CHAPTER - I

INTRODUCTION

Life will not be life without physical activities. Through physical activities an individual even lives alone is able to survive in this world. The story of evolution throws some light on the nature and type of activities which are an essential part of modern physical activities to be fit for day-to-day existence and to meet the occasional emergencies that arise. Whatever may be the emergency that trusts itself on individuals, the human beings have to readjust and carry on.

For proper growth and maintenance of good health, participation in daily physical activities is indispensible. The high level of physical fitness comes from years of daily experience in a selected variety of vigorous physical activities. It is a biological principle that builds structure and that structure decides function. Man needs vigorous exercises for growth and development. To perform daily activities in a more efficient manner, condition of muscles, their strength and endurance are essential to man. A muscle need to be overloaded in order to be strengthened.1

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Every human being participates in some kind of sports activity or physical exercise during the course of his/her life. This exercise may assume different forms for different individuals. It may be walking, jogging, cycling, working in a factory, participation in games and sports etc. Regular participation in exercise programme markedly influences physical, physiological and mental fitness of an individual.

While exercising, our muscles burn both fat and glucose (carbohydrates in the blood) in different proportions, depending on how an individual exercises. However, muscle can burn fat in a larger proportion to glucose. The word aerobic means performing exercise with the sufficient availability of oxygen. Aerobic can be viewed as an intricate system of bodily supply and demand.

The benefits of aerobic exercise are very much which efficiently operates heart and lungs, develops energy systems, and increases muscular flexibility, condition muscles, burns fats and calories. The increased oxygen flow gained through aerobic, re-energies by giving any one, more energy and a "reawakening “of his senses.2

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 jumping rope) can stimulate bone growth, as

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2Gina Kolata, Why some people won’t be fit despite exercise, (The New York : Times Publication, 2002,) P. 128
well as reduces the risk of osteoporosis of both men and women. In addition to the health benefits of aerobic exercise, there are numerous performance based benefits.

AEROBIC EXERCISE

The word Aerobics means performing exercise with availability of sufficient amount of oxygen. Aerobics can be viewed as an intricate system of bodily supply and demand. That is the body needs energy for any kind of activity and the need is filled by burning off the foods that we eat. The majority medical opinion is that Aerobics programs strengthen heart muscle, increase the efficiency of lungs and offer other wonderful benefits. Aerobics exercise refers to exercise that involves or improves oxygen consumption by the body. Aerobics means "with oxygen", and refers to the use of oxygen in the body's metabolic or energy-generating process.3

Many types of exercises are aerobic, and by definition are performed at moderate levels of intensity for extended periods of time. To obtain the best results, an aerobic exercise session involves a warming up period, followed by at least 20 minutes of moderate to intense exercise involving large muscle groups, and a cooling down period at the end. Both the term and the specific exercise method were developed by Kenneth H. Cooper, M.D., an exercise

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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 ergometer, and began measuring sustained performance in terms of a person's ability to use oxygen. His groundbreaking book, Aerobic, 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 Aerobic programs, most of which are based on oxygen-consumption equivalency.4

Overview of the Topic and Reason for Selection of Topic

Generally, except few University attached departments, Government and Government Aided Engineering Colleges, which forms about 2% of the total engineering colleges, all the other colleges are situated outside the city / town limits and the students

are transported by the respective colleges or the students make their own arrangements to reach the college. The engineering students are compelled to reach their transport point by early 6.30 or 7.00 am in morning and reaching back to their home by 7 pm in the night. Their lifestyle made them to deprive off their morning and evening physical activity time and normally spend more than 4 hours daily in the Bus / Van to reach the college and back to home. Obesity increases the risk of many physical and mental conditions. These morbidities are most commonly shown in metabolic syndrome, a combination of medical disorders which includes: diabetes mellitus type 2, high blood pressure, high blood cholesterol, and high triglyceride levels. This resulted in minimal physical activity or no physical activity and there was no possibility of burning the excess fat accumulated in the body. Because of these life patterns, an approximate estimation revealed that more than 50% of the engineering students enrolled in first year became overweight or obese in the next year and about 70% of the students became overweight or obese at the time of their completion of the Degree course.

To, observe this weakness in the engineering students, the researcher has selected two Aerobic exercises, i.e. floor aerobic exercises and step Aerobic exercises.
FLOOR AEROBIC

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 cardio respiratory training principles (namely 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, sidekicks and touch backs.5

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

5Ibid. P. 138
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. There by eliminating the suspension phase of the activity thus the incidence of impact type of influence should be lessened with low impact dance.\textsuperscript{6}

**STEP AEROBIC**

Step Aerobic was innovated by 'Gin Miller', circa 1989. It is a variation of traditional Aerobic 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 Aerobic was developed by Gin Miller (1989) while she was recovering from a knee injury, a trend that took the Aerobic 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.\textsuperscript{7}

Step Aerobic exercises produce forces that will stretch, squeeze, bend, twist and vibrate the bones, muscles, joints, tendons

\textsuperscript{6}Rebecca Donatelle, **Health: The Basics.** 6th ed. (San Francisco: Pearson Education, 2005), Inc.P. 211.

\textsuperscript{7}Ibid.P.212
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.8

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

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8Ibid, P. 212.
lunges and travelling 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.⁹

To ensure safe and effective aerobic exercise programmes with training, educational organizations emerged to help guide the Aerobic 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).¹⁰

The researcher has selected to identify which aerobic exercise is better for the engineering students in making them physical, psychologically, biochemical and physiologically strong.

**STATEMENT OF THE PROBLEM**

The purpose of the study was to find out the effect of varied Aerobic exercise, on selected physical fitness, physiological, biochemical, and psychological variables of obese men engineering college students.

¹⁰Ibid, P. 3
DELIMITATIONS

The following delimitations were recorded for this study.

1. Sixty obese men studying in different engineering colleges in Ahmedabad were delimited for this study.

2. Obesity of the subjects was determined based on the body mass index of the subjects. The subjects who were having more than 35% score of in BMI were considered as obese was the further delimitation.

3. The subjects selected for this study were delimited between 20 - 25 years of age.

4. The subjects were divided into three groups. Each group consisting of twenty subjects each, namely; experimental group I, experimental group II and control group was another delimitation.

5. Only two different aerobic exercises, namely; floor Aerobic exercise and step aerobic exercises were further delimited.

6. The following variables were delimited for this study:

   **Fitness Variables**

   a. Cardiovascular Endurance

   b. Muscular Strength

   c. Muscular Endurance

   d. Flexibility

   e. Body Composition
**Physiological variables**

a. Vital Capacity  
b. Mean Arterial Blood Pressure  
c. Resting Pulse Rate  
d. Respiratory Rate  
e. Breath Holding Time  

**Biochemical variables**

a. High Density Lipoprotein  
b. Low Density Lipoprotein  
c. Total Cholesterol  
d. Triglycerides  

**Psychological Variables**

a. Self confidence  
b. Emotional adjustment  
c. Assertiveness  
d. Inter personal relationship  
e. Stress management.  

**LIMITATIONS**

After the utmost effort of the researches, the following points were shall not controlled by the researcher, which can be considered as limitations of the study.

They are as follows:
1. During training, climatic correlations’, fixed diet & daily routine of the sub seeds were not controlled which might have influence on the results of the study.
2. Motivation level, psychological level, efforts were also not controlled which might have influence on the results of the study.

**HYPOTHESIS**

The following hypothesis were formulated on the basis of observations, experiments & related literature.

1. It was hypothesized that the step Aerobic exercise will have more significant effect on the selected physical fitness variables than the floor Aerobic exercise among obese students of engineering college.

2. It was hypothesized that the step Aerobic exercise will have more significant effect on the selected physiological variables than the floor Aerobic exercise among obese students of engineering college.

3. It was hypothesized that the step Aerobic exercise will have more significant effect on the selected biochemical variables than the floor Aerobic exercise among obese students of engineering college.
4. It was hypothesized that the step Aerobic exercise will have more significant effect on the selected psychological variables than the floor Aerobic exercise among obese students of engineering college.

**DEFINITION AND EXPLANATION OF TERMS**

**Training**

In the words of Singh (1991) "training is a pedagogical process which makes possible the achievement of high standard performances without any physical or mental damage, through the planned systematic development of certain specific skills, physical capabilities and the adaptation of the organism".

Training is defined as "a systematic process of repetitive, progressive exercise or work, involving the learning process and acclimation".\(^{11}\)

**Aerobic Exercise**

Aerobic means 'with oxygen'. Aerobic exercise is designed to produce a sustained increase in heart rate and whose energy cost can be met by the body from aerobic sources, that is, from increased oxygen consumption.\(^{12}\)


\(^{12}\)Ibid, P.87
Health Related Fitness

Physical activity, which can have definite influences on the health and the well-being of children and adolescents, as well as adults, is defined as health related fitness.  

Fitness

Fitness is the utilization of excessive calories by a cardiovascular and muscular process bringing the body to optimum efficiency.  

Cardio respiratory Endurance

Cardio respiratory endurance is the ability of the body's circulatory and respiratory systems to supply fuel during sustained physical activity.  

Muscular Strength

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

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**Muscular Endurance**

Muscular endurance is the ability of the muscle to continue to perform without fatigue.\(^{17}\)

**Body Composition**

Body composition refers to the relative amount of muscle, fat, bone and other vital parts of the body. A person's total body weight may not change over time. But the bathroom scale does not assess how much of that body weight is fat and how much is lean mass, body composition is important to consider for health and managing.\(^{18}\)

**Flexibility**

Flexibility is the range of motion around a joint. Good flexibility in the joints can help prevent injuries through all stages of life.\(^{19}\)

**Physiology**

Physiology is the study about the function of the body.\(^{20}\)

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\(^{17}\)Ibid.P.5.


\(^{19}\)Ibid,P.29

Resting Pulse Rate

The time from the end of one contraction to the end of the next contraction is a complete heartbeat or pulse or cardiac cycle. The complete cardiac cycle takes less than one second (about 0.08 sec) in a normal adult at rest and it shortened by exercise.\textsuperscript{21}

Mean Arterial Pressure

It 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.\textsuperscript{22}

Vital Capacity:

The volume of air that can be moved out of the lungs after maximum inspiration is called vital capacity.\textsuperscript{23}

Respiratory Rate

Number of breath inspirited and expired in one minute.\textsuperscript{24}

\textsuperscript{21}Ibid, P. 28.
\textsuperscript{24}Ibid, P. 139.
Breath Holding Time

Breath holding time is define as the duration of time through which one can hold his breath without the study of all living things.\textsuperscript{25}

High Density Lipoprotein (HDL)

HDL, a type of protein molecule carried in the blood that removes cholesterol from tissues and appears to protect against coronary heart disease. Reduces the development of atheroma and atherosclerosis. HDL was estimated by phophotung state method and is expressed as mg/dl.\textsuperscript{26}

Low Density Lipoprotein Cholesterol (LDL)

Low Density Lipoprotein Cholesterol is the major cholesterol carrying lipoprotein. Elevated LDL levels herald a strong predisposition to coronary heart disease, stroke and peripheral vascular disease. LDL was calculated using Friedwald's equation and expressed as mg/dl.\textsuperscript{27}

Triglycerides (TG)

Triglycerides are composed of the three carbon molecule glycerol and three fatty acids, one attached to each of the glycerol carbons. Triglycerides make up 95\% of the fats found in foods. TG

\textsuperscript{25}\textit{Ibid}, P.140
\textsuperscript{27}\textit{Ibid}, P.17.
were estimated by enzymatic calorimetric method and expressed as mg/dl.  

**Cholesterol (TC)**

Cholesterol is the fatty substance formed in the blood. Cholesterol is a white fatty alcohol of steroid group, found in body tissue, blood and bile, assists in synthesis of vitamin D and various hormones. Excessive deposits of cholesterol inside arteries are associated with arteriosclerosis and coronary heart disease. TC was estimated using enzymatic calorimetric method and expressed as mg/dl.

**Psychology**

Psychology is the science of the activities of an individual in relation to his environment.

**Self confidence**

A person's belief that he or she can succeed. Self-confidence is usually specific to particular tasks, but some people seem to display it in a wide range of activities. In sport, it has long been thought of as an important determinant of performance. It tends to be self-generating: confident athletes set themselves difficult training goals and persevere until they have achieved them.

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28 Ibid, P.17.
29 Ibid, P.18.
31 Ibid, P. 31
Emotional adjustment

Emotional adjustment is the maintenance of emotional equilibrium in the face of internal and external stressors. This is facilitated by cognitive processes of acceptance and adaptation. An example would be maintaining emotional control and coping behavior in the face of an identity crisis. ³²

Assertiveness

Assertiveness is a trait taught by many personal development experts and psychotherapists and the subject of many popular self-help books. It is linked to self-esteem and considered an important communication skill. ³³

Inter personal relationship

An interpersonal relationship is a relatively long-term association between two or more people. ³⁴

Stress management

Stress management is the amelioration of stress, especially chronic stress. ³⁵

³²Ibid, P. 31
³⁴Ibid, P. 32
SIGNIFICANCE OF THE STUDY

1. The study will be significant in determining different training schedules for obese men.

2. This study would be beneficial to physical education teachers and fitness trainers to prescribe suitable aerobic exercises for reducing obesity.

3. The study will be significant in assessing the fitness, physiological, biochemical and psychological variables of college obese men.

4. The study will be significant in finding out the influence of varied aerobic exercises on selected fitness, physiological, biochemical and psychological variables among college obese men.

5. The findings of this study would be helpful for future researchers to undertake similar studies at different levels.

OBJECTIVES OF THE STUDY

1. Except few University attached departments, Government and Government Aided Engineering Colleges, which forms about 2% of the total engineering colleges, all the other colleges are situated outside the city/ town limits and the students are
transported by the respective colleges or the students make their own arrangements to reach the college.

2. The engineering students are compelled to reach their transport point by early 6.30 or 7.00 am. And reaching back to their home by 7 pm. in the night. Thus, their life style made them to deprive off their morning and evening physical activity time and normally spend more than 4 hours daily in the Bus / Van to reach the college and back to home. This resulted in minimal physical activity or no physical activity and there was no possibility of burning the excess fat accumulated in the body.

3. Because of these life patterns, an approximate estimation revealed that more than 50% of the engineering students enrolled in first year became overweight or obese in the next year and about 70% of the students became overweight or obese at the time of their completion of the Degree course.