Chapter One

INTRODUCTION
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Soccer is undoubtedly one of the most popular sports in the world, engaging people worldwide as players, spectators and TV viewers (Haugaasen & Jordet, 2012). A survey by the *Fédération Internationale de Football Association* (FIFA) in 2006 reported that 265 million people regularly play soccer (FIFA, 2007b), making soccer one of the most highly participated sports in the world. In addition, large soccer events have in recent years drawn more TV viewers than most other sporting events. The world cup tournament of 2006 had 27 billion accumulated viewers and the final alone attracted an audience of more than 700 million (FIFA, 2007a). For Joseph S. Blater, FIFA president, soccer popularity remains undiminished and is actually increasing (FIFA, 2007c). This global access to soccer requires an optimal performance from all of its practitioners, particularly, soccer players.

The term football encompasses a large category of games. The aim of these games is to use a ball to score a goal, mainly by kicking or using the body to various levels. The most popular type of football in the globe is association football, which is also known as just ‘football’ or ‘soccer.’ This type of football is played by large number of players in over 200 countries. Other types of football include: American football, Australian Rules football, Canadian football, Gaelic football, Rugby League, Rugby Union, etc. These variations of football are known as football codes.
Recent burgeoning of the football industry has enhanced the attractiveness of the sport as a professional occupation for performers at the highest standard, where the financial rewards for success are considerable. Management of the top teams is continually on the look-out for emerging star players, either mature players on opposition teams or those developing in under-age and youth ranks. The economic benefits of being able to recruit talented players and develop them to full potential are obvious. Recognition of the financial gains associated with early development of football talent has led to the institution of ‘academies’ as ‘centres of excellence’ attached to the major professional soccer clubs worldwide. In conjunction with these schemes, there has been an increased systematization of physical training and greater emphasis on fitness (Reilly, Bangsbo & Franks, 2000).

Sports science and football

A significant amount of research has been undertaken in recent years to identify the important factors underpinning elite sports performance. This increase in research activity has been particularly evident in soccer, where the importance of sports science research and applied work is now more widely accepted (Reilly & Williams, 2003). In order to boost soccer players’ performance, researchers all over the world have actively studied these practitioners in different areas of sports sciences. Over the past two decades, considerable scientific information about the physiology and medicine in football has been collected. But this information is mainly about the physiological profile of elite soccer players in America and West
Europe, while this information is limited about players from other parts of the world (Ostogic, 2003).

Coaches and spectators often imply that elite players are in some way “gifted” with unique abilities that ensure that they will achieve excellence within the sport in question. In support of this presumption, scientists argue that we are not all born equal and that certain individuals may be endowed with characteristics that predispose them towards achieving excellence more than others (Bouchard, Malina, & Perusse, 1997; Rowe, 1998). However, to achieve excellence in any domain, individuals have to spend a considerable amount of time trying to improve performance through practice-related activities (Ericsson, Krampe, & Tesch-Romer, 1993; Howe, Davidson, & Slaboda, 1998). A consistent observation is that elite performers in the sports, arts and sciences accumulate in excess of 10,000 hours of practice before reaching an international level of performance (i.e. the so called 10-year rule; Simon & Chase, 1973). It is likely that the development of expertise is dependent on a complex recipe where innate hereditary factors are blended with the correct environmental factors, such as the influence of parents and coaches, as well as an individual’s commitment and motivation to practice (Starkes & Ericsson, 2003).
Talent identification in football

Identification and selection of talented soccer players are not straightforward operations. Detection and identification of talent are more difficult in team games than in individual sports such as running, cycling or rowing, where predictors of performance are more easily scientifically prescribed (Reilly et al., 1990). Long-term success in soccer is dependent on a host of personal and circumstantial factors, not least of which is the coherence of the team as a whole and the availability of good coaching. These factors make it difficult to predict ultimate performance potential in soccer players at an early age with a high degree of probability.

Performance in soccer is a construct requiring a myriad of skills but is highly dependent upon a subtle blend of players’ physical, tactical, technical and socio-psychological abilities (Stølen, Chamari, Castagna, & Wisløff, 2005). At higher levels of performance, the quest for success continuously leads practitioners, researchers and sports scientists to explore different means to evaluate and improve these main areas of performance, both singly and, more impactfully, in combination.

In sport, as in other domains such as science, music and the arts, the attainment of excellence represents the primary goal of many individuals. Spectators marvel at expert performance and coaches endeavour to nurture their proteges towards new heights of achievement but it is the athletes who aspire to reach ‘greatness’. As a consequence, the study of expertise in sport, along with the identification and development of future elite performers, is a respected area within
the sport sciences. Its expansion is particularly evident in soccer where there has been renewed interest in talent identification and development (Wilkinson, 1997).

The ability to execute skilled movement patterns efficiently and effectively is the most important aspect of soccer performance and players must apply cognitive, perceptual and motor skills to rapidly changing situations (Ali, 2011). There have been attempts to measure these parameters for talent identification (or development) purposes and skill acquisition and intervention research. In order to remain competitive, clubs now attempt to invest significant amounts of money in challenging to identify and nurture potentially elite players. Identifying soccer prospective at an early age ensures that players receive specialized coaching and training to accelerate the talent development process. The consistent identification of potential elite players permits clubs to focus their expenditure on developing a smaller number of players, representing a more effective management of their resources. In the effort to produce young talented players, sports scientists have an important role to play in working together with coaches and administrators to underline key elements of the talent identification and development process.

**Importance of physical fitness in football**

Within any evidence-based framework for professional sports performance, knowledge of the physical requirements of play is necessary to aid in the design and application of adequate fitness training strategies in preparation for contemporary competition (Bradley et al., 2009b). Indeed, research in male professional soccer has
shown that the physical characteristics of players (Nevill, Holder, & Watts, 2009) and the fitness demands in official competition have substantially evolved over recent decades (Cazorla, Zazoui, Boussaidi, Zahi & Duclos, 2009; Strudwick & Reilly, 2001). The main purpose of any contemporary strength and conditioning process is thus to equip players with the optimal blend of fitness-related skills to respond to the ever-evolving demands of elite soccer competition. These demands refer to a wide range of characteristics that are essential in assisting players in competing for possession of the ball, reacting quickly and optimally to continually changing game situations, and maintaining high performance levels throughout the entire duration of games and across the competitive season (Reilly, 2007). Accordingly, a thorough understanding of the athletic requirements specific to match-play and factors potentially affecting competitive performance can ensure that objective and realistic decisions are taken for structuring the physical conditioning elements of training programmes.

Soccer is a multifaceted sport that requires well developed physical fitness to be successfully played. Professional football is a difficult sport in which various activities such as fast sprints, kicks and tackles are done in succession (Kargarfard and Keshavarz, 2005). It is a sport characterized by short sprints, rapid acceleration or deceleration, turning, jumping, kicking, and tackling (Wisloff, Helgerud and Hoff, 1998). It is generally assumed that through the years, the game has developed to become faster, with more intensity and aggressive play than seen previously (Tumilty, 1993).
Players must possess moderate to high aerobic and anaerobic power, have good agility, joint flexibility and muscular development, and be capable of generating high torques during fast movements (Reilly et. al., 2000). As soccer is a team sport, an efficient organization of the team is required for the optimal development of players’ abilities, the control of opponents, and the successful resolution of a match. Players are placed in certain positions to fulfill specific tasks.

Generally speaking, the framework structure of any physical conditioning regimen should ensure that an appropriate and complementary combination of fitness components is provided to cope with the particular requirements of play. Indeed, the physical development framework in soccer refers to the various elements underpinning the conditioning programme: developing work capacity and endurance, speed, strength, power and recovery (Svensson & Drust, 2005). A challenge for conditioners is to provide a systematic approach to integrate, develop, and fine-tune this multitude of physical qualities.

In professional soccer internationally, the foundations for contemporary practice and competition are no longer based solely on simple personal views of how well players perform, or on traditional subjective analytical methods passed from one generation of coach to another. Over recent years, a more comprehensive approach to coaching through science is providing the applied practitioner and player with greater control, preparation, accountability and, most importantly, measurable progress (Meyers, 2006). Of course, the translation of knowledge and expertise gleaned from
data derived from match analysis into a form that is usable and applicable in training and competition is paramount if it is to have a meaningful impact on performance (Carling, 2012).

Based on various research results, physical and physiological characteristics of soccer players are required to such a high level of anaerobic power, aerobic capacity, speed, muscular strength, agility and flexibility (Chaleh Chaleh, 2007; Minasian, 1997; Arnason et al., 2004; Bangsbo et al., 1991). The assessment and determination of the anthropometric and physiological characteristics are essential to successful achievement of a soccer team not only during a game, but also along the whole sportive season, and such information can and must be used by the coach to change the player’s function or even the tactical formation of the whole team with the purpose to maximize the performance, once each positioning presents specific features (Shephard, 1999).

Soccer at the professional level of play is arguably the world’s leading team sport, performed by men and women, children and adults with different level of expertise (Shephard, 1999). Aspects such as experience, body composition, endurance, balance between anaerobic and aerobic power, among other factors, are of primary importance in development and evaluation of elite players (Ostojic, 2004).

Success in sports has been associated with specific anthropometric characteristics, body composition and somatotype (Carter & Heath, 1990; Duquet & Carter, 2001). During a soccer match (90 minutes), the player’s movements are
characterized by high intensity, short-term actions and pauses of varying length. To be successful in such a team sport, soccer players need an optimal combination of technical, tactical, physical characteristics (e.g. somatotype), and mental motivation (Bangsbo, 1994), among other sports characteristics. Hence, for soccer coaches, managers, sports physiotherapists, and scientists, an in-depth understanding of the determinants of success, such as the specific anthropometric characteristics of players may be important.

**Football in India**

India is a country where sports is a culture and is mostly followed by everyone. Cricket is a religion of its own and is followed by people all over the country; it can make or break relations. Apart from cricket there are other sports struggling to survive like Hockey, Tennis, Badminton, Basketball and one such survivor is Football.

Football in India has just recently gained a lot of interest and has become the new talked sport, it has gotten recognition. In India having a career in sports is nothing but difficult especially when playing a sport other than cricket. Given that India has a very weak infrastructure, enormous talent is oozing out of this country but there is no definite channel to put it through. In spite of this, there are football teams present within India and have constituted their own league. Some of the major teams to name are Air India, Churchill brothers, Dempo, East Bengal, Mohammedan, Mohan Bagan, Mumbai, Pailan Arrows, Pragya United, Salgaokar,
Shilling Lajong, Sporting club de goa etc. These clubs recruit the best players in India and are also paid for their contribution (smash report, 2012).

Football is one of India's most popular sports, next to cricket. Traditionally it has enjoyed popularity in the states West Bengal, Goa, Kerala and the entire North-East India, especially Manipur, Meghalaya, Mizoram and Sikkim. Having been Asian champions twice, the standard of Indian football has degraded due to a lack of investment and proper planning. While standards of other Asian nations in which football is the most popular sport improved, Indian football was largely neglected in preference to cricket. In September 2006, India and Brazil signed an agreement formalizing a scheme to train Indian footballers and coaches. Today India's top domestic league, the I-League, is one of the most popular sports league in the India, and is home to some of India's most famous football clubs (Wikipedia, 2013).

It is widely acknowledged that a scientific approach has to be applied for selecting potential athletes and training them for better performance. As a fundamental stage for adopting a scientific approach, systematic collection of empirical data and materials are essential. Until now, many sports scientists have conducted diverse kinds of research to elucidate various characteristics of elite athletes including morphology, fitness, psychology, and physical capacity. And the majority of these studies were on the scientific analyses of elite athlete's physical characteristics and fitness and/or competition and their records (Barnes, 1981;
Although one might expect team success to be strongly correlated to physical fitness, but there is limited evidence for such a relationship. An attempt has been made in the present investigation to explain the importance of physical fitness in performance of south zone inter University level football male players. Further, construction of norms in the form of percentile scores is also accomplished for future reference.

**STATEMENT OF THE PROBLEM**

The purpose of the study was to prepare a fitness profile of football players at the south zone inter University level and compare the results of physical fitness tests of other south Indian states with that of Karnataka state. An attempt has also been made to describe results of physical fitness tests in terms of percentile scores to construct norms for future interpretation.
DELIMITATIONS

1. The study was delimited to University players of South Indian states viz Karnataka, Kerala, Tamil Nadu and Andhra Pradesh in men section only.

2. Players representing technical Universities and University of health sciences was excluded from the study.

3. The study was further delimited to the football players selected to represent various universities during 2011-12.

4. Collection of data was delimited to cardio respiratory endurance, strength endurance, Speed, Agility, Flexibility, and Explosiveness.

5. In order to assess endurance capacity, Beep test was administered.

6. For assessing various other components, suitable standard tests were administered.

LIMITATIONS

1. Differences in genetic factors among the subjects were limitation to the study.

2. Any sort of training error which may affect the physical fitness performance during the course of study was considered as limitation to the study.

3. Life style and dietary habits of the subjects was beyond the control of the researcher.
4. Any sort of intervening injury to the subjects during the course of study could not be controlled by the researcher.

5. Socio-economic background of the players differed.

6. Regional influence in terms of weather conditions could not be controlled.

**HYPOTHESIS**

On the basis of the literature gone through, research findings and the scholar's understanding of the problem, following hypotheses were formulated:

1. There is significant difference in cardio respiratory endurance measured in terms of beep test between the Inter University players belonging to different south Indian states.

2. There is significant difference in strength endurance measured in chin ups between the Inter University players belonging to different south Indian states.

3. There is significant difference in speed measured in terms of 50 meters dash between the Inter University players belonging to different south Indian states.

4. There is significant difference in agility measured in terms of shuttle run between the Inter University players belonging to different south Indian states.

5. There is significant difference in flexibility measured in terms of sit and reach between the Inter University players belonging to different south Indian states.
6. There is significant difference in explosiveness measured in terms of standing broad jump between the Inter University players belonging to different south Indian states.

SIGNIFICANCE OF THE STUDY

- The results of the study will be helpful in knowing the importance of physical fitness in the performance of football players.
- The obtained data will be useful in improving the standard of football in South Indian states, especially Karnataka.
- Subsequently obtained data can be systematically made available in the form of norms for selection of football teams at various levels.
- The resultant information gathered will help football coaches to understand the importance of physical fitness during competition and its maintenance during off season.
- The results of the study will create awareness among players regarding deterioration of physical fitness level during off season.
- State wise comparison will be helpful for players as well as coaches in understanding the physical fitness status and develop strategies to improve it.
- The results of the study will provide new dimension to the process of talent identification in football at university level.
DEFINITION AND EXPLANATION OF IMPORTANT TERMS

Physical fitness

Physical fitness refers to the organic capacity of the individual to perform the normal task of daily living without undue tiredness or fatigue having reserves of strength and energy available to meet satisfactorily any emergency demands suddenly placed upon him- Nixon

Aerobic fitness

Aerobic fitness determines the level at which you can take in and use oxygen to perform an activity. An activity like walking doesn't put much stress on your body and most people can cope with this aerobic activity. Aerobic activities are activities like jogging, where you can continue without getting too tired. You work at a rate which means you don't get completely fatigued or out of breath. Aerobic training will increase the level at which this fatigue takes place, and will make your heart and lungs more efficient for exercise. You will be able to run further and faster before getting tired.

Anaerobic fitness

Anaerobic fitness determines the level at which you can work at a high intensity. This usually means short bursts of activity, where you will often be out of breath. You are working at a level where your body cannot provide enough oxygen and your muscles need to get energy from glycogen. You can only work for a short
time at this level before you get too fatigued and go into something called "oxygen debt". An example of anaerobic exercise is sprinting. Anaerobic training, will make your body more efficient at using glycogen as a stored fuel and also help it deal with oxygen debt. One effect of oxygen debt is the buildup of lactic acid, which is felt when your legs for example, feel a burning sensation at the end of an intense long sprint. This lactic acid needs to be removed from muscles as quickly as possible and anaerobic training helps make your muscles more efficient at coping with lactic acid and better at removing waste products from muscles.

**Cardiovascular endurance**

Cardiovascular efficiency is the ability of circulatory and respiratory systems to adjust and recover the effects of exercise or physical exertion.

**Speed**

Speed is the rate at which a person can propel his body or parts of his body through space (Johnson and Nelson)

Rapidity with which a movement or a successive movement of same kind may be performed is referred as speed (Clark & Clark).

Speed in changing the body position or changing the direction of movement is agility (Clark & Clark).

Speed is “the displacement per unit time and is typically quantified as the time taken to cover a fixed distance. Tests of speed are not usually conducted over
distances greater than 200m because longer distances reflect anaerobic or aerobic capacity more than absolute ability to propel the body at maximal speed” (Baechle & Earle, 2000).

**Agility**

It is the ability to perform a series of explosive power movements in rapid succession in opposing directions. Agility enables an individual to rapidly change the body position and direction in a precise manner (Johnson and Nelson).

Players must be able to move backwards, sideways and forwards while constantly changing direction. Agility refers to the ability to change body direction and position rapidly and can involve whole body change of direction in the horizontal plane, whole body change of direction in the vertical plane (jumping) and, rapid movement of body parts (Draper & Lancaster, 1985). Stationary and dynamic agility refer to the ability to rapidly change direction from a stationary or moving position respectively.

**Flexibility**

Flexibility is the ability to move a joint through a complete range of motion (ROM). Anatomical limitations such as bone constraints (which provide protection and stability to a joint), large muscles, obesity and other factors affect the ROM about a joint.
It is the ability to move the body and its parts through, as wide range of motion as possible, without undue strain to articulations and muscle attachments. The ability to achieve an extended range of motion without being impeded by excess tissue damage i.e. fat or muscle.

**Muscular Strength**

It is the extent to which muscles can exert force by contracting against resistance. In other words, Muscular strength is the ability of the muscles to exert force against the movable or immovable objects.

**Muscular Endurance**

It is the ability of the muscle to repeat identical movements or to apply pressure against resistance or to maintain certain degree of tension over a period of time.

**Vital Capacity**

The total volume of air that can be voluntarily moved in one breath, from full inspiration to maximum expiration, or vice versa, is termed as the vital capacity.

**Strength**

Strength is “the force or tension a muscle or, more correctly, a muscle group can exert against a resistance in one maximal effort” (Foss. & Keteyian, 1998). Strength can be measured by a number of different tests, such as the bench press and
the back squat. Baechle and Groves define strength as "the ability to exert maximum force during a single effort.

**Power**

Power is the product of strength and speed and is important for optimal performance in high intensity activities such as jumping, and accelerating from a stationary position (Bangsbo, 1994). Muscular power is commonly assessed by calculating the vertical displacement when jumping from a stationary position (Wisloff, Helgerud & Hoff, 1998).

Power is "a measurement of the ability to exert force at higher speeds. More precisely, power is the product of the force exerted on an object and the velocity of the object in the direction in which the force is exerted" (Baechle, 1994).