Chapter-I

INTRODUCTION

Soccer competition is the highlight of the Indian soccer festival. Teams from all the states participate in the event. Soccer in India is believed to have started in the early 1800s. However, the tradition dates back to the 1880 in West Bengal, when the British army introduced organized soccer. The game became popular first in Bengal, before it spread to the other parts of the country.

Soccer, although widely practiced throughout India, suffers from lack of experimentation and research. There would appear to have been no systematic assessment of the physiological and physical demand required to play the match.

In the arena of world sports also, the performance of Indian athletes is not getting due recognition because of certain lacunae in respect of talent search, which is scientifically performed by other countries of the world towards their greatest achievement in different spheres. It has, therefore, been realized that outstanding sporting performance, even with the best coaching methods, optimal living and
training conditions can be achieved only by individuals having an inherent extraordinary gift. The athletic traits and characteristics Speed, Power, Agility and Balance of an individual can be explored depending upon physical fitness having component of Muscular Strength, Cardio-respiratory Endurance, Flexibility and Motor Fitness.

India’s results in international soccer over the last two and a half decades are not something that would inspire confidence. To no other major sport in the country has progress been as alien as it has been to soccer in the last 25 years. While almost every other Asian and African nation has moved forward, gaining technical competence and a spot of international recognition here and there, Indian soccer has gone from bad to worse while some of the Asian countries have improved significantly to get close to the International elite and others have jogged at a leisurely pace to still be within sight of the goals, it is almost as if Indian soccer has been content to occasionally kick its arms and legs in a bedraggled state, and from the same spot, moving not an inch forward. One can look forward confidently to the future of soccer provided all are prepared to accept change-change that is for the better. After all, soccer is the best game in the world and it’s worth fighting and changing for (Shaji, 2000).
No doubt, over the past thirty years the number of exercise physiology laboratories has increased tremendously. As a result, much new knowledge dealing with how best to train athletic team has appeared in the scientific literature but unfortunately very little in the Indian context.

If we think about the nature of soccer then it is a game, that is characterized as a high intensity intermittent sport. The game is played for 90 minutes, during which players run at different speeds and execute technical skills randomly. A high number of accelerations and decelerations, associated with the large number of changes of direction of play, tackles and jumps creates an additional load on the muscles involved. As in any sport, those players better suited to cope with the demands of the game reach the elite level. Players who form part of professional clubs and national teams have excelled in their performance and thus are considered the elite.

Moreover, there is still much uncertainty and debate surrounding soccer’s physiological requirements because of emphasis on skills (to the neglect of fitness), conservative training methods and the difficulty of studying the sport scientifically (Tumilty, 1993).
Despite the large number of soccer players in Asia, research dealing with the performance capacity of elite Asian soccer players is also lacking. Most of the physiological data on elite soccer players originates from Western Europe and North America (Chin, 1994). Studies on the physiological profile of soccer players are also very scarce.

The dilemma for the coaches and players is to determine how to accomplish improvements in fitness through an organized fitness programme without sacrificing the ability to perform well in a game, or neglecting the skills which give soccer its unique character. It is likely that an increase in fitness will be able to be capitalized on only if there is an increase in the player's ball skill and game sense, and the reverse may also apply.

Despite the universal nature of the sport and a formal history extending back over a hundred years, there are still many uncertainties concerning its physiological requirements and optimum training and conditioning methods. Possible reasons include the emphasis placed by many players and coaches on the skill aspect of the game, sometimes to the neglect of the fitness requirements; the methodological difficulties for sports scientists, of investigating such an open and
varied sport; the conservative nature of a sport in which many coaches are former players who train their team just as they themselves were once trained; and the evolving nature of the game, in which strategies, tactics and the role of players continue to change (Tumilty, 1993).

Evaluation of elite athletes is one means of determining characteristics that contribute to outstanding performance. Besides structural aspects such as Somatotype and Body Composition, Balance between Anaerobic Power and Aerobic Power are certainly of primary import (Ramadan, 1987). Therefore, the attention is focused on different profiles of these soccer players. By this investigation one can clarify what components of fitness distinguish the top players from the less successful, and in some cases from other athletes.

There is general agreement among observers of the sport that over the past few decades it has become in some way 'faster' and is played at a higher 'intensity'. The modern 'total soccer' concept requires that players become more flexible in their capabilities, for instance full backs must have the abilities of wingers also, able not only to defend, but to make powerful long runs, to dribble effectively and to cross accurately (Tumilty, 1993).
A fit player (technically and tactically) can delay the onset of fatigue during a match and training session and will therefore, perform better. The more tired a player is, the more prone he is to making errors, and a player who makes a lot of errors will often lose his confidence, which all players need to perform well. Fitness will aid them in the proper execution of various techniques as well as in playing. Physical fitness for soccer player can be divided into three areas: endurance, strength and speed (Beim, 1977, Csanadi, 1978). In this context there is a need to explore these three areas, to estimate how they affect a player's performance, in general, and how much importance should be given to developing each of these qualities.

The existing literature in the field of soccer shows that endurance, speed, agility, maximum leg strength, upper body strength, leg power, muscular endurance, flexibility, coordination and reaction time are important pre-requisites for efficient soccer performance (Cassell, 1979, Bandyopadhyay, 1982, Uppal, 1986) but excess body fat proves to be a hindrance.

Soccer also requires an above average aerobic component to assist in rapid recovery between the intermittent bouts of high intensity work and maintain endurance capacity over long match play.
Flexibility and agility are also key factors that permit the quick stops, starts, and turns these athletes must perform, as well as sport-specific skills that are essential to successfully compete at national and international levels (Lydia, 2004).

Optimal preparation of the competitive soccer player is very challenging because the player must be technically advanced, tactically sound, and of sufficient fitness to carry out the skills and strategies of the game. Philosophies of training vary with the tradition, history, and playing style of each country. There are also varied training seasons depending on the climate of the country (Kirkendall, 2000).

Soccer, being an intermittent activity sport, taxes both the aerobic and anaerobic system. During competition, a player's workload intensity will range from walking to sprinting. Thus, to sufficiently sustain the ability to perform during a soccer match, a player must possess a strong anaerobic component also, that combines strength, speed and power.

Every year thousands of youngsters join soccer clubs, where they are confronted with qualified trainers mass-produced in special courses. These trainers have excellent facilities and first class material at their disposal. Because of increased leisure, the number of training
hours has been doubled in recent years. Hundred of scouts haunt the football fields, study groups are called into being, committees ponder, more and more specialized literature makes its appearance, reports are produced in abundance, and yet football does not become more attractive. More and more mediocre players and ball passers manage to survive through effort, fitness and running ability, and this does nothing to benefit the quality of the game. There is nothing wrong with a player keeping his position through work rate, provided the game is enlivened by attractive, individual play. When the workers begin to gain the upper hand, as now, the future beings to look bleak. The public wants to see more than hard work; they want the kind of brilliant individual play that gives rise to unforgettable moments (Coerver, 1985).

Though a soccer coach should have some basic knowledge of physiology, it certainly isn’t necessary for him to know the Latin names of all the muscles. What he does need is a thorough knowledge of realistic exercises for increasing the co-ordination, speed, explosive power and stamina of his players. Far too often one sees players being driven about like a herd by a coach’s whistle and performing all sorts of exercises in which there is no trace of independence or personality.
It is perfectly all right to subject technically gifted players to old-fashioned conditioning once in a while, but it is wrong for technically limited players to waste costly time on such soul-destroying routines. Condition training, like other forms of training, must be match-oriented. It must be such that players improve their technical skills and simultaneously develop an optimal condition for playing a game of soccer (Coerver, 1983).

The difference the distance covered by midfielders and by other team members is not great, yet it seems sufficient to require a slightly greater aerobic capacity in the former. The superior capacity of midfield players seems related to the greater distance covered by them at low movement intensities, as studies do not indicate that they travel further at high intensities (Tumilty, 1993).

The roles of muscularity and strength as contributors to power and playing ability have received some attention. The authors of a study in which players from the first and reserve teams of an English League team were monitored throughout the season concluded that the more muscular and stronger players were better able to survive the rigors of the prolonged competition, and that an array of strength and power tests successfully discriminated between proficiency levels
(Moynihan, 1989). For example Pele played the game at a murderous pace because he inherited a powerful muscles.

The criteria for selecting a method of strength testing include the following factors- specificity, ease of data acquisition and analysis, cost and safety. Specificity of strength testing considers the muscle involved in sport movement, the movement pattern and contraction type, and the velocity of the contraction. (Powers, 3rd Ed.)

Thus, strength in the lower limb is of obvious concern in soccer-the quadriceps; hamstrings and triceps must generate high forces for jumping, kicking, turning and changing pace. The ability to sustain forceful contractions is also important in maintaining balance and control. Isometric strength is possibly important in maintaining a player’s balance on a slippery pitch and also in contributing to ball control. For a goalkeeper almost all the body’s muscle groups are important for executing his skills. For outfield players, the lower part of the trunk, the hip flexors and the plantar flexors and dorsi flexors are used most. Upper body strength employed in throw-ins and the strength of neck flexors could be important in forcefully heading the ball. At least a moderate level of upper body strength should prove helpful in preventing being knocked off the ball.
The only problem area with regard to developing a player’s physical qualities is sprinting speed. For the most part this is inherited. Even an ideal program of sprint training will not give a slow player the speed of a natural sprinter. In soccer, however, speed does not mean sprint speed alone. The main thing a player needs is the ability to make decisive moves in a game, and this is something that any player who follows this training plan can achieve because it will greatly improve his tactical insight. (Coerver, 1983).

The literature on training is overflowing with unrealistic forms of exercise to develop a player’s agility and flexibility. What one sees in practice, however, is that after ten years of such exercises a player is still angular and uneconomical in his movements, which says all that needs to be said about the practicality of the exercises in question.

The only joint for which there is an abundance of exercises in the specialist literature is the shoulder joint, which is an area of lesser importance for soccer players. (Coerver, 1983). So soccer requires the flexibility of spine, hip and ankle, which plays an important role in execution of skills.

Loss of flexibility can result in a reduction of movement efficiency and may increase the chance of injury in some sports.
Therefore, many athletic trainers and coaches recommend regular stretching exercises to improve flexibility and thus reduce the chance of injury and perhaps optimize the efficiency of movement (Power, 3rd ed.).

The world of training methodology has crossed many milestones as a result of different types of research, in general, and their application to the sports development, in particular. In the modern scientific age, athletes are being trained by highly sophisticated means for better achievement in their concerned sports. They are being exposed to the exercises and training methods which have proved beneficial for achieving higher standards. Much progress has been made in the recent years in the acquisition of knowledge about training means and techniques of sports skills. In sport training, specialized exercises are being prescribed for the fullest and optimum development for a particular game (Patel, 1980).

The soccer world has little experience with power training because, like the various kinds of condition training, it was adapted from other sports. There are players who could reach the top if they developed explosive power. Preseason power training sessions using modern equipment can do no harm, and it is also very useful to have
one session a week during the season. With this training plan, power is developed through the innumerable exercises in which explosive action is called for. (Coerver, 1983)

The ability to jump, sprint, put the shot, throw the javelin, or perform fast starts as would be required by backs and linemen are a few examples of athletes converting energy to power. The ability to develop considerable power is a prime factor in athletic success. Power is performance of work expressed per unit of time. The term ‘explosive power’ has been associated with this anaerobic metabolism and the tests to measure it. However, ‘explosive’ itself connotes power, leaving us to consider the term ‘explosive power’ as redundant. Consequently, the term ‘anaerobic power test’ to reflect such measurement (Fox, 1989)

Body composition is an important aspect of fitness for soccer players, as superfluous adipose tissue acts as dead weight in activities where body mass must be lifted repeatedly against gravity. This applies to locomotion during play and in jumping for the ball. The most commonly used model of body composition divided the body into two compartments- fat and fat free mass.
Not only this, simple reaction time gives a measure of how quickly a subject can respond to a stimulus in the immediate environment. This ability is predominantly due to heredity as reaction time decreases with age. It might be important in soccer where players have to respond immediately to environment stimulus. The faster the simple reaction time of the individual, the quicker will be the response to complex situations. It will also give him an advantage in initiating abrupt movement. Thus a fast simple reaction time denotes general athletic ability while fast responses in a complex or choice reaction time test specific to soccer characteristic game related decision-making.

The wide participation in soccer indicates that the game is within the reach of an enormous fraction of the population. Specific genetic gifts, necessary for some activities (e.g. stature for basketball, mass for American football, high low twitch muscle fiber population for purely endurance events) seem to be of minor importance in soccer (Kirkendall, 2000).

The success of the team depends on how individuals are blended into an effective playing unit. When teams roughly equal in ability meet, the one with the higher overall fitness level will have the
advantage of being more able to cope with a fast pace of play. Attention to fitness profiles is relevant not just in the build-up towards key matches and tournaments but also throughout the competitive league season. Fitness profiling is achieved by means of a battery of tests. The test items may either be part of a comprehensive physiological assessment or be dedicated to performance in soccer. The fitness profiles have some value in allowing comparisons between individuals and global standards; individual weaknesses may be identified and remedial training prescribed.

The most important variables determining performance in team sports such as soccer are physical condition, and technical and tactical performance. However, because of the complexity of the game of soccer it is difficult to ascertain the relative importance of each of these variables.

When comparing soccer players with the general public, their physiological profile is above the norm. When comparing soccer players with the athletic population, their profile is basically average. No one characteristic stands out from the other or from other sports. Agility has been shown to be exceptional, but until more data on an athletic population is reported, there is no way to tell if this is indeed
exceptional. This means that the game is accessible to a large variety of people, not discriminating against people of average abilities. Part of the joy of the game is having the fitness necessary to perform the difficult, and sometimes-artistic skills in rapidly changing tactical situations. (Kirkendall, www.sportsci.org).

Unfortunately, we Indians still believe in magic formulas for transforming limited trained into champions. This can only be reached through the implication of new research findings. To spot the gaps and subsequently bridge them the scholar, in the form of present study, is making a modest effort in this direction to prepare physiological and physical profiles of soccer players.

This thesis was intended to highlight the physiological profiles that were relevant to success in the game of soccer. Seven broad areas (Heart rate, Blood Pressure, Respiratory rate, Anaerobic power, Vital capacity, Negative breath holding capacity and Positive breath holding capacity were covered in the first part. The physical profile of soccer players was covered next, describing the pattern of physical abilities to participation in soccer evaluated from different measurements during and following the game.
Statement of the Problem

The main purpose of the study was to determine the selected Physiological and Physical Profiles of Soccer players.

Delimitations

1. The study was delimited to soccer players of Kolkata (West Bengal)
2. The study was delimited to the following Physiological and Physical variables.

Physiological Variables

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<th>Blood Pressure</th>
<th>Rest</th>
<th>Game</th>
<th>Recovery</th>
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<tr>
<td>Heart Rate</td>
<td>Rest</td>
<td>Game</td>
<td>Recovery</td>
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<tr>
<td>Respiratory Rate</td>
<td>Rest</td>
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Anaerobic Power

Vital Capacity
Positive Breath Holding Capacity
Negative Breath Hold Capacity
Physical Variables

Speed
Agility
Leg Strength
Power
Flexibility
Cardio-respiratory Endurance
Reaction Time
Body composition

Limitations

Certain factors like diet, daily routine habits, facilities, training, geographic conditions, etc., that would have affected the results of the study were considered as the limitations of the study.

Hypothesis

From the scholar’s own understanding of the problem and as gleaned through the literature it was hypothesized that in relation to all the selected Physiological and Physical variables, the Profile of the players may not be distinct in nature.
Definition and Explanation of the Terms

Profile

A group of data representing quantitatively the extent to which an individual exhibits traits or abilities as determined by test or rating and usually presented in the form of a graph, or to study and design the exterior shape.

Profile studies have been employed in order to show various trait patterns. Essentially this involves placement of the individual on test scales for a number of characteristics. Thus the individuals strength and weakness can be assessed from his position on a common scale for all traits. The scale may be from norms already available or may be constructed from a sample of the population to which the subject belongs.

Physiological Profile

Physiological profile refers to those Physiological functions of different systems of the body, which are liable to vary across age or as a result of exercise, etc. (Prakesh, 1994)
Physical Profile

Physical profile refers to the athlete's status on those components, which are essential for efficient functioning in the psychomotor domain. These components are performance oriented and are dependent upon functioning of different systems of the body in an integrated manner. (Prakesh, 1994).

Significance of the Study

Very high degrees of physical and physiological fitness are required to be mastered for an outstanding performance in soccer. Based on the research that has been conducted, it is evident that soccer players are very fast, quick, mobile and active, having enough endurance as well as balanced state of personality. Sports scientists in many countries are experimenting to find different ways and means to formulate the easiest and accurate methods of treating their sportsmen for maximum output.

The frequent changes and advancements in soccer games are mainly due to the emphasis given by sports experts to systematic training and application of scientific knowledge accurately.
However, although many efforts have been made regularly to improve upon the techniques of training sportsmen, with the help of research evidence and facts, yet very little research has been done to promote these games on scientific terms in India.

A lot is heard and known about the contribution of scientific development in training of soccer players in most advanced countries. But scientific and result oriented investigation analysis as well as assessment has not been undertaken seriously in India to prove the worth of each of them, which perhaps, helps coaches and physical educators to select players.

It has been established that for the attainment of top performance, interaction of many factors is responsible. Under modern conditions for the selection of athletes and for the training for games and sports, with the focus on superior performance, emphasis is laid on the Physiological and Physical factors, besides other factors.

The present study, therefore, may make the following significant contributions:

i. The study may act as a screening tool based on physiological and physical variables.
ii. The study may help to assess improvement throughout the phase of conditioning.

iii. The study may help to predict soccer performance.

iv. The study may help to know the degree of adaptive changes that are brought out by strenuous training.

v. From a practical standpoint, this study is important for coaches and trainers to adjust training regimes and concentrate on the variable that is specific to improve performance and achieve success in soccer.

vi. By understanding the profile of successful players, coaches, trainers and exercise scientists can have better working knowledge.

vii. During the preseason period, players normally undergo fitness testing in order to determine each player’s physiological condition. From the results of the testing, the coaches can identify the strengths and weaknesses of the players and train them accordingly. Appropriate testing can be specified to reflect the actual fitness status of the soccer players.

viii. The present study may help to investigate the physiological profile of the soccer player with special reference to VO₂ (max)
and Pulmonary capacities. The study may certainly help coaches and other technical people in the field of active sports sciences to get a fair idea of the physiological status for child players in order to formulate and monitor their future training programmes.

ix. The knowledge of the profile of the soccer players will aid the medical staff in designing appropriate training programmes.

x. The study may help to provide some baseline data, which can then be used by coaches, sports scientists and future investigators to improve the performance of soccer in international competition.

xi. The study may provide descriptive information of soccer players.

xii. This study may also help the beginners to develop a mental picture about their fitness level.

xiii. Fitness Profiling can generate a useful database against which talented groups may be compared.
References


