CHAPTER I

INTRODUCTION

High sports performances through sports training can be achieved by a scientific and systematic use of training means. Training means are different physical exercises and other modalities, methods and procedures used for improvement, maintenance and recovery of performance capacity and performance preparedness. Any material, method or measure which is used to attain the aims of training can be called as training means. Each training means has its own specific effect and the performance capacity, this effect may be direct and indirect (Singh, 1991).

1.1 TRAINING

Training is the total process of training of sportsman, through different means and forms for better performance. Training aims at improving the fitness of persons. It is a programme of exercise designed to improve the skill and increase the energy capacities of an athlete for a particular event (Edward, 1981). The physical training brings about local changes in the muscles, improved neuromuscular co-ordination of activities and a series of more general cardio respiratory changes (Thomas, 2001). In sports the performance depends largely on physical fitness components. Each sports activity demands different types and level of different motor abilities and when a sportsman possesses these he is said to have the specific physical
fitness of various motor components, irrespective of any sport which this sportsman possesses. The contribution of physical fitness towards sports performance is indirect. But it never should be overlooked that specific physical fitness depends largely on general physical fitness (Singh, 1991).

1.2 HIGH INTENSITY AEROBIC INTERVAL TRAINING

Optimization of training methods is an area of great interest for scientists, athletes, and fitness enthusiasts. Currently, there is great interest in maximal intensity, short-duration training.

High intensity interval training (HIIT) is alternating between high and low intensity exercise(s) or between high intensity exercise and a short period of rest. High Intensity Interval Training is physiologically difficult to endure maximal intensities throughout the workout for a long period of time. HIIT helps to lose body fat while simultaneously retaining lean body mass and strengthening the cardiovascular system. HIIT develops sport-specific energy systems and also improves fat and carbohydrate oxidation in skeletal muscle. Moreover it develops “mental toughness”. HIIT is extremely efficient as it facilitates bigger training effect with less time spent. And compared to 45 minutes of aerobics, 5 min of HIIT is a lot easier on the joints.

Training for endurance athletes generally emphasizes participation in long-duration low- or moderate-intensity exercise during the base or preparation phase of the season, with short-
duration high-intensity efforts as the competitive phase approaches. It is already proved that HIIT produces results faster than other traditional methods of training. High resistance interval training also proved to have great significant benefits on elite athletes.

Most endurance athletes use high-intensity training to prepare for competitions. There is enough evidence for the beneficial effects of various kinds of high-intensity resistance and interval training on the endurance performance of competitive athletes. The effects of low- to moderate-intensity endurance training on aerobic fitness are well documented (Jones & Carter, 2000), but reviews of high-intensity training on endurance performance have focused only on describing the effects of resistance training (Swensen & Tanaka, 1998). The impact of weight training with runners (Jung, 2003), and the different types of interval training used by athletes (Billat, 2001) and studied by researchers (Billat, 2001).

1.3 Concurrent Training

The inclusion of resistance training (to gain strength, hypertrophy, and power) combined with aerobic exercise (to enhance endurance) in a single program is known as concurrent training. Concurrent training programs involving strength and endurance exercises are commonly performed by the athletes to achieve adaptation specific to both forms of exercises. Research investigating the effects of concurrent training has typically compared changes in
strength and endurance variables after strength training, endurance training or concurrent strength and endurance training. Concurrent training studies investigating endurance and strength performance to date have shown mixed results. Nelson et al. (1990) reported that improvements in maximal oxygen uptake (VO₂ max) during the second half of a twenty weeks programme were compromised when strength training was implemented into an endurance programme. In contrast, a number of studies have found no interference to strength or endurance development as a consequence of concurrent training (Sale et al. 1990, Bell et al. 1991 & McCarthy et al. 1995).

1.4 CONCURRENT TRAINING AND ITS EFFECTS

The phenomenon of concurrent training, or simultaneously training for strength and endurance, was first described in the scientific literature in 1980 by Robert C. Hickson (Nader, 2006). Concurrent strength and endurance training is more effective in improving athletic performance than either endurance or strength training separately. This is contrary to previous studies, which found combined training inhibits muscle and power improvements (Michael et al. 2003).

Strength, endurance, and power are the key factors in athletic performance (Michael et al. 2003). Knowing how to maximize each component, to create the most effective program, is often difficult to achieve. On one hand, endurance training increases capillary density
(the muscle’s ability to receive oxygen) and decreases the ratio of fast-twitch fibers (strength muscles) to slow twitch fibers (endurance muscles) (Michael et al, 2003). On the other hand, strength training causes fiber hypertrophy (the muscle to get bigger), decreases capillary density, and increases the ratio of fast-twitch fibers to slow-twitch fibers (Michael et al, 2003). The training by strength and endurance concurrently showed improvements in vertical jump, anaerobic power, and aerobic capacity (Michael et al, 2003).

Strength/power athletes may perform endurance exercise in order to maintain an optimal body weight or to reduce body fat levels. Aerobic endurance exercises are an effective and efficient method of reducing body fat (Mc.cadle.2001). Another possible benefit of aerobic training for Strength/power athletes is the increased tolerance for exercise in the heat and during hyperthermia. In extreme heat, 15 to 20% of the cardiac output may be distributed to the skin for heat dissipation (Mc Ardle, 2001). This limits the blood flow to the working muscles. Aerobically-trained individuals have an increased senility and capacity of the sweating response so that they are better able to regulate their body temperature (Mc Ardle, 2001).

Combining aerobic exercise and resistance training in the same workout session, a technique referred to as concurrent training, can be a time-efficient training method. Perhaps one of the long-lasting and most engaging debates for fitness professionals has been about which sequence is better when combining the two modalities.
1.5 FOOTBALL

It is impossible to say exactly when football began, because its origin is lost, literally, in the mists of time. Some say men and women first began kicking ‘an object’ around as far back as the twelfth century. Perhaps they did, but it took a long time for the game to become organized. The first real stirrings were in the middle of the last century, when boys at established English public schools, and at universities such as Cambridge, began to play a form of football which at least bore some resemblance to our modern game. It is surprising that a game thought of mainly as a working man’s pastime should have originated in the very bastions of the so called privileged classes. However such was the popularity of football that it was not long before it appealed to a wider audience. The oldest football league club was found in 1862-26 years before the formation of the league itself - Nottingham country, which came into existence three years before their arch-rivals Nottingham forest.

Football is being played in all the countries. Though it was officially acknowledged, this game had been known by the people only after the creation of the Football association in 1863. The game rapidly had spread to Continental European countries and then to other countries. In 1904, Federation of International de Football Association (FIFA) was established and after four years Football was included in Olympics (Rink, 1987).
Organized football, formally referred to as “association football,” was derived from a traditional free for all type game played in towns and villages in Anglo-Saxon times. The earliest known reference to the game is from 1175 and was a traditional match played on Shrove Tuesday. The original game was essentially a possession game, with very few rules; no limits on time of play, terrain, or team numbers. This violent form of the sport was often subjected to bans (Bangsbo 1994).

It was not until the 19th century that the game we now know as football started to take shape. Differing versions of football were played in the greater British public schools, Rugby, Harrow, Eton and Charterhouse. Tables of rules were first drawn up at around 1840. In 1863, the Football Association was formed, using the “Cambridge Rules” as the basis for their game, which were tabled the year before. Although the game has grown and the rules have changed extensively since, it was in this period that the 11-man game of football we see today was developed (Bangsbo 1994).

Football performance is based upon number of factors like physiological; technical; tactical; and mental zones. Football had been considered to be one of the oldest ideal games in India. It is being played widely all over the world and it is as popular in Europe and as in Latin America. During 1880, Football was familiarised in India by the British people who ruled over India. This sport had been popularised first in Bengal and then spread to other parts of the
country. The Indian Footballers nurtured the prospect to learn Football through numerous educational organisations started by the Christian Missionaries in Pre-Independent India and it scattered Football to the nook and corner of India. The contribution of army captains, ministers and educators in promoting, growing and improving Football in India is great.

The Fitness and possession of the skills are required for playing Football. Fitness requires number of separate characteristic. Football also requires combination of many characteristics and abilities. As significance, fitness for Football is said to be multivariate and also precise to the sport. It negotiates physical, psychological, physiological, and psychomotor factors. Such qualities desirable in challenging and retentive control of the ball, upholding a high work-rate for 90 minutes of play, reacting rapidly and suitably as occasions arise and modifiable psychological characteristics before and during match-play.

Football has undertaken a wonderful development temporarily on its birth. One of the highest strength of the game is its effortlessness. At its simplest level all that are desired is a ball and an open space with something to act as a goal post. No other sport is so simply accessible and so directly sensational (Morris, 1981).

Football is one of the most widespread sports in the biosphere in terms of observer game and sharing of players. It is fast, quick,
forceful and beautiful. It is careful as an energetic game because the game strains a high degree of ability as well as intellect and awareness of mind. The football player requires the qualities of speed, strength, agility, balance and flexibility (Rink, 1987).

Football players’ essential need is an extraordinary level of fitness to manage with the physical strains of the game and to allow for their practical skills to be exploited during the match. Therefore, fitness exercise is a vital part of the general training program. Fitness training has to be multi-layered in order to cover different requirements in Football. Hence, training can be classified into a number of components based on the different types of physical demands during match.

With suitable training, performance of a player throughout a match can be improved and the risk of injury can be shortened. In order to prepare an efficient training program it is significant to be aware of the different components of fitness training in Football (Reilly, 1996). Since 1970, physical training has become an essential part of Football. Most defenders are mandatory to run down the wing, while attackers often check back to link up with the halfbacks. A regular specialized player runs about 6-9 km per match. Few players run up to 13-15 kilometres (Expert football, 2007).
1.6. JUSTIFICATION OF THE STUDY

An earlier sport was in the form of leisure, and then became competition, now in the present world sports has become particularly professional. To accomplish top level performance in the worldwide arena, one must have a fitness schedule and systematic execution (Schaaflstal, 2008). Experts in the field of sports have put their minds into it and made tremendous efforts to find out the ways and the means to achieve top level performance. Training is the foundation of performance in sports (Bompa, 1999).

High Intensity Aerobic Interval Training, Concurrent Low Intensity Aerobic and Resistance Interval Training are the training modules of the present and future. Sports specific training can help to improve strength, flexibility and stamina whereby the player can improve his performance in specific sports. Hence the present study aimed at developing different training to enhance the performance at two folds; one aimed at developing physical and physiological conditioning; and second aimed at performance by enhancing technical and tactical aspects of football players. So far, a few have investigated this training approach scientifically. Hence, this research may contribute to the sports person.

1.7. STATEMENT OF THE PROBLEM

The purpose of this study was to investigate the effects of high intensity aerobic interval training, concurrent low intensity aerobic
and resistance interval training on selected motor ability, physiological, psychological and skill performance variables of college level male football players.

1.8. OBJECTIVES OF THE STUDY

To following are the objectives of the study.

1. To find out the effects of the high intensity aerobic interval training on selected motor ability, physiological, psychological and skill performance variables of college level male football players.

2. To find out the effects of the concurrent low intensity aerobic and resistance interval training on selected motor ability, physiological, psychological and skill performance variables of college level male football players.

3. To compare the effects of high intensity aerobic interval training, concurrent low intensity aerobic and resistance interval training on motor ability, physiological, psychological and skill performance variables of college level male football players.

4. This topic is aimed to find out the influences of High intensity aerobic interval training and combination of low intensity aerobic and resistance interval training on selected motor ability, physiological, psychological and skill performance variables of male football players. This study could Also be able
to understand on how far the selected variables are influenced by the above treatment.

1.9. HYPOTHESES

1. It was hypothesized that there may be significant improvement from their baseline to post treatment due to high intensity aerobic interval training; concurrent low intensity aerobic and resistance interval training on selected motor ability of college level male football players.

2. It was hypothesized that there may be significant improvement from their baseline to post treatment due to high intensity aerobic interval training; concurrent low intensity aerobic and resistance interval training on selected physiological variables of college level male football players.

3. It was hypothesized that there may be significant improvement from their baseline to post treatment due to high intensity aerobic interval training; concurrent low intensity aerobic and resistance interval training on selected psychological variables of college level male football players.

4. It was hypothesized that there may be significant improvement from their baseline to post treatment due to high intensity aerobic interval training; concurrent low intensity aerobic and resistance interval training on selected skill performance variables of college level male football players.
5. It was further hypothesized that the concurrent low intensity aerobic and resistance interval training may have better influence on motor ability, physiological, psychological and skill performance variables of college level male football players than the high intensity aerobic interval training.

1.10. SIGNIFICANCE OF THE PRESENT STUDY

1. Designing a combination of training program for a specific sport is a challenge and this study would give an insight to design such training program.

2. The findings of the study would expose the effects of high intensity aerobic interval training, concurrent low intensity aerobic and resistance interval training on selected motor ability parameters.

3. This study would also bring up the possibilities of new similar researches in future.

4. This study would add to the quantum of knowledge in the area of sports training.

1.11. DELIMITATIONS

The study was delimited in the following aspects:

1. The present study was delimited to 45 college level male football players of Velammal Institutions, Chennai, and their age was fixed between 18 – 23 years.
2. The subjects were divided at random into three groups (each consisting of 15) in which Group I undergone high intensity aerobic interval training, Group II with a combination of low intensity aerobic and resistance interval training and Group III was control group.

4. The duration of training programs was delimited to 12 weeks only.

1.12. LIMITATIONS

The present study has following delimitations.

1. Certain factors like life style, daily routine work, diet and other factors that might have an effect on the results of the study, were not be taken into consideration.

2. No attempt was made to control the factors like air resistance, intensity of light, atmosphere, and temperature during training and testing periods.

3. No special motivational techniques were used during testing. Therefore the differences that might occur in performances due to lack of motivation will be recognized as a limitation of the study.

4. The difference in economic and educational backgrounds of students that might affect their performances were not taken into consideration.
5. The skills of the subjects and their previous experience in physical activities like sports and games were not taken into consideration.

6. Physical maturity, which might take place during the study period, was not taken into consideration.

1.13 DEFINITION OF THE TERMS

1.13.1. High Intensity Interval Training

Repeated sessions of relatively brief intermittent exercise, often performed with an “all-out” effort or at an intensity close to that elicits VO₂ max” (Gibala and Mcgee, 2008).

1.13.2. Agility

Agility is the ability to move and change direction and position of the body quickly and effectively while under control (Baumgartner, 2003).

1. 13.3. Explosive power

Ability to overcome lower resistance with high speed. Explosive power always finds expression in motor movements i.e., it is a form of dynamic strength (Singh, 1991).
1.13.4. VO\textsubscript{2} max

The point at which the oxygen consumption plateaus and shows no further increase (or increases only slightly) with an additional workload is called the maximal oxygen consumption (William. D Mc Arde 2006).

1.13.5. Cardio Respiratory Endurance

Cardio-respiratory endurance is the ability of the lungs and heart to take in and transport adequate amounts of oxygen to working muscles which allow activities involving large muscle groups to be sustained for long period of time (Edward L, 1993). Cardio-respiratory endurance is defined as the ability of heart and lungs to provide an adequate supply of oxygen to the body over an extended period of time (Baumgartner, 2003).

1.13.6. Stress

A pattern of negative physiological states and psychological responses occurring in situations where people perceive threats to their well-being, which they may be unable to meet (Lazarus and Folkman, 1984).

1.13.7. Mental toughness

Mental toughness describes the bundle of qualities that include an unusually high level of resolution, a refusal to be intimidated, an ability to stay focused in high – pressure situation, the capacity for
retaining an optimum level of arousal throughout a competition, an unflagging eagerness to compete when injured, an unyielding attitude when being beaten, a propensity to take risk when rival shows caution and an inflexible, perhaps obstinate insistence on finishing a contest rather than concede defeat (Weinberg, 1981).

1.13.8. Dribbling

The ability of a player to put the defender out of the game by taking him on and beating him (Michael Owen 1999). Dribbling is nothing more than moving with the ball across the field. It is a skill used to relocate a player into desirable positions where he can shoot or pass the ball (Armstrong 1988).

1.13.9. Shooting Accuracy

Shooting accuracy is the ability of a player to beat goal keeper with wide variety of shots using different parts of the foot (Michael Owen, 1999).

Shooting of the goal is an attempt to send the ball directly into opponent goal, with the aim to score. It is based on individual and collective action (Isokawa, 1988).