (isotonic) or to sustain for a period of time (isometric).

1.8.1 IMPORTANCE OF ENDURANCE

Endurance is one of the basic components of general athletic ability and it is usually considered to be the most important component of physical fitness.
Some activities in which endurance is of prime importance are running (except for short distance). Swimming, Cycling, Wrestling, Basketball, Handball, Soccer, Rugby and Kabaddi. In all these activities endurance occupies an important place.

1.9 MUSCULAR STRENGTH

Strength has been considered as the most important conditional ability. It has been the most significant factor to enhance sports techniques and performance. Since all sports movement are created by the contraction of muscle, therefore, strength is an important component of various conditional abilities skills and tactical actions. (Uppal 2001).

Strength helps the muscles to exert force to physical activity can be performed without strength. When strength is less other life functions are handicapped. The functioning capacity of vital organs such as those of respiratory, circulatory and digestive systems depend upon the condition of voluntary muscles. Strength in hands helps to pull, push and to lift objects. Strength in legs helps to carry body weight and to carry extra burdens. Muscular strength is reduced or lost by inactivity. The main criterion of muscular contraction is its increasing tension which can be associated with the various phases of muscle length differentiated as follows:
a. Isometric contraction, in which the length of the muscle remains the same.

b. Concentric contraction, which involves shortening of muscles and

c. In eccentric contraction of which, the length of the muscle increases while its tension may remain the same even increase.

Strength can be defined as the agility of a muscle or muscle group to exert against a resistance. Muscular endurance can be defined as the ability of a muscle group to apply force repeatedly for period of time (isotonic) or to sustain for a period of time (isometric). In the game of Handball passing, shooting, catching are the offensive skills, blocking, rebounding and defensive pattern are the defensive skills.

According to Powers and Howley (1997), muscular strength is the maximal ability of a muscle to generate force. It is evaluated by how much force a muscle can generate during a single maximal contraction. Muscular strength is important in almost all sports. Routine tasks around the home also require muscular strength.

Muscular strength is the ability of the muscle to exert force during an activity. The key to making the muscles stronger is working them against resistance, whether, that is from weights or gravity.
1.9.1 IMPORTANCE OF MUSCULAR STRENGTH

Kraemer and Fleck (2005) stated that a properly designed and implemented resistance training program not only provides important health benefits, prevents injury and prepares athletes for competition, it’s also fun! In today’s world we have to look at the health benefits of activity as well as physicals performance gains in sport.

1.10 SPEED

Speed is used in sports for such muscle reaction (motor movement) that are characterized by maximally quick alteration of contraction and relaxation of muscle. It is also the ability to execute motor actions, under given conditions in minimum possible time. (Uppal 2001)

1.10.1 IMPORTANCE OF SPEED

Speed of movement is highly specific to areas of the body. An individual with fast arm movement may have slow leg movements. In fact this specificity extends even to the type of task and the direction of movement. Speed is essential for executing skills in all sports and games.

1.11 PSYCHOLOGY

The word psychology come from the Greek work psycho, means mind or soul and logs mean science. So the world psychology is the science of the mind and soul. Psychology study human nature science of the mind and soul. Psychology is the study of human nature scientifically and rather than formulate
condition. Psychology plays a major role in sports and in closely associated with psychological components.

Sports psychology is defined as the scientific study of human behaviour in sport. Like the other discipline with in sports and exercise science, sports psychology can be applied to varied skilled movement physical activities and exercise programmes. such as corporate fitness, exercise rehabilitation and health oriented exercise programmes as well as traditional physical education and competitive athletics. For the purposes of this study, the investigator selected intelligence quotient, mental health and cognitive style as psychological parameters.

1.11.1 MENTAL HEALTH

Mental health is for everyone; no one is excluded. How we feel and how we think are paramount importance everyday of our lives. Whether we are “u” or ‘down” makes a difference. Although we live in a world of not line communication, knowledge explosion, scientific miracles, and expeditions to mars, people are still the center of the universe and mental well-being is pivotal in the lives of people.

Mental health is not of value to individuals but is of paramount importance to others, especially families. How a person feels and thinks, whether it is positive or negative or vacillating, influences those at home, at the office, professions are now interested in mental health. In particular, psychiatry, social work, psychology, physical education and nursing have developed training
programs for providing mental health services. Other professions and interested individuals are participating in mental health services. The world of today emphasizes mental well-being as one of its most important values.

Mental health is very much related to physical performance and fitness (Milton Thakeray, 1979). Today mental health is recognized as an important aspect of total fitness and total health status. It is a basic factor that contributes to the maintenance of physical health as well as social ineffectiveness. Mental health or mental fitness is one of the objectives of total development or wholesome development of the individual. Mental development objectives deal with higher mental activity such as acquisition of knowledge, ability to think correctly, to intellectualize and to interpret the things around in a right manner. Besides this, accumulation of knowledge about health, fitness, and diseases games skills is also an important aspect of physical education.

1.11.2 IMPORTANCE OF MENTAL HEALTH

Mental health can be seen as a continuum, where an individual's mental health may have many different possible values. Mental wellness is generally viewed as a positive attribute, such that a person can reach enhanced levels of mental health, even if they do not have any diagnosable mental health condition. This definition of mental health highlights emotional well-being, the capacity to live a full and creative life, and the flexibility to deal with life's inevitable challenges. Many therapeutic systems and self-help books offer methods and philosophies espousing strategies and techniques vaunted as effective for further
improving the mental wellness of otherwise healthy people. Positive psychology is increasingly prominent in mental health.

1.11.3 INTELLIGENCE QUOTIENT

An intelligence quotient, or IQ, is a score derived from one of several different standardized tests designed to assess intelligence. The term "IQ," from the German Intelligenz-Quotient, was coined by the German psychologist William Stern in 1912 as a proposed method of scoring early modern children's intelligence tests such as those developed by Alfred Binet and Théodore Simon in the early 20th Century. Although the term "IQ" is still in common use, the scoring of modern IQ tests such as the Wechsler Adult Intelligence Scale is now based on a projection of the subject's measured rank on the Gaussian bell curve with a center value (average IQ) of 100, and a standard deviation of 15, although different tests may have different standard deviations.

IQ scores have been shown to be associated with such factors as morbidity and mortality, parental social status, and to a substantial degree, parental IQ. While its inheritance has been investigated for nearly a century, controversy remains as to how much is inheritable, and the mechanisms of inheritance are still a matter of some debate.

1.11.4 IMPORTANCE OF INTELLIGENCE QUOTIENT

IQ scores are used in many contexts as predictors of educational achievement or special needs, by social scientists who study the distribution of
IQ scores in populations and the relationships between IQ score and other variables, and as predictors of job performance and income.

The average IQ scores for many populations have been rising at an average rate of three points per decade since the early 20th century with most of the increase in the lower half of the IQ range a phenomenon called the Flynn effect. It is disputed whether these changes in scores reflect real changes in intellectual abilities, or merely methodological problems with past or present testing.

1.11.5 COGNITIVE STYLE

Cognitive style or "thinking style" is a term used in cognitive psychology to describe the way individuals think, perceive and remember information, or their preferred approach to using such information to solve problems. Cognitive style differs from cognitive ability (or level), the latter being measured by aptitude tests or so-called intelligence tests.

1.11.6 IMPORTANCE OF COGNITIVE STYLE

Controversy exists over the exact meaning of the term cognitive style and also as to whether it is a single or multiple dimension of human personality. However, it remains a key concept in the areas of education and management. If a pupil has a similar cognitive style to his/her teacher, the chances that the pupil will have a more positive learning experience is said to be improved. Likewise, team members with similar cognitive styles will probably feel more positive about their participation in the team. While the matching of cognitive styles may
make participants feel more comfortable when working with one another, this alone cannot guarantee the success of the outcome. Some of the existing notions and measures of cognitive style are now discussed.

1.12 PHYSIOLOGY

Physiology is the science of functioning of all the organs and systems of an organism. For the physiological system of the body to be fit, they must function well enough to support a specific activity that the individual is performing. More over, different activity make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurologic process which are specific to the activity.

In physiology, one learn how the organs, systems, tissues, cells and molecules within cells work and how their functions are put together to maintain the internal environment. Physiology is the science dealing with the study of human body functions. Exercise physiology is the study of how body's structures and functions are changed as a result of exercise. It applies the concept of exercise physiology to training the athlete and enhancing the athlete's sports performance. (Ajmer Singh, 2005)

Exercise physiology is the scientific study of physiological changes in athletes' body with the effects of exercise, whether long term or short term. Different environmental changes, namely, altitude, climate, temperature, humidity, nutritional status etc have some close associations with the optimal performance of an athlete. (Shyamal Kaloy, 2007)
For the physiological system of the body to be fit they must function well enough to support the specific activity in which 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. (Frost 2001)

The lungs, heart and blood perform a vital function on the body's supply system. They supply to the muscle with necessary fuels, oxygen and carry wastes such as carbon dioxide and lactic acid. Consequently the cardio respiratory system in the athletes needs to be developed.

The various physiological variables are resting pulse rate, blood pressure, breath holding time, vita capacity, anaerobic power, aerobic power hellebore. The pulse rate are blood pressure are two take in the side of physiological variables in the study. The pulse rate and blood pressure are the two parameters that belong to the blood circulatory system of the body.

1.12.2 IMPORTANCE OF PHYSIOLOGY

Understanding the importance of physiology in physical education is to study the training effects. To study the ways and means by which the athletes can improve their performance and the principle of training methods. Sports consist about 99% of preparation and 1% of performance we need to make the most effective use of our preparation time so that our athletes can achieve high level performance for that the physiological systems should be taken care very much for the adoption to their particular activities. As because "Function decides
structure”. The system will change or adopt according to the nature of the activity. Therefore, to know this among the players are very important for the improvement of performance. Because the level of fitness of physiological system may vary from player to player according to the conditional status of the proper functioning of physiology system is needed to achieve in sports. In this present research, the investigator selected physiological variables VO₂ max. Vital capacity and anaerobic power to study the effect of aerobics, step aerobics and aqua aerobic exercises.

1.12.3 VO₂ MAX

VO₂ 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. O₂ - oxygen, max - maximum.

VO₂ 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 (VO₂ max) is widely accepted as the single best measure of cardiovascular fitness and maximal aerobic power. Absolute values of VO₂ max are typically 40-60% higher in men than in women.” Clearly, then,
VO_{2}max varies considerably in the population, with sex being a primary determining factor in this variability.

### 1.12.4 VITAL CAPACITY

Force vital capacity is the maximum volume of air that a person can exhale after maximum inhalation. It can also be the maximum volume of air that a person can inhale after maximum exhalation.

A person's vital capacity can be measured by a spirometer which can be a wet or regular spirometer. In combination with other physiological measurements, the vital capacity can help make a diagnosis of underlying lung disease. The unit that is used to determine this vital capacity is milliliters.

Vital capacity is the maximum amount of air a person can expel from the lungs after first filling the lungs to their maximum extent and then expiring to the maximum extent. It equals the inspiratory reserve volume plus the tidal volume plus the expiratory reserve volume.

### 1.12.5 ANAEROBIC POWER

Most of the anaerobic activities are related to the leg power. Greater the leg power, better the Anaerobic performance in the field of sports and games. Leg power is essential with muscular strength. Muscular strength can be developed through maximal load of weight training. Muscle strength and explosive power are increased, due to the increase in the size of the muscle fiber which are present in the leg muscle. The muscle fibers are developed as a result
of the increase in Actin, Myosin and other myofibrular proteins present in the muscle fibre.

The leg explosive power is also associated with the fast twitch muscle fibre. Greater the percentage of fast twitch muscle fibre, better the leg explosive power and speed. Hence the Leg explosive power plays the vital role in most of the Anaerobic activities.

Anaerobic exercise is typically used by athletes in non-endurance sports to build power and by body builders to build muscle mass. Muscles that are trained under anaerobic conditions develop biologically differently giving them greater performance in short duration-high intensity activities.

1.13 REASON FOR SELECTION OF THE TOPIC AND VARIABLES

The physical education is designed to allow students to experience at least a minimum exposure to the activities, like aquatics, conditioning activities, gymnastics, individual / dual sports, team sports, rhythms, and dance. Students are encouraged to continue to explore those activities in which they have a primary interest by effectively managing their community resources. The aim is the wholesome development of human personality or complete living by providing skilled leadership, adequate facilities and ample time for the individual and the groups to participate in activities that are physically wholesome, mentally stimulating and socially sound. Thus to make every child physically, mentally and emotionally fit and also to develop in him such personal and social
facilities as well help him to live happily with others and build him up as a good citizen. To keep the field ever contributing, researches in the field of physical education is undertaken to analyse, improve, and incorporate and to find reasoning in several new areas which would bring out wholesome man.

A number of training methods are being used by sedentary persons for improving their total fitness. Aerobics is a form of physical activity that combines rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness: flexibility, muscular strength, and cardiovascular fitness. The different forms of aerobics exercises, namely, floor aerobics, step aerobics and aqua aerobic exercises contribute for the development of physical, physiological and psychological fitness of the individual. Though the physical activities are basically aerobics in nature, depending upon the type, the intensity, resistance, requirement of strength varies which in turn affect the physical, physiological and psychological components of the individuals undertaking these physical activities. Hence, in this research, the investigator was interested to find out the effect of floor aerobic, step aerobic and aqua aerobic exercises on selected physical, physiological and psychological variables of Trainees of Teacher Training Institutes.

1.14 STATEMENT OF THE PROBLM

The purpose of the study was to determine the effects of floor aerobics, step aerobics and aqua aerobics on selected physical variables: endurance, muscular strength and speed, physiological variables: VO₂ max, vital capacity
and anaerobic power and psychological variables: intelligence quotient, mental health and cognitive style of the trainees of teacher training institutes.

1.15 HYPOTHESES

On the basis of the literature gone through, research finding and the scholar's understandings of the problem, following hypotheses is formulated.

1) It was hypothesised that comparing to control group there would be significant improvement due to floor aerobics, step aerobics and aqua aerobics on selected physical variables: endurance, muscular strength and speed, physiological variables: VO\textsubscript{2} max, vital capacity and anaerobic power and psychological variables: intelligence quotient, mental health and cognitive style of the trainees of teacher training institutes.

2) It was hypothesised that comparing between the experimental groups, namely, floor aerobics, step aerobics and aqua aerobics, there would be significant differences on selected physical variables: endurance, muscular strength and speed, physiological variables: VO\textsubscript{2} max, vital capacity and anaerobic power and psychological variables: intelligence quotient, mental health and cognitive style of the trainees of teacher training institutes.
1.16 SIGNIFICANCE OF THE STUDY

1. This study may be useful to the physical educationists, coaches and individuals to use as an initial device for developing physical fitness, physiological and psychological variables of teacher trainees.

2. This study may be significant in suggesting selected floor aerobics, step aerobics and aqua aerobics exercises for the development of physical, physiological and psychological variables.

3. The findings of this study would be helpful for physical educationists, coaches and individuals to draw up suitable training schedules to improve specific fitness variables.

4. The findings of this study would be helpful to the sports administrators, educational authorities to incorporate floor aerobics, step aerobics and aqua aerobics in the training schedule of the teacher trainees.

5. The findings of this study would add more to the knowledge of the area of aerobic dance.

1.17 DELIMITATIONS

This study was delimited in the following ways, which were taken into consideration while interpreting the results and arriving at conclusions:

1. The study would be delimited to 120 students who are undergoing training in teacher training institutes in Coimbatore.
2. Only men students in the age group of 18 to 22 years were selected for this study.

3. The study was further delimited to selected physical, physiological and psychological variables.

4. The following dependent and independent variables were selected in this problem.

1.17.1 Dependent Variables

Physical fitness components

   i. Endurance

   ii. Muscular Strength

   iii. Speed

Physiological variables

   i. VO$_2$ max

   ii. Vital Capacity

   iii. Anaerobic power

1.17.2 Independent Variables

   i. Floor Aerobics Exercises

   ii. Step Aerobics Exercises

   iii. Aqua aerobics Exercises
1.18 LIMITATIONS

1. The investigator does not consider humidity, temperature and other environmental conditions, which could have certain effect on the performance of the subjects.

2. Socio-economic background, lack of nutritional knowledge and life style factors would be considered as the limitations of the study.

3. The subjects' previous training in physical activities, sports training, participations that would have certain effect on their physical, physiological and psychological variables would be considered as the limitations of the study.

4. Heredity which may contribute to physical, physiological and psychological efficiency was taken as a limitation to this study.

5. Diet of the subject, general activity, levels of motivation of the subjects is beyond the control of the researcher.

1.19 MEANING AND DEFINITIONS OF THE TERMS

The definition of technical terms used in this study are given below to avoid possible difficulty and confusion.

1.19.1 Physical Fitness

The ability to perform daily tasks vigorously and alertly with energy left over for enjoying leisure time activities and meeting emergency demands. It is
the ability to endure, to hear up, to withstand stress, to carry on in circumstances where an unfit person could not continue, and is a major basis for good health and well being.

1.19.2 Endurance:

Endurance is the ability to do sports movements, with the desired quality and speed, under conditions of fatigue.

1.19.3 Cardio Respiratory Endurance

Endurance is the capacity to sustain movement or effort over a period of time.

Cardio-respiratory endurance is operationally defined as the Physical Efficiency Index arrived based on Harvard Step Test.

1.19.4 Muscular Strength

Muscular strength is the maximum force a muscle group can exert over a brief period of time.

The muscular strength is operationally defined as 1 RM (one repetition maximum).

1.19.5 Speed

The maximal rate at which an individual is able to move his entire body over a specific distance is considered to be his speed movement.
Speed is the performance prerequisite to as motor under given conditions (movement task, external factors, individual prerequisites in minimum of time).

Speed is operationally defined as the shortest time taken by the subject to complete 50 meters run test.

1.19.6 Physiology

Physiology is the study of the functions of the normal human body.

1.19.7 VO₂ Max

VO₂ max is the maximal oxygen uptake or the maximum volume of oxygen that can be utilized in one minute during maximal or exhaustive exercise. It is measured as milliliters of oxygen used in one minute per kilogram of body weight.

1.19.8 Vital Capacity

The volume of air that can be moved out of the lungs after maximum inspiration is called vital capacity.

The maximal volume of air that can be forcefully exhaled from the lungs following a maximal expiration.

1.19.9 Anaerobic Power

Anaerobic means without oxygen. Anaerobic energy is produced without the use of oxygen.
The capacity to carry out work without the presence of oxygen and fatigue outcome is called as anaerobic power.

1.19.10 Psychology

Psychology is an academic and applied field involving the study of the mind, brain, and behaviour of both human and non-human.

Psychology is a ‘science of mind’, the study of the human behaviour and personality, character traits and attitude in all its aspects: physical, psychomotor, genetic, interaction with environment, and personality.

1.19.11 Sports Psychology

Sports psychology is a specialization within ‘psychology’ that seeks to understand mental factors that affect performance in sports, physical activity and exercise and apply these to enhance individual and team performance.

1.19.12 Intelligence Quotient

An intelligence quotient, or IQ, is a score derived from one of several different standardized tests designed to assess intelligence. For the operational purposes of this study, Wechsler Adult Intelligence Scale (WAIS) was used in this study.

1.19.13 Mental Health

A state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.
1.19.14 Cognitive Style

Cognitive style was defined as the way individuals think, perceive and remember information, or their preferred approach to using such information to solve problems.