CHAPTER I

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Physical education is an educational course related to the physique of the human body, taken during primary and secondary education that encourages psychomotor learning in a play or movement exploration setting to promote health. Physical education trends have developed recently to incorporate a greater variety of activities besides typical sports. Introducing students to 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 teachers have even begun to incorporate stress-reduction techniques such as yoga, deep-breathing and tai chi. Physical education provides psychological benefits such as improving general mental health, concentration, awareness and positive mood. It can be taught to any age student with little or no equipment making it ideal for mixed ability and age classes. Tai chi can easily be incorporated into a holistic learning body and mind unit. Teaching non-traditional sports to students may also provide the necessary motivation for students to increase their activity, and can help students learn about different cultures.

Teaching non-traditional (or non-native) sports provides a great opportunity to integrate academic concepts from other subjects as well, which may now be required of many physical education teachers. The four aspects of physical education are physical, mental, social, and emotional.
Another trend is the incorporation of health and nutrition to the physical education curriculum. The child nutrition and wiz reauthorization act of 2004 required that all school districts with a federally funded school meal program develop wellness policies that address nutrition and physical activity. While teaching students’ sports and movement skills, physical education. Teachers are now incorporating short health and nutrition lessons into the curriculum. This is more prevalent at the elementary school level, where students do not have a specific health class. Recently most elementary schools have specific health classes for students as well as physical education class. With the recent outbreaks of diseases such as swine flu, school districts are making it mandatory for students to learn about practicing good hygiene along with other health topics. Today many states require physical education teachers to be certified to teach health courses.

The physical education program is a vital part of the total education program, which is designed to maximize the potential for self-fulfilling living in the community. It has long argued that participation in sports develops social characteristics of participants. Participation alone may not, however, benefit takes place from the individual to society. (Anoop Jain, 2003).

1.1 PHYSICAL EDUCATION

Physical Education may be defined as education through the physical activities where many of the educational objectives are achieved by means of big muscle play activities. It is a vital phase of education and an integral part of
the total education process. The vital phase of education that is physical education, aims at all round development of an individual where the medium of achieving the goal is physical activity. Hence it is through the big muscle activity an individual can enlighten the personality traits such as physical fitness, emotional balance and social behaviour etcetera besides intellectual development. The physical education programme provides each student with an opportunity to assess the fitness and to develop skill and understanding that will enable one to enjoy a productive stay in school, college and a more meaningful existence after school and college. Right from the origin of physical education the major objectives of physical education was physical fitness. The aim of physical education in the early years attained physical fitness, which was a main requisite of the then citizens. As days changed, the need, importance, scope and objectives have also changed because the demand of environment to preserve to withstand stress, to resist fatigue and to possess the energy for vigorous and well rounded life has increased.

1.2 AIMS AND OBJECTIVES OF PHYSICAL EDUCATION

The aim of physical education is the wholesome development of human personality or complete living. 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. The important contribution of physical education is the general developments through physical activities, when these activities are properly directed it leads to the total education of the individual.
Thus physical education are physical activities are tools of education for the development of the individual as a whole. Physical education should be an important part of that requirement and does more than provide some minutes of moderate-vigorous activity. It also teaches students how to integrate exercise into their lives in order to establish a lifetime of healthy living. A growing body of evidence demonstrates the benefits of physical education beyond fitness. Several large-scale studies found improvements in students’ academic performance and cognitive ability with increased time spent in physical education. Children who spent time in physical education in place of a classroom activity performed no worse academically than students not enrolled in physical education. Physical activity also has a positive impact on tobacco use, insomnia, depression, and anxiety. The quality of the physical education program, not just the time spent on the class, is the foremost concern (Coe, et al., 2006).

Physical activity enhances a person's life both socially and psychologically. Studies have shown that physical activity may modify anxiety and depression. Physical education may help prevent degenerative disease, improve overall physical condition, maintain emotional balance, promote a sense of social effectiveness, contribute to academic performance, and establish positive recreation habits. Therefore, physical education must not be considered a curricular frill; rather, it must be supported as an integral part of comprehensive education.
1.3 TRAINING

The physical education program is a vital part of the total education program, which is designed to maximize the potential for self-fulfilling living in the community. It has long argued that participation in sports develops social characteristics of participants. Participation alone may not, however, benefit takes place from the individual to society. (Anoop Jain, 2003).

1.4 SPORTS TRAINING

Sports training is a programme of exercise designed to improve the skills and increase the energy capacities of an athlete for a particular event. Sports activities consist of motor movement and action and their success depends to 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 (Fox, 1984). Bompa (1999) suggested that the physiological goal of training is to improve body function and optimize athletic performance. Training is primarily a systematic athletic activity of long duration, which is progressively and individually graded. Human physiological functions are modeled to meet demanding tasks.

The concept of training is reflected in words or terms, which are given to separate components of training (technique training, strength training) or separate methods of procedures of doing physical exercise (interval training and circuit training). Training means are various physical exercises and their objects, methods and procedures, which are used for the improvement, maintenance and recovery of performance capacity and performance readiness.
Physical exercises are the physical means of training. The other means are used in addition to physical exercises or separately as per requirement. Each training means has its own specific effect on the performance capacity. This effect may be direct or indirect. Physical exercises have a direct effect on performance capacity. Means like physiotherapy, autogenous training has indirect effect (Singh, 1991).

Physical training refers to the processes used in order to develop the components of physical fitness, as for example, how to improve aerobic endurance, to strength and relax muscles, to increase arm and shoulder strength, to relate exercises and programmes to the specific requirements or individual sports. On the other hand, sports training aims at achieving high performance in sports competition. In order to achieve high performance, sports training is done in a planned and systematic manner. Sports training is based on systematic facts and principles. A system most suitable for achieving high performance has to be first made on the basis of the sports training which is planned. It is always assessed, planned, organised and implemented by a coach or a sports teacher or some other person. The sports training aims at finding out hidden reserves and makes the sportsperson aware of it. It also aims at further development of these reserves. The sportspersons control their day to day routine in such a manner that they are able to do training once or twice a day with high effect. Sports training is basically an educational process. So, it strives to develop all the aspects of personality. It is a continuous process of perfection, improvement and creation of means and

Research on the effect of weight training on health and fitness determinants revealed that weight training, like other types of exercise, positively affects physical performance and body composition and a number of health parameters (Miller, et al., 1984; Stone, 1991; Toth, et al., 1995). Almost every study revealed an increase in muscular strength, whereas the effect on aerobic power is inconsistent and dependent on the type of weight training compared with running and cycling, the weight-training-induced changes in body composition consist of a larger increase in fat-free mass, whereas the decrease in fat mass seems to be somewhat smaller. The modest effect on fat mass might be attributed to the lower energy costs of a single weight-training workout (McArdle & Foglia, 1969). The latter finding seems to make this kind of exercise less effective in programs of weight control and weight reduction (McArdle & Foglia, 1969).

Muscle strength is related to the cross-sectional area of the muscle. However, this strong relationship diminishes when explosive athletes and endurance athletes are compared. What most studies suggest is that strength is highly related to muscle size. However, people who have a disproportionate amount of fast-twitch fibers will gain strength faster than those who do not. Fast-twitch fibers tend to be stronger than other fiber types, so people who have more of them will tend to be stronger and have greater potential for strength gains.
1.5 BENEFITS OF PHYSICAL TRAINING

Physical training may lead to better muscular balance and joint stability, possibly impacting the number of injuries sustained and individual's performance in a sport. The benefits may arise from the use of training that emphasizes the body's natural ability to move in three anatomical planes of motion. In comparison, though machines can often be safer to use, they restrict movements to a single plane of motion, which is an unnatural form of movement for the body and may potentially lead to faulty movement patterns or injury. Physical training is important for maintaining physical fitness and can contribute positively to maintaining a healthy weight; building and maintaining healthy bone density, muscle strength, and joint mobility; promoting physiological well-being; reducing surgical risks; and strengthening the immune system.

Frequent and regular aerobic exercise has been shown to help prevent or treat serious and life-threatening chronic conditions such as high blood pressure, obesity, heart disease, Type 2 diabetes, insomnia, and depression. Strength training appears to have continuous energy-burning effects that persist for about 24 hours after the training, though they do not offer the same cardiovascular benefits of aerobic exercises. Exercise can also increase energy and raise one's threshold for pain.

There is conflicting evidence as to whether vigorous exercise (more than 70% of VO2 Max) is more or less beneficial than moderate exercise (40 to 70% of VO2 Max). Some studies have shown that vigorous exercise executed by
healthy individuals can effectively increase opioid peptides (aka endorphins, a naturally occurring opiate that in conjunction with other neurotransmitters is responsible for exercise induced euphoria and has been shown to be addictive), positively influence hormone production (i.e., increase testosterone and growth hormone), benefits that are not as fully realized with moderate exercise.

Physical training has been shown to improve cognitive functioning via improvement of hippocampus-dependent spatial learning, and enhancement of synaptic plasticity and neuro genesis. In addition, physical activity has been shown to be neuro protective in many neurodegenerative and neuromuscular diseases. Physical activity is thought to have other beneficial effects related to cognition as it increases levels of nerve growth factors, which support the survival and growth of a number of neuronal cells. Both aerobic and anaerobic exercise also work to increase the mechanical efficiency of the heart by increasing cardiac volume (aerobic exercise), or myocardial thickness.

Not everyone benefits equally from exercise. There is tremendous variation in individual response to training: where most people will see a moderate increase in endurance from physical training, some individuals will as much as double their oxygen uptake, while others will never get any benefit at all from the exercise. Similarly, only a minority of people will show significant muscle growth after prolonged weight training, while a larger fraction experience improvements in strength. This genetic variation in improvement from training is one of the key physiological differences between
elite athletes and the larger population. Studies have shown that exercising in middle age leads to better physical ability later in life.

1.6 AEROBIC ACTIVITY

Aerobic exercise (also known as cardio) is physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Aerobic literally means "living in air", and refers to the use of oxygen to adequately meet energy demands during exercise via aerobic metabolism. Generally, light-to-moderate intensity activities that are sufficiently supported by aerobic metabolism can be performed for extended periods of time. The intensity should be between 60 and 85% of maximum heart rate.

1.7 AEROBIC TRAINING

For every moment, the body uses energy. The body can procure this energy in two different ways: Without oxygen (anaerobic) – when there is not enough oxygen, waste products will pile up in the muscles with oxygen (aerobic) – this means that the exercise is performed under circumstances where there is enough oxygen in the muscles. To improve endurance the practioner should train aerobic system and move to lactate threshold. Aerobic training can be divided into three overlapping training intensity areas: low, moderate and high intensity training. The overall purpose of aerobic training is to: improve the oxygen transport in the circulation improve the muscle’s ability to use the available oxygen improve the ability to recuperate after hard exercise.
Aerobic exercise is a moderate intensity workout that extends over a certain period of time and uses oxygen in this process. Aerobics has become the most happening workout trend among the youth. Not only is performing aerobic exercise interesting, but also is very beneficial for health. There are different types of aerobics like fitness walking, jogging, swimming, kickboxing, inline skating, bicycling etcetera. In line skating or rollerblading is one of the most popular sports that are luring millions of people into trying it. It helps to strengthen lower back and works a great deal in enhancing cardiovascular development. Kickboxing is extremely useful for quick weight loss, as it helps in burning about 350-450 calories during a 50 minute workout session. At the initial level, kickboxing consists of some basic stretches and cardio warm up (Cooper, 1969).

Aerobic exercise and fitness can be contrasted with anaerobic exercise, of which strength training and short-distance running are the most salient examples. The two types of exercise differ by the duration and intensity of muscular contractions involved, as well as by how energy is generated within the muscle. New research on the endocrine functions of contracting muscles has shown that both aerobic and anaerobic exercise promote the secretion of myokines, with attendant benefits including growth of new tissue, tissue repair, and various anti-inflammatory functions, which in turn reduce the risk of developing various inflammatory diseases. Myokine secretion in turn is dependent on the amount of muscle contracted, and the duration and intensity of contraction. As such, both types of exercise produce endocrine benefits.
Among the recognized benefits of doing regular aerobic exercise are:

- Strengthening the muscles involved in respiration, to facilitate the flow of air in and out of the lungs.
- Strengthening and enlarging the heart muscle, to improve its pumping efficiency and reduce the resting heart rate, known as aerobic conditioning.
- Improving circulation efficiency and reducing blood pressure.
- Increasing the total number of red blood cells in the body, facilitating transport of oxygen.
- Improved mental health, including reducing stress and lowering the incidence of depression, as well as increased cognitive capacity.
- Reducing the risk for diabetes.

As a result, aerobic exercise can reduce the risk of death due to cardiovascular problems. In addition, high-impact aerobic activities (such as jogging or using a skipping rope) can stimulate bone growth, as well as reduce the risk of osteoporosis for both men and women.

In addition to the health benefits of aerobic exercise, there are numerous performance benefits:

- Increased storage of energy molecules such as fats and carbohydrates within the muscles, allowing for increased endurance
- Neovascularization of the muscle sarcomeres to increase blood flow through the muscles
• Increasing speed at which aerobic metabolism is activated within muscles, allowing a greater portion of energy for intense exercise to be generated aerobically

• Improving the ability of muscles to use fats during exercise, preserving intramuscular glycogen

• Enhancing the speed at which muscles recover from high intensity exercise

1.8 ORIGIN AND DEVELOPMENT OF AEROBIC TRAINING

Aerobics is a form of physical exercise that combines rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness such as flexibility, muscular strength, and cardio-vascular fitness. It is usually performed to music and may be practiced in a group setting led by an instructor (fitness professional), although it can be done solo and without musical accompaniment. With the goal of preventing illness and promoting physical fitness, practitioners perform various routines comprising a number of different dance-like exercises. Formal aerobics classes are divided into different levels of intensity and complexity. Aerobics classes may allow participants to select their level of participation according to their fitness level. Many gyms offer a variety of aerobic classes. Each class is designed for a certain level of experience and taught by a certified instructor with a specialty area related to their particular class.
Both the term and the specific exercise method were developed by Dr. Kenneth Cooper, M.D., an exercise physiologist, and Col. Pauline Potts, a physical therapist, both of 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 ergometer, 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.

Aerobic capacity describes the functional status of the cardio respiratory system, (the heart, lungs and blood vessels). Aerobic capacity is defined as the maximum volume of oxygen that can be consumed by one's muscles during exercise. It is a function both of one's cardio respiratory performance and of the ability of the muscles to extract the oxygen and fuel delivered to them. To measure maximal aerobic capacity, an exercise physiologist or physician will perform a VO$_2$ max test, in which a subject will undergo progressively more strenuous exercise on a treadmill, from an easy walk through to exhaustion. The individual is typically hooked up to a respirometer to measure oxygen, and the speed is increased incrementally over a fixed duration of time. The higher a
cardiorespiratory endurance level, the more oxygen transported to exercising muscles, the longer exercise can be maintained without exhaustion and accordingly the faster they are able to run. The higher aerobic capacity, the higher the level of aerobic fitness. The Cooper and multi-stage fitness tests can also be used to functionally assess aerobic capacity. Aerobic capacity can be improved through a variety of means, including Fartlek training (Edvardsen, et al. 2011).

1.9 FLOOR AEROBICS

Floor aerobics is a form of aerobic power distinguished from other types of aerobic exercise performed on the plain floor. The floor must be safe without any protrude and safe in manner. Floor aerobics are done with count. Floor aerobics was developed in manner to avoid to do exercise in open place. Day by day the women took the advantageous that is to be performed.

1.10 STEP AEROBICS

Step aerobics is a form of aerobic power distinguished from other types of aerobic exercise by its use of an elevated platform (the step). The height can be tailored to individual needs by inserting risers under the step. Step aerobics classes are offered at many gyms and fitness centers which have a group exercise program. Step aerobics was innovated by Gin Miller around 1989. After a knee injury, Gin consulted with an orthopedic doctor, who recommended she strengthen the muscles supporting the knee by stepping up and down on a milk crate and from this she developed the step regimen.
1.11 BENEFITS OF AEROBIC TRAINING

Aerobics helps burn calories and fat. It also helps to reduce stress, promote restful sleep, strengthen muscles and gives the body a more streamline appearance. The number of calories burned depends on the speed of movements, step height, and length of exercise. Exercise sessions can create social connections with others and step as well as low-impact aerobics is suitable for all ages, low cost, and has no restrictions on place.

1.12 PHYSICAL ACTIVITY AND PHYSIOLOGICAL CHANGES

Exercise and sport scientists actively engage in research to better understand the mechanisms that regulate the body’s physiological responses to acute bouts of exercise as well as its adaptations to training and detraining. Most of this research is conducted at major research universities, medical centers, and specialized institutes using standardized research approaches and select tools of the exercise physiologist. Numerous cardiovascular changes occur due to participating in physical activity. To better understand the changes that occur, we must look more closely at specific cardiovascular functions. The changes in all components of the cardiovascular system, looking specifically at the heart rate, stroke volume, cardiac output, blood pressure and blood flow.

1.13 REASON FOR SELECTION OF THE PROBLEM

And even though several studies have been conducted on aerobics training and other combined training, no study has been conducted to find out
the influence of floor aerobics, step aerobics and these two combined training on motor fitness, physiological and biochemical variables of women students in an exhaustive manner in India. The women in the adulthood period may in the process of physical growth as well as they are in menstruate cycle. And also today’s trend in physical activities to involves in the aerobics activity especially for women. In order to know the influence of floor aerobics, step aerobics and these two combined training on motor fitness, physiological and biochemical variables, the investigator has selected the topic.

1.14 STATEMENT OF THE PROBLEM

The purpose of the study was to find out the influences of floor aerobics, step aerobics and combined training on motor fitness, physiological and biochemical variables of women students.

1.15 SIGNIFICANCE OF THE STUDY

1. The findings of the study will be helpful to make the society to maintain the fitness through aerobic activity.

2. The findings will be helpful for physical education teachers and coaches to identify the physical training methods to develop the motor quality.

3. The findings will be helpful to train the sports athletes in the form of coordination.

4. The findings of the study will be helpful for physical education teachers and coaches to identify the difference between the floor and step aerobics.
1.16 HYPOTHESES

1. It was hypothesized that there would be a significant improvement on motor fitness, physiological and biochemical variables of women students due to the influence of floor aerobics.

2. It was also hypothesized that there would be a significant improvement on motor fitness, physiological and biochemical variables of women students due to the influence of step aerobics.

3. It was also hypothesized that the combined training would significantly improve the motor fitness, physiological and biochemical variables of women students.

4. Further it was hypothesized that combined training would produce significant improvement on motor fitness, physiological and biochemical variables of women students than the floor aerobics, step aerobics and control groups.

1.17 DELIMITATIONS

1. The study was confined to 120 women students.

2. Their age ranged from 18 to 22 years.

3. The subjects were selected from the Annai Veilankanni’s college for women.

4. The selected subjects were divided in to four groups with thirty subjects.

5. The following independent and dependent variables were selected for this study.
Independent Variables

1. Floor Aerobics Training
2. Step Aerobics Training
3. Combined Floor and Step Aerobics Training

Dependent Variables

Motor Fitness Variables

1. Speed
2. Agility
3. Cardiovascular Endurance

Physiological Variables

1. Blood Pressure
2. Vital Capacity
3. Resting Heart rate

Hematological Variables

1. Low Density Lipoprotein
2. High Density Lipoprotein
3. Triglycerides

1.18 LIMITATIONS

The following factors will be limited in the study. The daily routine, climatic condition, time of training, time of testing, nutritional factors, motivational factors and interests of the subjects.
1.19 DEFINITIONS OF THE TERMS

1.19.1 AEROBIC TRAINING

Aerobics training is form of aerobic power distinguished from other types of aerobic exercise by its use on the floor and an elevated platform (the step).

Aerobics is a form of exercises that can be performed in a rhythmic manner by counts. Aerobics is a form of physical exercise that combines rhythmic aerobic exercise with stretching and strength training routines with the goal of improving all elements of fitness such as flexibility, muscular strength and cardiovascular fitness.

1.19.2 SPEED

Speed is refereed as the rate of change of human body motion of movement. Speed is the ability to execute motor actions, under given conditions, in minimum possible time.

1.19.3 AGILITY

Agility is refereed as the ability of change of direction when the human body in the motion or movement. Agility is very important in all activities involved quick changes in position of the body and its parts. Fast start and step and quick changes in direction are fundamental to good performance in practically all court.
1.19.4 CARDIO VASCULAR ENDURANCE

The ability of the lungs and heart to taken in and transport adequate amounts of oxygen to the working muscles and allowing activities that involve large muscle masses. (Edward L. Fox, 1993)

1.19.5 BLOOD PRESSURE

According to Chatterjee, “Blood pressure is the lateral pressure exerted by the blood on the vessel walls while feeling through it. Resting pressure world indicate the pressure during basal condition”. Guyton defined pressure as the force exerted by the blood against any unit area of the vast wall.

1.19.6 SYSTOLIC BLOOD PRESSURE

The force exerted on the walls of the blood tubes during the contraction of the heart (Chatterjee, 2002).

1.19.7 DIASTOLIC BLOOD PRESSURE

The force exerted on the walls of the blood tubes during the relaxation of the heart (Chatterjee, 2002).

1.19.8 VITAL CAPACITY

It is defined as the maximal volume of air that can be forcefully exhaled from the lungs following a maximal inspiration (Larry G. Shaver, 1982).

1.19.9 RESTING HEART RATE

Resting heart rate is defined as the rate at which the heart beats when a person is at complete rest. The best is before getting out of bed in the morning (Fox, 1989).
1.19.10 LOW DENSITY LIPOPROTEIN

Low-density lipoprotein (LDL) is one of the five major groups of lipoproteins. Lipoproteins are complex particles composed of multiple proteins which transport all fat molecules (lipids) around the body within the water outside cells. LDL is sometimes referred to as "the bad cholesterol."

1.19.11 HIGH DENSITY LIPOPROTEIN

High-Density lipoprotein (HDL) is one of the five major groups of lipoproteins. Lipoproteins are complex particles composed of multiple proteins which transport all fat molecules (lipids) around the body within the water outside cells. (HDL) is sometimes called "good cholesterol".

1.19.12 TRIGLYCERIDES

A triglyceride is an ester derived from glycerol and three fatty acids. Triglycerides are formed by combining glycerol with three fatty acid molecules. Alcohols have a hydroxyl (HO-) group. Organic acids have a carboxyl (-COOH) group. Alcohols and organic acids join to form esters. The glycerol molecule has three hydroxyl (HO-) groups. Each fatty acid has a carboxyl group (-COOH). In triglycerides, the hydroxyl groups of the glycerol join the carboxyl groups of the fatty acid to form ester bonds.