Introduction
CHAPTER I
INTRODUCTION

Today's world is a world of competitions and this is very true of sports and games. Infact it has become a prestige issue to win medals at the International level. This has resulted in countries spraying no effort to achieve the goal. Multi-millions are spent on research projects to invent new techniques and technology to achieve excellence.

Phenomenal progress registered in performance in different sports disciplines are attributable to several factors, the most important of which include better training methods, improved nutrition, better equipment and play fields and better selection of athletes. Of these factors, training methods and procedures to select athletes to sports that are suitable to them have been markedly revolutionised. The rapid progress made in the understanding of the mechanism involved in the adaptation of athletes to different training procedures has significantly contributed to the development of interval training, circuit training, parcours training and resistance training. Variations in these training methods have been introduced to make them appropriate and to achieve specific performance objectives. Therefore, training methods and techniques are generally used according to the degree of the involvement of different element of fitness in any sports performance.

The word 'training' has been a part of human language since ancient times. It denotes the process of preparation for some task. This process invariably extends to a number of days and even months and years.
TRAINING

Training is a program of exercise designed to improve the skills and increase the energy capacities of an athlete for a particular event (Fox, 1984).

MEANING OF TRAINING

The word 'training' is used in its broad sense and its meaning varies with the field of application. In sports, the word training is generally understood to be a synonym of doing physical exercises. In its narrow sense, training is doing physical exercises for the improvement of performance.

'Training is a systematic process of repetitive and progressive exercise or work involving also learning process and acclimatization' (Arnheim, 1985).

IMPORTANCE OF TRAINING

Training improves the functioning of the circulatory and respiratory and the muscle system, while practice is largely aimed at improving the control of muscular activity by the nervous system.

Sports training is characterised by a continuous control and regulation. Systematic nature of the training process is reflected adequately by the fact that the various means and methods, load dynamics, training tasks etcetera are all planned in order to achieve short or long term goals, keeping in view the interrelations of various training elements, cyclic nature of performance developments and long term goal of sports training.
The determination of performance structure is a very difficult task and till now sports scientists and coaches have not been able to satisfactorily tackle this task. A systematic and integrated effort by the various training scientists in class co-operation with the coaches is needed for effectively meeting this challenge. A beginning has been made in this direction and after some years perhaps, we would be in a position to determine satisfactorily the structure of performance in various sports. This would decidedly have a positive effort on better and systematic formulation of the training process (Singh, 1984).

PRINCIPLES OF TRAINING

Sports training is a process of preparation of sportsman, based on scientific and pedagogical principles, for higher performance (Singh, 1984).

The basic principles of any physical training programme are:

OVERLOAD PRINCIPLE

This demands that the work intensity be maximal and that it be gradually increased as the individual’s fitness level improves during the course of the conditioning programme.

SPECIFICITY OF TRAINING

This requires that the training programme be specific to develop not only the predominant energy systems involved but also the specific muscle groups involved as well as the specific movement patterns involved with regard to a particular sport.
DETERMINING THE MAJOR ENERGY SYSTEM INVOLVED

Identifying the predominant energy systems for any sport or activity, which can be decided on the basis of its intensity and performance time, is one of the most important principles of physical training.

INDIVIDUAL DIFFERENCES

Just because of the individual response in different ways to identical stimuli, a coach should not insist every individual on the theme to perform the same workout at the same rate. Individual differences are quite natural and the programme should be structured in such a way to meet these differences.

TYPES OF TRAINING

Success in competitive sports and games can be attributed to many factors, training being one of the most important factors. Different training methods have been commonly used to improve physical fitness and its related standards of performance of athletes. The training methods include, Interval training, Fartlek training, Circuit training, Weight training, Altitude training, Resistance training, Hypoxic training, Continuous training, Alternate pace running etcetera.

PURPOSE OF TRAINING

Training is exercise repeated at frequent intervals for the purpose of improving strength and endurance. Practice differs from training by its goal of improving the performance of a particular act rather than physical activity.
in general. Training improves the functioning of the circulatory, the respiratory and the muscle systems, while practice is largely aimed at improving the control of muscle activity by the nervous system (Morehouse and Miller, 1976).

Physical training brings about local changes in the muscles, improved neuro muscular co-ordination activities and a series of more general cardiorespiratory changes as mentioned below:

1) An increase of maximum respiratory minute volume in exercise.
2) Possibly a slight increase in oxygen diffusing capacity.
3) 10-30 per cent increase of maximum oxygen uptake (depending on initial fitness).
4) An increase in stroke volume and maximum cardiac output.
5) An increase in size of heart and

PHYSIOLOGICAL RESPONSE TO PHYSICAL ACTIVITY

Functioning of the body requires energy which depends upon the ability of the heart and blood vessels to process oxygen and deliver it to the muscle, where it becomes fuel for energy (Hockey, 1985).

Regular exercise results in an increase in the blood, improved oxygen carrying and waste removal capacity and increase in workload capacity (Vitale, 1973).

Deficiency of an individual on performing activities depends basically on cardiorespiratory changes and training causes development of cardio-
respiratory efficiency. Through training, the efficiency of the circulatory and respiratory systems are improved and resting and exercise blood pressure values are lowered (Mathews and Fox, 1980).

Training increases the overall efficiency of the heart, contraction becomes more forceful, the diastolic phase increases and reservoir capacities are enlarged (Book Walter, 1969).

It has been conclusively proved that sportsman indulging in strenuous sports will have increased the efficiency of heart function, circulation, the greater oxygen consumption, greater fatiguability, increased palmonary ventilation, better extraction and more appetite than sedentary one (Begarbatta, 1958).

CIRCUIT TRAINING

Circuit training method was originally introduced by Morgan and Adamson in 1957 at the University of Leeds, England. It is a scientific arrangement of proven exercises performed systematically and repeatedly as a circuit.

Circuit training is the programme in which an athlete moves from one exercise station to another in a planned sequence and in the shortest possible time. In planning a circuit training programme, exercises are chosen to fit the need of the individual. Each of these exercises is then numbered and assigned to certain area called station (Neal, 1969).

Circuit training is probably the most common training regime used by a wide variables of sports activities in order to improve performance. A
circuit consists of number of different stations at which the athlete performs a given exercise as many times as possible within a given time period. When the time is completed, the individual moves on to next station and performs a different exercise for a similar period of time and so on around the various stations (Connolly and Einzing, 1986).

Circuit training is designed to develop cardiorespiratory endurance as well as flexibility, strength and muscular endurance in essential muscle groups. It is an efficient training method in terms of gain made in short time (Miller, 1974).

Circuit training can provide vigorous activity in a number of fitness and motor ability activities and is aimed at developing all the basic physical fitness components performed in an interesting and an imaginative fashion (Johnson and Stolberg, 1971).

The main purpose of circuit training is to develop strength and endurance at the same time. The exercises can be selected and arranged in such a way that both power and endurance are equally trained or that more emphasis is laid on one of the two. The load should be adjusted to the individual load tolerance. In addition to the exercises and their arrangement, the training programme should lay down the kind and magnitude of additional loads in relation to the individual maximum strength. capacity, number of repetitions of each series of exercise, breaks between exercises and after completing the circuit and the number of circuits to be performed (Kreistraining, 1979).
Circuit training can be used for general fitness purposes or can be adopted as a condition medium for various orders of sports (Clarke and Clarke, 1972).

Circuit training is a continuous series of exercise attempting to improve as many components of physical fitness as possible especially endurance. Generally, six to twelve stations are set up. Selection and sequence of the activities within a lap of the circuit is made with consideration given to the continuous nature of the performance. A group of individual spends two minutes at each station, then move along clockwise to the next station (Mathews and Fox, 1971).

A method of conditioning involving repetitions of progressive order of exercises within a defined time limit (Annarino, 1972).

IMPORTANCE OF CIRCUIT TRAINING

Circuit training is more suitable for developing endurance abilities (basic endurance, general endurance, speed endurance, strength endurance and power endurance). Circuit training done with high intensity and with sufficient rest period is also effective for the improvement of maximum strength (especially in case of team games and combative sports).

Circuit training is also helpful for teaching new techniques but it can be more effectively used for stabilization of already acquired motor skills under conditions of fatigue. In short, circuit training is an effective organizational form of doing physical exercises for improving endurance and strength abilities (Singh, 1984).
ADVANTAGE OF CIRCUIT TRAINING

This system easily lends itself to handle large groups efficiently and productively. It is a practical method, entailing some preliminary planning, but beyond that it needs little co-ordinating fun and challenging through competition against team-mates and against time.

CIRCUIT TRAINING AND PHYSICAL FITNESS

Circuit training can provide vigorous activity in a number of selected fitness and motor ability activities and is aimed at developing all the basic physical fitness components, performed in an interesting and imaginative fashion (Johnson and Stolberg, 1971).

Circuit training is most definitely an effective technique for improving strength and flexibility. It should be and is most often used as a technique for developing and improving muscular strength and endurance (Bucher and Prentice, 1985).

The intensity and vigour of circuit training are indeed challenging and enjoyable to the performer. This system produces positive changes in motor performance, general fitness, muscular power, endurance and speed (Arnheim, 1985).

Very little research has been done on the effect of circuit training on physical, physiological, psychological and biochemical variables. This paved the way for the investigator to conduct a study on the effect of circuit
training and parcours training on selected performance related fitness components.

PARCOURS TRAINING

A new concept of circuit training developed in Europe has been adopted recently in the United States and Canada called parcours. It consists of a series of stations set up over a 1 to 2½ mile path, to provide a recreational exercise circuit for individuals of all ages and abilities (Prentice, 1994).

Various fitness levels are designated which stress muscular strength and endurance, cardiorespiratory endurance and flexibility activities.

Parcours is a technique for improving cardiorespiratory endurance that basically combines continuous training and circuit training. This technique involves jogging a short distance from station to station and performing a designated exercise at each station according to guidelines and directions provided on an instruction board located at that station. Parcours circuit provides an excellent means for gaining some aerobic benefits while incorporating some of the benefits of calisthenics.

STATEMENT OF THE PROBLEM

The purpose of the study was to find out the effects of circuit training and parcours training on selected physical and physiological variables among college men students.
NEED OF THE STUDY

Parcours training though is similar to circuit training is a combination of circuit training exercises along with continuous running. The investigator of this study was interested in using this new concept “Parcours training” to find out its influence and to compare the same with the influence of circuit training. If the results of the study prove that parcours training improves the physical and physiological variables more than circuit training, it could well be recommended for players and coaches.

HYPOTHESES

It was hypothesised that

1) There would be no significant influence of circuit training on leg explosive power.
2) Circuit training would not have any significant effect on sped.
3) Circuit training programme would not make any significant improvement in agility.
4) There would be no significant influence of circuit training on strength endurance.
5) Circuit training would not have any significant effect on flexibility.
6) Circuit training programme could not make any significant decrease in resting heart rate.
7) There would be no significant influence of circuit training on cardiorespiratory endurance.
8) Circuit training would not have any significant effect on maximum oxygen consumption (VO₂ max).
9) There would be no significant influence of parcours training on leg explosive power.
10) Parcours training would not have any significant effect on speed.
11) Parcours training programme would not make any significant improvement in agility.
12) There would be no significant influence of parcours training on strength endurance.
13) Parcours training would not have any significant effect on flexibility.
14) Parcours training programme could not make any significant decrease in resting heart rate.
15) There would be no significant influence of parcours training on cardiorespiratory endurance.
16) Parcours training would not have any significant effect on maximum oxygen consumption (VO₂ max).
17) There would be no significant difference in leg explosive power between circuit training group and parcours training group.
18) There would be no significant difference in speed between circuit training group and parcours training group.
19) There would be no significant difference in agility between circuit training group and parcours training group.
20) There would be no significant difference in strength endurance between circuit training group and parcours training group.
21) There would be no significant difference in flexibility between circuit training group and parcours training group.
22) There would be no significant difference in resting heart rate between circuit training group and parcours training group.
23) There would be no significant difference in cardiorespiratory endurance between circuit training group and parcours training group.

24) There would be no significant difference in maximum oxygen consumption (VO\textsubscript{2} max) between circuit training group and parcours training group.

**SIGNIFICANCE OF THE STUDY**

1) The study would be of great significance because it would provide an opportunity to the physical educators, exercise physiologists, coaches and athletes to scientifically understand and assess the changes in the physical and physiological variables due to circuit training and parcours training.

2) The findings of the study would be of greater value in designing coaching programme using either circuit or parcours training.

3) The findings of this study would contribute to the body of knowledge in the field of training and exercise physiology.

**DELIMITATIONS**

The study was delimited to the following aspects:

1) This experimental study was administered to only three groups of ten men students each.

2) The age of the subjects ranged from seventeen to nineteen years only.

3) The height and weight of the subjects were not taken into consideration.
4) In this study, only circuit training and parcours training were administered to the groups.

5) The following physical variables only were chosen for the study:
   a) Leg explosive power
   b) Speed
   c) Agility
   d) Strength endurance
   e) Flexibility

6) The physiological variables were restricted to the following:
   a) Resting heart rate
   b) Cardiorespiratory endurance
   c) Maximum oxygen consumption (VO₂ max)

LIMITATIONS

1) Certain factors like food habits, life style, daily routine and the environmental factors which may have an effect on the results of this study were not taken into consideration while interpreting the results.

2) Lack of sophisticated instruments and measurement techniques were realised which might have caused variations in the result of the present study.

3) Participation in intramural competitions and other physical activities by the subjects could not be controlled or assessed.

4) Changing climatic conditions on the subjects during training and testing periods could not be controlled.

5) Special motivational techniques were not used to encourage the subjects to do their best during their practice or the tests and there
was no way of determining whether the subjects had the same degree of motivation during the various stages of the tests.

**DEFINITION OF THE TERMS**

To have better comprehension and clarity of the problem under study, the following terminologies are defined.

**TRAINING**

Training is the systematic process of repetitive progressive exercise or work involving also learning process and acclimatization (Arnheim, 1985).

“Training has been explained as a program of exercises designed to improve the skills and increase the energy capacities of an athlete for a particular event” (Fox, 1985).

**CIRCUIT**

Circuit is the term used to designate the total series of exercises, usually eight to twelve exercises (Mac Miller, 1974).

**CIRCUIT TRAINING**

Circuit training is the programme in which an athlete moves from one exercise station to another in a planned sequence and in the shortest possible time (Neal, 1969).
PARCOURS TRAINING

"Parcours is a training technique that combines continuous training with exercises done at stations along the course" (Prentice, 1994).

EXPLOSIVE POWER

The ability of the neuro muscular system to overcome resistance with a high speed of contraction is defined as explosive power (Dick, 1980).

SPEED

"The capacity of an individual to perform successive movements of the same pattern at a fast rate" (Barrow and Gee, 1979).

AGILITY

Agility is defined as the ability of the body or parts of body to change directions rapidly and accurately (Barrow and Gee, 1979).

STRENGTH

Strength is the force exerted by the important muscle group of the body in one maximal contraction (Judith, 1985).

ENDURANCE

Muscular endurance is the ability of a muscle group to apply force repeatedly or to sustain a concentration for a period of time (Hockey, 1989).
FLEXIBILITY

Flexibility is the range of movement at a joint or joint complexes (Hazeldine, 1987).

RESTING HEART RATE

The heart rate or heart frequency is defined as the frequency of heart beats in one minute when a player is in resting condition (Barry, 1982).

CARDIORESPIRATORY ENDURANCE

Cardiorespiratory endurance is the ability of the lungs and heart to take in and transport adequate amounts of oxygen to working muscles which allows activities involving large muscle groups to be sustained for long period of time (Fox, 1993).

MAXIMUM OXYGEN CONSUMPTION

Maximum oxygen consumption is defined as the greatest oxygen uptake attained by an individual while breathing air at sea level during the performance of physical work (Larry, 1982).